Draft Revised East Sussex Local Flood Risk Management Strategy

2016-2026

TECHNICAL APPENDICES

Contents

A1 Overview of East Sussex: physical, social and economic characteristics

A1.1. The East Sussex Local Flood Risk Management Strategy (LFRMS) covers the administrative area of East Sussex County Council (ESCC) that includes the districts of Lewes, Rother and Wealden and boroughs of Eastbourne and Hastings, as illustrated in Figure 1.

A1.2. The county of East Sussex covers an area of 1,725 square kilometres and is characterised by a densely populated urban coastal zone and a dispersed settlement pattern in rural areas.

A1.3. The county falls within the South East River Basin District and is served by one water and sewerage company - Southern Water – and one water supply only company – South East Water. It lies within two Environment Agency areas of responsibility, with the western 60% of the county covered by the Solent and South Downs area, and the eastern 40% of the county is covered by the Kent and South London area. East Sussex also falls within the Southern Regional Flood and Coastal Committee area.

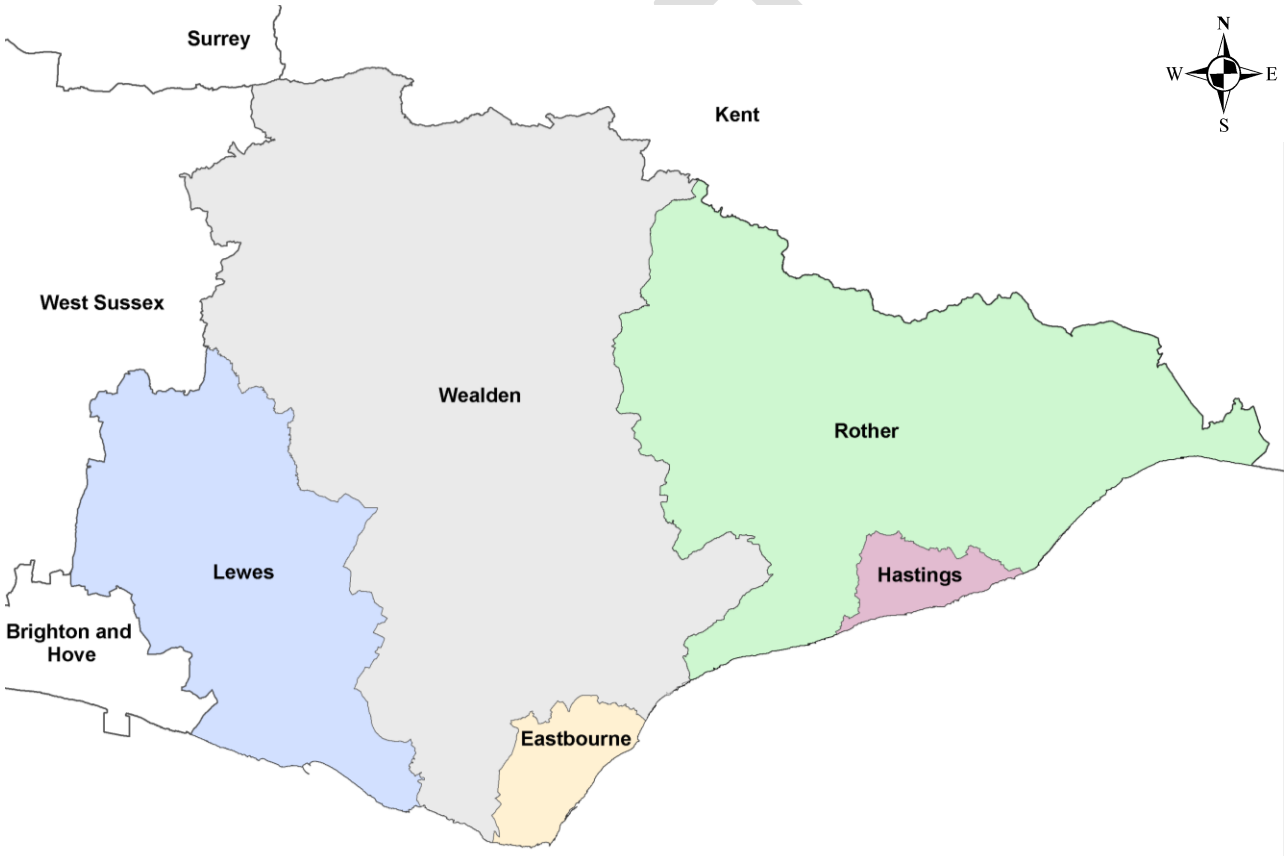

Figure 1. The administrative boundaries of East Sussex County Council (its districts and boroughs) and neighbouring lead local flood authorities (county and unitary authorities). *Not to Scale*

Socio-economic Characteristics

A1.4. In 2015 the population of East Sussex was estimated at over 539,000 (equating to 239,900 households), with three quarters living in market towns and urban areas on the coastal strip (East Sussex in Figures, 2015). Between the years of 2001 and 2011 the population of the county increased by nearly 7%,and is expected to increase by approximately a further 5% by 2021. Health deprivation is a significant problem in areas of Hastings where life expectancy for both men and women is below the national average and the lowest across the Strategy area. Employment and income deprivation is a significant problem in Hastings, but also exists in pockets across the rest of the county. Within these areas average unemployment rates are over twice the county average. Low skill levels and poor education attainment are also an issue in parts. Hastings still remains the most educationally deprived authority in the area despite recent improvements.

Natural Environment

A1.5. Much of East Sussex is recognised for its high quality landscape. The county is covered by five National Character Areas – the High Weald, Low Weald, South Downs, Pevensey Levels and Romney Marshes - each defined by a combination of landscape, biodiversity, geodiversity, cultural and economic activity. The High Weald Area of Outstanding Natural Beauty (AONB) covers around a third of East Sussex and the Low Weald is also understood to be a landscape of considerable historic complexity. The South Downs National Park, covering most of the area of the former Sussex Downs AONB, was confirmed in April 2010, and became fully operational in April 2011. The National Park covers 14.1% of the county, approximately 244km^2 in total, and encapsulates the first defined stretch of Heritage Coastline between Seaford and Eastbourne, including Beachy Head. The county also possesses considerable areas of coastal marshland including the Pevensey Levels and Romney Marshes.

A1.6. The county possesses an array of sites designated as being of international, national and local importance for biodiversity. There are six Special Areas of Conservation (SACs), two Special Protection Areas (SPAs) and two Ramsar sites (one proposed), which are strictly protected by the EU Habitats and Birds Directives. National designations include 64 Sites of Special Scientific Interest (SSSIs) that are important for wildlife or geological interest, four National Nature Reserves and 10% of East Sussex is covered by Ancient Woodland, the highest proportion of any county in England. There are also designations of local importance including 35 Local Nature Reserves, 280 Local Wildlife Sites (formerly Sites of Nature Conservation Importance) and more than 50 Local Geological designations (formerly Regionally Important Geological and Geomorphological Sites).

Geology

A1.7. The geological structure of East Sussex can be characterised as a broad dome, or anticline, which trends east-west and reaches its highest point in Ashdown Forest, in the northern part of the county. Subsequent cracking and erosion of the anticline has given expression to a varied and highly attractive landscape, the surface rocks of which date mainly from the Cretaceous or subsequent geological periods.

A1.8. The geology of East Sussex is easily explained by sub-dividing the county (Figure 2) into four distinctive landscapes:

A. The High Weald;

B. The Low Weald;

C. The Chalk Downs; and

D. The Coastal Marshes.

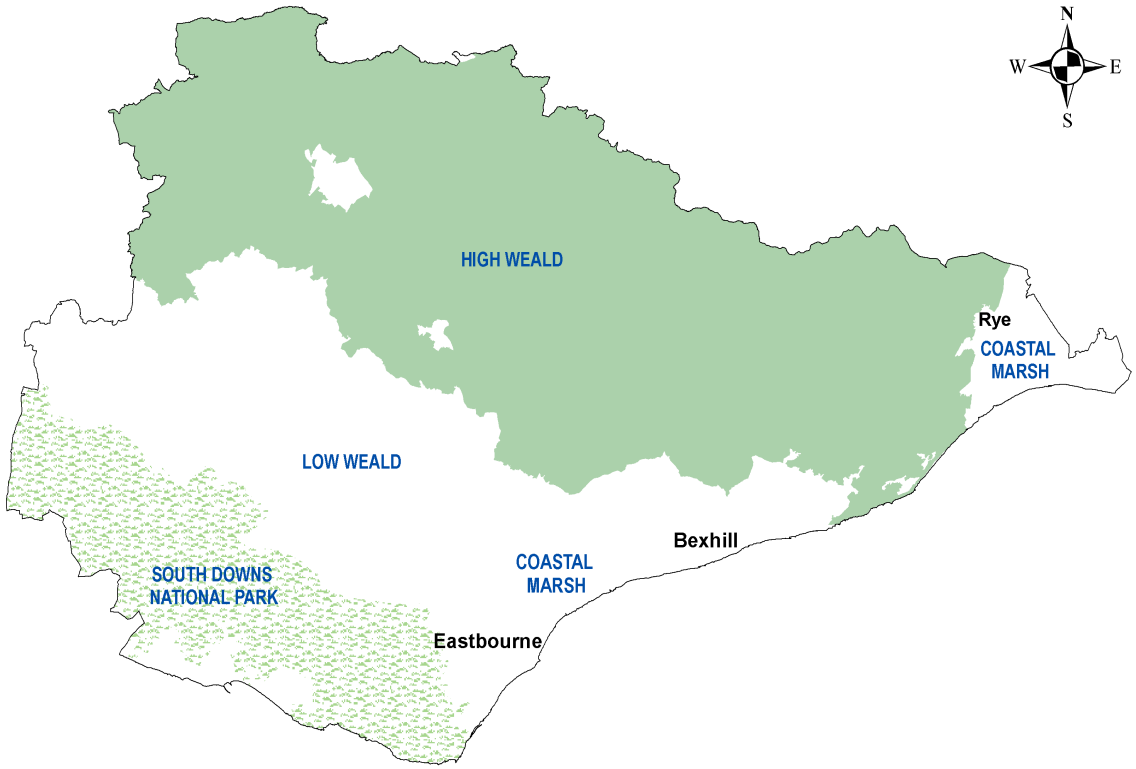

Figure 2. Diagram displaying the key geological sub-areas within East Sussex: the High Weald, Low Weald, Chalk Downs and Coastal Marshes. *Not to Scale*

A1.9. The High Weald covers much of the northern, central and eastern parts of the county. It is a faulted structure comprising of clays and sandstones (collectively known as the Hastings Beds). This varied and extensively eroded geology has produced an attractive and distinctive landscape, the majority of which lies within the High Weald AONB.

A1.10. The Low Weald is a generally flat clay vale that separates the High Weald from the Chalk Downs to the south. The surface geology is mainly Weald Clay, but narrow bands of Gault Clay and the Lower and Upper Greensands outcrop close to the ridge of the Downs.

A1.11. The Chalk Downs form a significant line of hills extending along the coast westwards from Eastbourne. They produce a unique, open, rolling landscape dissected by major river valleys cut by the Ouse and Cuckmere. Almost the entirety of the undeveloped downland is part of the South Downs National Park.

A1.12. The Coastal Marshes represent a fourth geological sub-area. These are located between Eastbourne and Bexhill, and in the Rye Bay/Camber area either side of the Rother estuary. Inundated by the sea in recent geological times, these areas comprise large flat sheets of alluvium, extending inland over the Pevensey Levels and Romney Marsh. This is protected by extensive storm beach gravel deposits along the coast.

Historic Environment

A1.13. The challenges presented by flooding, whether it is coastal or inland, have been a constant theme for the people living in East Sussex over the last ten thousand years. There are a number of remains from prehistory, Roman and early medieval activity that have been uncovered along the coast and in river valleys. Since the early medieval period there has been progressive inning (i.e. land reclamation) and management of valley floors and former marshlands, with the use of sea defences, banks, ditches and sluices to control water levels. The labour and resourcefulness in adapting to and managing the environment have left a rich archaeological heritage and history.

A1.14. East Sussex possesses highly valued built and cultural assets, including many listed buildings, scheduled monuments, registered parks, gardens and battlefields. County-wide mapping is available which shows archaeological potential and identifies areas where development may affect historical/archaeological remains.

Catchment Characteristics

A1.15. The administrative boundary of East Sussex falls within five river catchments (Figure 3) the:

- River Adur;
- River Ouse;
- Cuckmere and Sussex Havens;
- Rother and Romney; and
- River Medway.

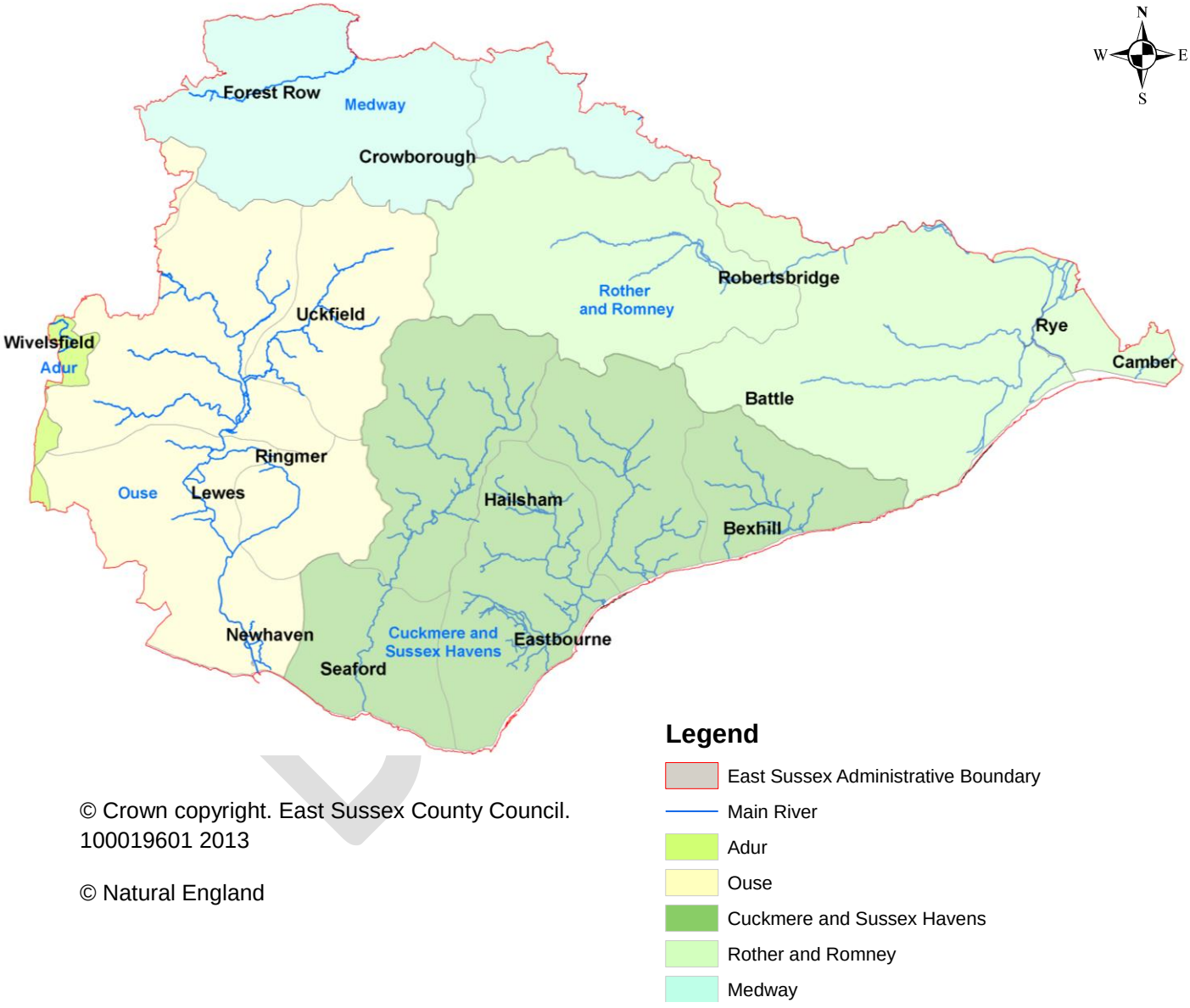

Figure 3. Diagram displaying the location of the River Adur; River Ouse; Cuckmere and Sussex Havens; Rother and Romney and River Medway catchments in relation to the East Sussex administrative boundary. *Not to Scale*

River Adur

A1.16. The River Adur catchment (600 km^2) is comprised of five topographically defined sub-catchments (Figure 4): the Lower Adur; Adur West Branch; Adur East Branch; Ferring Rife and Teville Stream. Less than 5% of the catchment falls within East Sussex.

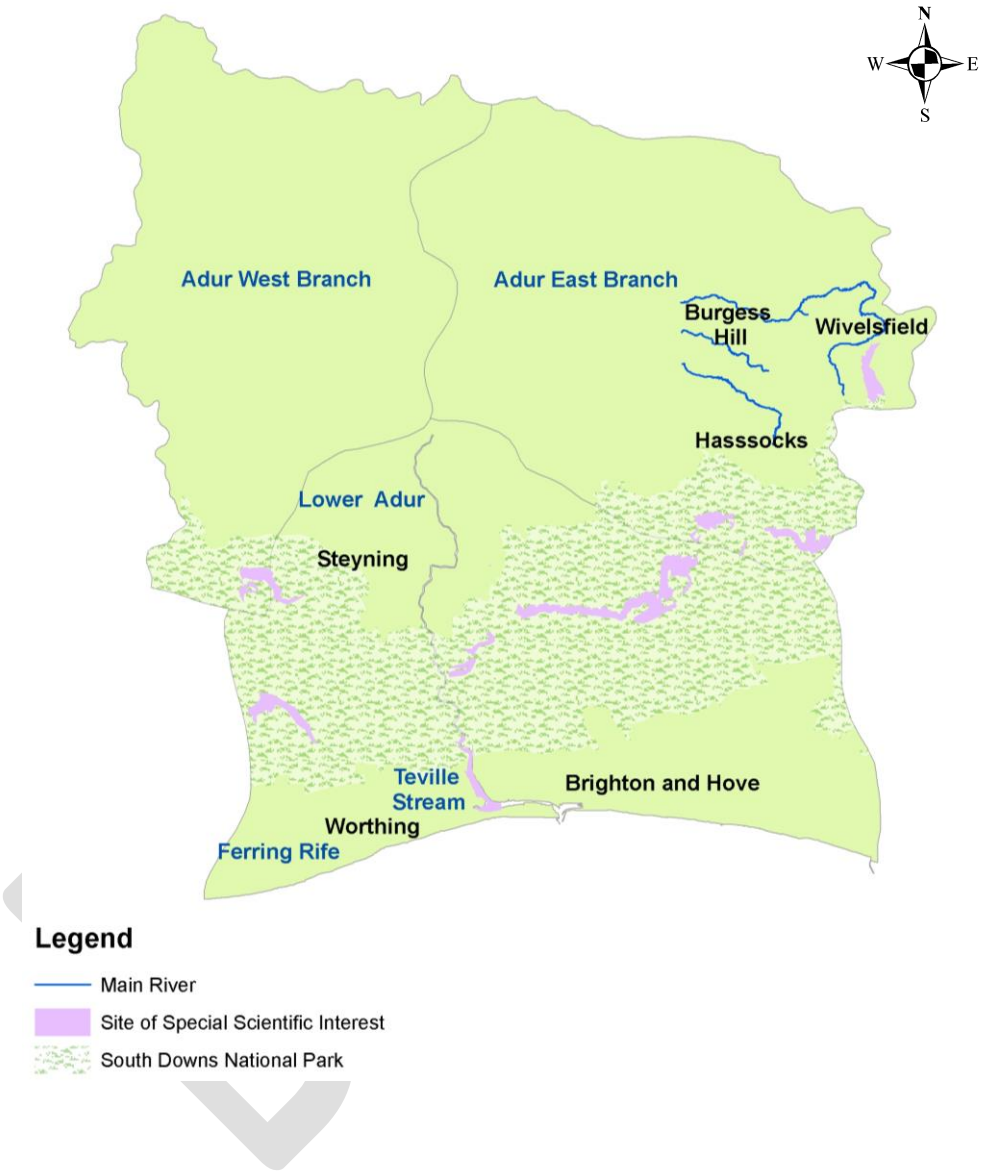

Figure 4. Diagram of the River Adur catchment, displaying sub-catchments, key settlements and environmental designations. *Not to Scale*

A1.17. Beyond the heavily developed coastal plain, which includes the population centres of Littlehampton, Worthing, Shoreham, and Brighton & Hove; the catchment is mostly characterised by rural and agricultural land use, with several small settlements, villages and towns scattered throughout.

A1.18. The topography of the catchment is dominated by the steep South Downs chalk ridge to the south, beyond which the land gently descends into the low-lying coastal plain. The northward face of the South Downs ridge is steeper and overlooks the Low Weald, a broad, low-lying vale with higher drier outcrops of limestone and sandstone. The northwest part of the catchment is characterised by the sandstone ridges and valleys of the High Weald.

A1.19. The majority of the main River Adur flows through the Low Weald where gradients are generally flat. However, some of the upstream tributaries of the Adur East Branch originate in the High Weald where the ground elevations are more than 200m above mean sea-level (compared to 100m above sea-level for the tributaries of the Adur West Branch).

A1.20. The chalk of the South Downs and the sandstone of the High Weald are areas of higher ground. In these permeable areas, the soils are generally well drained and the streams respond to seasonal groundwater variations and high levels of surface water runoff from the open landscape during intense rainfall events. The chalk formation is an important aquifer and forms a significant water resource, widely abstracted for public use.

A1.21. The Low Weald occupies the majority of the upper catchment, including Wivelsfield that falls within the administrative boundary of East Sussex County Council. A band of impermeable Weald Clay underlies this area causing poor drainage and prolonged waterlogging of overlying soils. This causes a rapid response to rainfall events i.e. a high percentage of surface water runoff.

A1.22. The area contains several sites of environmental and landscape importance, including the South Downs National Park, High Weald Area of Outstanding Natural Beauty (AONB) and eight Sites of Special Scientific Interest (SSSIs). This includes the Adur Estuary SSSI which is of particular significance due to its saltmarsh habitat.

A1.23. Within the East Sussex section of the River Adur catchment there are the following heritage designations - 60 Listed Buildings, 3 Conservation Areas and 1 Scheduled Monument. Of notable interest is the 16th century, grade 1 listed, Wings Place in Ditchling.

River Ouse

A1.24. The River Ouse catchment (605 km^2) is comprised of four sub-catchments (Figure 5): the upper, middle and lower Ouse and the River Uck.

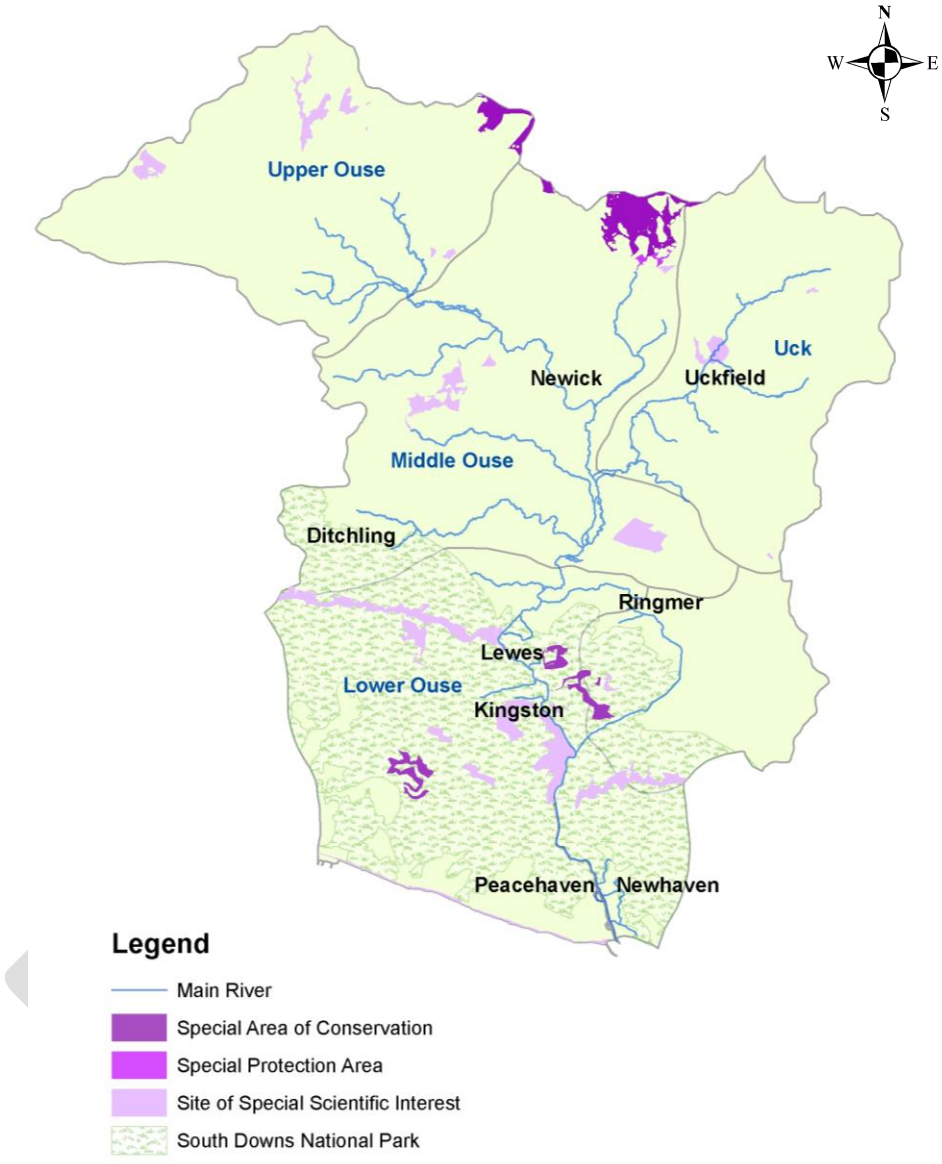

Figure 5. Diagram of the River Ouse catchment, displaying sub-catchments, key settlements and environmental designations. *Not to Scale*

A1.25. The physical characteristics of the River Uck catchment, in particular its steep slopes and channel gradient, leave downstream areas susceptible to flooding due to the rapid conveyance of runoff following heavy rainfall events.

A1.26. The River Ouse flows through gentle undulating countryside in its upper reaches and below the confluence with the Uck it flows out onto a broad flat floodplain where it meanders down to Lewes. At Lewes, the Ouse is bottlenecked through a narrow gap in the chalk of the South Downs, then widens out and flows across the low flat valley of the Lewes Brooks, reaching the coast at Newhaven. The river levels are tidally-influenced between Newhaven and Barcombe Mills.

A1.27. The Upper Ouse lies within the High Weald, which is comprised of silty sands and sandstones, with lesser amounts of mudstone. These semi-permeable layers are overlain by various silty, loamy and sometimes clayey topsoils, which vary from moderately well draining to poorly draining soils that can become waterlogged in wet weather. Clays result in high runoff rates which mean that the catchment responds quickly to rainfall events (described as 'flashy') and flooding can occur rapidly.

A1.28. The Middle Ouse is situated within the Low Weald; an area that is underlain by a band of impermeable Weald Clay where drainage is poor and overlying soils are subject to prolonged waterlogging. Greensand and Gault clay underlie the southern part of the Low Weald and as such the topsoil here is better drained.

A1.29. The Chalk layers of the South Downs are overlain by generally shallow and well-drained topsoil that allows rainfall to quickly seep into the underlying chalk aquifers. Rain soaks into the chalk bedrock and may emerge at the base of the ridge slope as springs, producing the characteristic spring line across the South Downs ridge.

A1.30. A large area of the upper catchment is part of the High Weald Area of Outstanding Natural Beauty, and much of the lower catchment lies within the South Downs National Park. The area possesses an array of sites designated as being of international, national and local importance for biodiversity. These include one Special Protected Area (SPA), three Special Areas of Conservation (SAC), two National Nature Reserves and 24 Sites of Special Scientific Interest. Many of these sites support important wetland habitats and species sensitive to changes in water level, flow and quality.

A1.31. Within the River Ouse catchment there are the following heritage designations – 1,683 Listed Buildings, 124 Scheduled Monuments and 61 Conservation Areas. Key heritage designations include Sheffield Park House, Lewes Castle, Glynde Place and Caburn Iron Age Hillfort.

Cuckmere and Sussex Havens

A1.32. The Cuckmere and Sussex Havens catchment (506km^2) is comprised of five smaller river catchments (Figure 6): the Cuckmere River; and watercourses on the Willingdon Levels; the Pevensey Levels; Wallers Haven and Combe Haven.

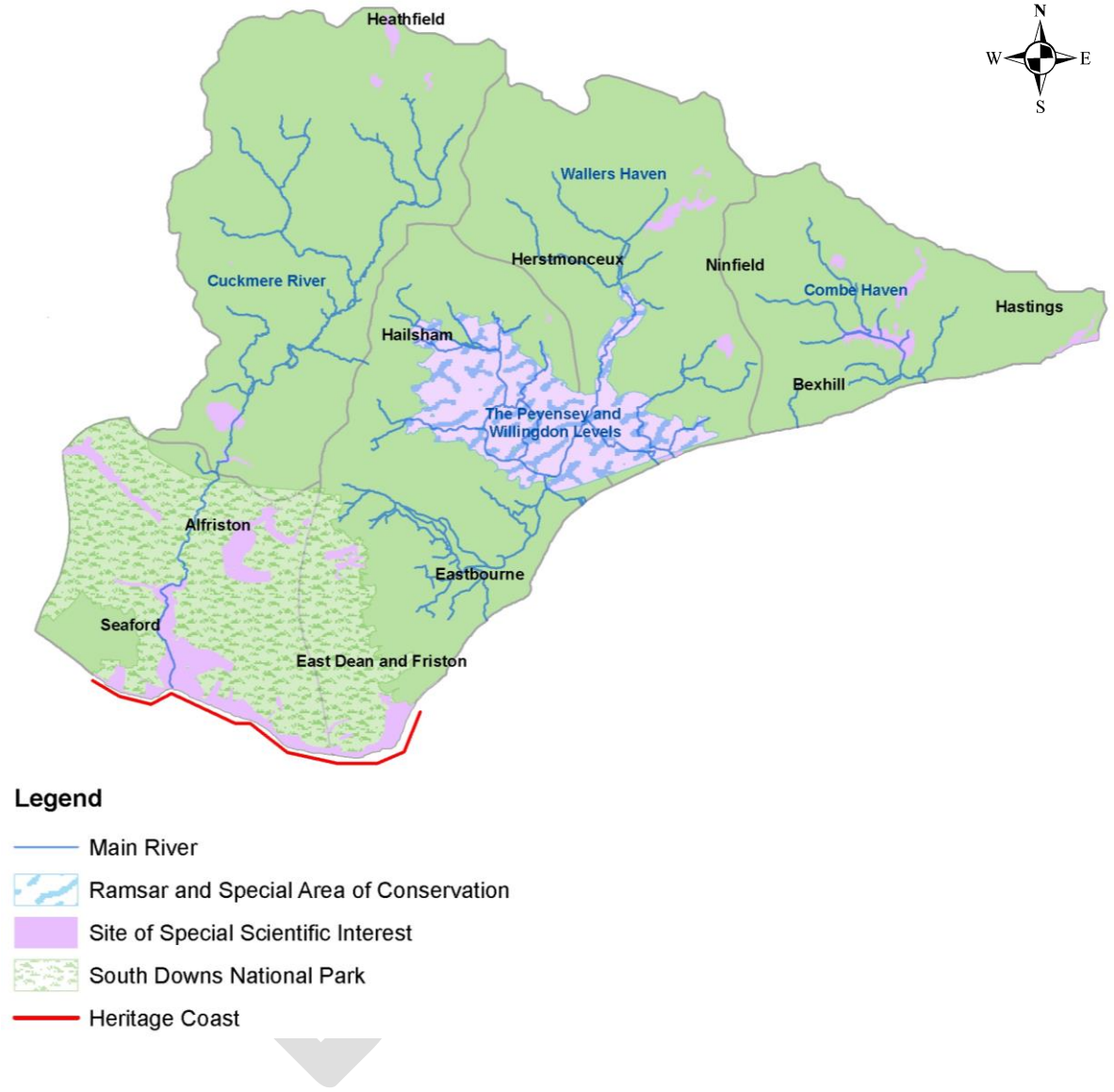

Figure 6. Diagram of the Cuckmere and Sussex Havens catchment, displaying sub-catchments, key settlements and environmental designations. *Not to Scale*

A1.33. Topography has a major influence upon river flows within this catchment. Fast-flowing streams emerge from the Upper Weald area in the north and then flow more slowly down into the shallower low-lying coastal plain. Landscape varies from the distinctive hills and steep scarp slopes of the South Downs, to the gently rolling hills of the Low Weald and the extensive low-lying area of the Pevensey and Willingdon Levels.

A1.34. Within the geology of this catchment, the High Weald consists of various sandstones and mudstones, of which the Ashdown Sands and Tunbridge Wells Sands are 'minor' aquifers from which water is abstracted for public water supply. Soils in the High Weald tend to be free draining over the Ashdown Sands however they are also interspersed with relatively impermeable, clay-rich soils which remain seasonally waterlogged in places. Springs are common where permeable and impermeable rocks meet.

A1.35. The Low Weald is formed of softer silty sandstones and mudstones that continue beneath much of the Pevensey Levels and across the middle reaches of the Cuckmere River. Springs are common at the junction between permeable sandstones and the impermeable mudstones, resulting in a large number of small streams with a naturally flashy response to rainfall events and strong seasonal variations in river flows. Despite the density of woodland in the High Weald, surface water runoff is higher than for the Low Weald because of the steeper topography and comparatively less permeable soils.

A1.36. The lower reaches of the Cuckmere River enter the highly permeable chalk of the South Downs; a major aquifer and important water resource for surrounding towns and villages. There are no main rivers or streams issuing from the chalk, although many springs rise at the foot of the scarp boundary between the Upper Greensand and the Gault Clay. The permeable chalk geology in parts of the lower catchment results in more complex groundwater flooding and surface water drainage problems.

A1.37. The upper catchments of the Cuckmere and Sussex Havens lie within the High Weald Area of Outstanding Natural Beauty and the lower reaches within the South Downs National Park. The Pevensey Levels are designated as an internationally important site for migratory wading birds under the Ramsar Convention. The Lower Cuckmere is designated as a Site of Special Scientific Interest (SSSI) – the Seaford to Beachy Head SSSI - due to its landforms of geographical and geomorphological interest, and diverse range of habitats which support nationally rare, scarce and significant plants, invertebrates and birds.

A1.38. Within the catchment there are 1,946 Listed Buildings, 130 Scheduled Monuments and 62 Conservation Areas. Key heritage designations include Pevensey Castle, Battle Abbey and Arlington Medieval Village.

Rother and Romney

A1.39. The Rother and Romney catchment (970 km^2) falls within the administrative areas of both ESCC (approximately 40%) and Kent County Council, *see* Figure 7.

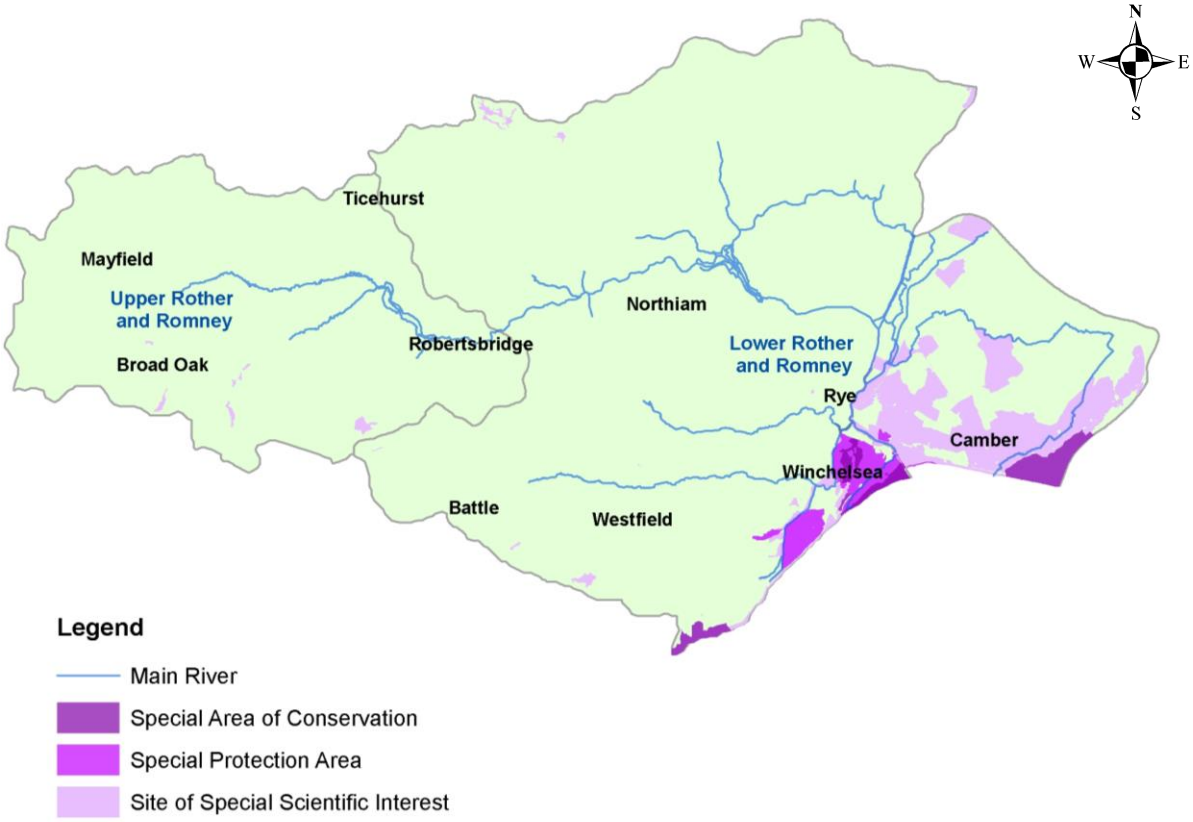

Figure 7. Diagram of the Rother and Romney catchment, displaying sub-catchments, key settlements and environmental designations. *Not to Scale*

A1.40. The primary river system within East Sussex for this plan area is the River Rother, which rises in Mayfield and flows eastward through the towns of Robertsbridge and Etchingham. The Rivers Tillingham and Brede join the Rother estuary at Rye. The Walland and Romney Marshes, which lie to the east of the catchment, consist of wetlands of international conservation significance and grade 1 and 2 agricultural land.

A1.41. The High Weald in this catchment is comprised of a geology of alternating sands, silt and clay ridges dissected by incised river valleys. These layers are commonly known as the 'Hastings Beds'. The constituent units of the Hastings Beds Group include

the Ashdown Beds, Wadhurst Clay and Tunbridge Wells Sands. The layering of the Hastings Beds in the upper catchment results in the incorporation of impermeable clay and silt layers within the largely 'sandy' soil, which following a rainfall event can result in fast runoff and rapid onset flooding.

A1.42. The soils of the upper catchment are Stagnogley Soils that occur widely in lowland Britain on tills and soft argillaceous rocks. These tend to be deeper silty or clayey loams, which can restrict drainage and increase runoff, interspersed with areas of loamy soils that provide better drainage.

A1.43. The lower Rother valley is covered by alluvial soils that are developed in loamy or clay alluvium and which have a mixture of good to poor drainage. The land here is very flat so although water can drain into the soil, it often sits on the surface or forms puddles as it slowly infiltrates. In the 1960s the Kent River Authority instigated the Rother Area Drainage Improvement Scheme, which led to the Rother being embanked in its lower reaches and pumping stations built to improve land drainage.

A1.44. The area of the River Rother catchment immediately adjacent to and surrounding Rye Harbour comprises of predominantly sand dune soils that are freely draining.

A1.45. Important designations and protected areas within this catchment include the High Weald Area of Outstanding Natural Beauty, one Special Protection Area, three Special Areas of Conservation, 22 Sites of Special Scientific Interest and the proposed Dungeness to Pett Level Ramsar site.

A1.46. Within the catchment there are 2,054 Listed Buildings, 41 Scheduled Monuments and 12 Conservation Areas. Notable designations include the grade I listed Bodiam Castle, Beauport Park Roman Bath House and the Military Canal at Rye.

River Medway

A1.47. The River Medway catchment (1,388 km^2) contains the heavily managed River Medway and its four main tributaries (Figure 8): the Eden, Bourne, Teise and Beult. Only a small section, 25% of the catchment, falls within the East Sussex administrative boundary.

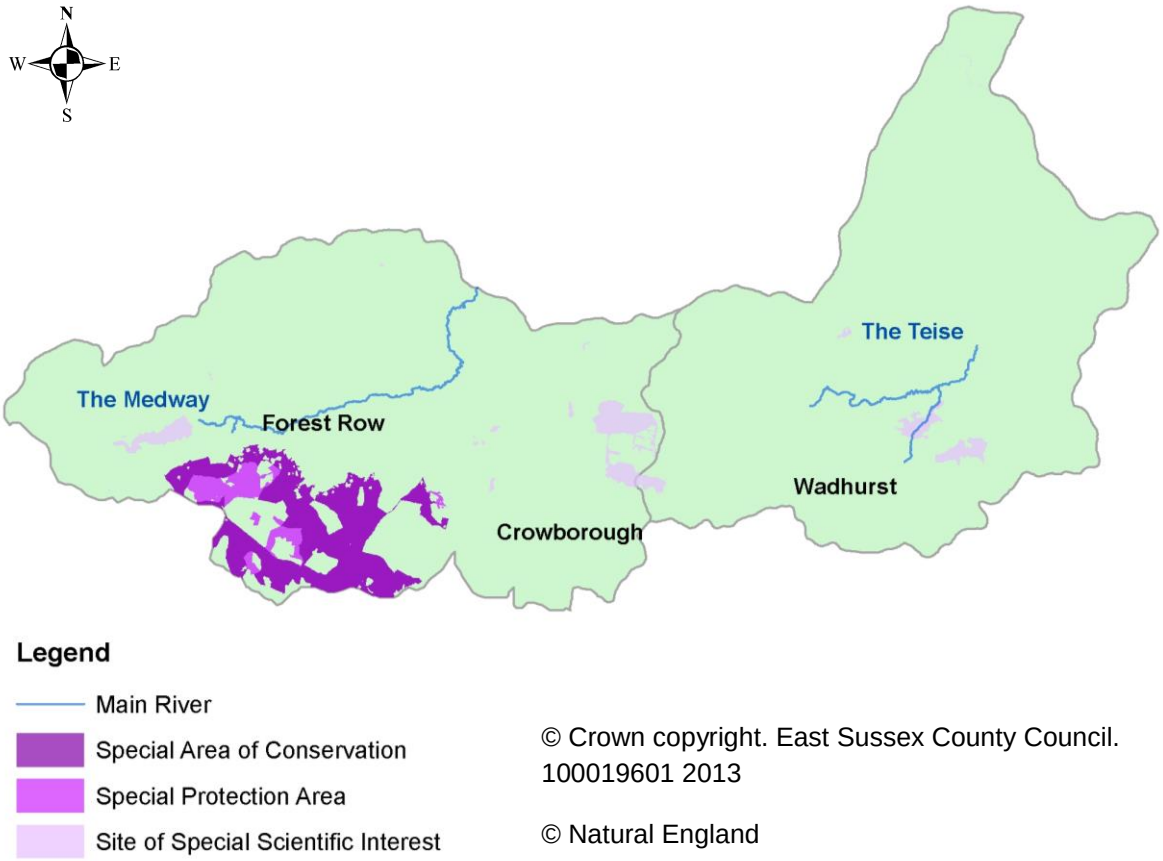

Figure 8. Diagram of the River Medway catchment, displaying sub-catchments, key settlements and environmental designations. *Not to Scale*

A1.48. The River Medway rises as a spring near East Grinstead (West Sussex) and flows east where it is joined by the Eden. The river continues to flow eastwards through the Leigh Barrier and into Tonbridge in Kent. The River Medway flows across the northern most part of East Sussex, through Forest Row and then eastwards towards Groombridge, where it veers northwards along the East Sussex County boundary for a short distance before entering Kent, *see* Figures 3 and 8.

A1.49. The geology of this area is comprised of the deeply incised tributaries of the High Weald which have cut through the siltstones, sandstones and clays of the Hastings Beds. Surrounding the Hastings Beds is the Low Weald, which is characterised by heavy clay, with very little sandstone compared with the High Weald. The more permeable geological components are locally important aquifers which provide baseflow for the headwaters of the Medway and Teise Rivers.

A1.50. The High Weald (upper Medway and Teise) is predominantly covered by loamy and clayey soils with slightly impeded drainage. The soil texture is very granular and compact, therefore producing a lower permeability that restricts the downward movement of water. Soils of this type can become waterlogged quickly after heavy rainfall, which then increases the rate of surface water runoff leading to higher fluvial flows.

A1.51. There are also patches of sandy and loamy soils in the mixed dry and wet heath communities to the south-west of the catchment, around Ashdown Forest and Royal Tunbridge Wells. This soil texture is lighter than the rest of the High Weald but surface runoff rates can still be high due to a surface layer of peat that holds water.

A1.52. Important designations and protected areas within this catchment include the High Weald Area of Outstanding Natural Beauty, Ashdown Forest Site of Special Scientific Interest, Ashdown Forest Special Area of Conservation and Special Protection Area.

A1.53. Within the River Medway catchment in East Sussex there are 580 Listed Buildings, 26 Scheduled Monuments and 9 Conservation Areas. Notable designations include High Rocks Hillfort and Bayham Abbey.

Shoreline Characteristics

A1.54. The iconic coastline of East Sussex stretches from Saltdean in the west of the county to Camber Sands in the east, *see* Figure 3. The shoreline is a varied mosaic, characterised by high chalk cliffs; lowland reclaimed marshland and shingle beaches. There is also extensive agricultural land; large urban areas that fringe the coast including Eastbourne, Bexhill and Hastings; as well as many areas designated and protected for their heritage, landscape, geological and biological value.

A1.55. The coastline is constantly in a state of flux, further exacerbated by social, economic and environmental pressures.

A1.56. The shoreline of East Sussex is characterised by a legacy of human intervention, with attempts to 'hold the line' through coastal defence for over 200 years, in order to slow the effects of coastal erosion and to prevent inundation. Defence is required due to the substantial levels of financial and cultural investment along the coast. Considerable lengths of the county's coast have been developed with 90 to 95% of its frontage defended against erosion and/or flood risk. This is understandable when the majority of the county's population is concentrated within the coastal zone. Within the developed coast are pockets of deprivation, including Hastings, the 13th most deprived neighbourhood in the country, as identified by the Index of Multiple Deprivation 2015.

A1.57. The 'Hard engineering' of the coastal frontage through the development of coastal defences and management practices have minimised the delivery of sediment alongshore, to nourish beaches locally within the county. The construction of defences inhibits sediment movement and prevents cliff erosion. Limited sediment supply and the 'unnatural' hard engineered line of the current shoreline has resulted in the need to artificially manage the foreshore, including the need for replenishment schemes, as well as the use of groynes and breakwaters.

A1.58. Rising maintenance costs coupled with environmental pressures, such as the impacts of climate change including increased storminess and rising sea-levels, have highlighted the need to search for alternative, sustainable methods of defence. Detailed future policy for the frontages of East Sussex are outlined within two Shoreline Management Plans; South Foreland to Beachy Head and Beachy Head to Selsey Bill. Changes in policy options as a result of recent and more detailed strategy assessments can be found online at se-coastalgroup.org.uk.

A1.59. The coastline of East Sussex is recognised for its landscape and environmental importance. The shoreline contains a significant share of the region's designated wildlife sites, such as the Ramsar and SAC protected Pevensey Levels, as well as the heritage coastline of the Severn Sisters and Beachy Head, which warrant protection. Detail of these designations, including the South Downs National Park, can be seen in Figures 2 through to 8.

A1.60. The coastline is also subject to increased social pressures, due to housing demands and tourism. The high amenity value of the East Sussex frontages warrants its long-term protection.

A2 Policy and Legal Framework

A2.1. A number of key policy and legislative drivers underpin East Sussex County Council's new role as a lead local flood authority (LLFA).

A2.2. Table 1 outlines regulations, policy and legislation which are directly relevant to the risk management authorities or which they should be mindful of when carrying out their flood risk management duties and functions. To view the following statutory documents in full, please visit legislation.gov.uk and search for the desired act, regulations or directive.

Table 1. An outline of key legislative and policy drivers which are directly relevant to the risk management authorities in East Sussex or which they should be mindful of when carrying out their risk management duties and functions.

Policy, Regulation, Legislation	Purpose
Flood Risk Management	
The Pitt Review (2007)	Following the widespread flooding of summer 2007 an independent review was undertaken by Sir Michael Pitt on behalf of the Government. The final report entitled *"Learning Lessons from the 2007 Floods"* called for urgent and fundamental changes to the way the country was adapting to the likelihood of more frequent and intense periods of rainfall. Focus centred on surface water flooding - the main cause of damage during the 2007 floods. The report outlined 92 recommendations, of which 21 were specifically related to local authorities and their responsibilities. Of particular interest was the recommendation that local authorities should play a major role in the management of local flood risk, taking the lead in tackling local flooding and co-ordinating all relevant agencies.
The Flood and Water Management Act (2010)	The Flood and Water Management Act aimed to improve the management of water resources and create a more comprehensive and risk based regime for managing the risk of flooding from all sources. The Act gave the Environment Agency a strategic overview role in regard to flood and coastal erosion risk management and maintained its responsibility for fluvial, coastal and reservoir flood risk. County council or unitary local authorities were identified as lead local flood authorities, responsible for managing local flood risk i.e. flooding from surface water, groundwater and ordinary watercourses. The Act also provided duties and powers to aid partnership working, improve information sharing between risk management authorities and help achieve sustainable outcomes from flood risk activities. Other changes included: Regional Flood Defence Committees becoming Regional Flood and Coastal Committees, powers were introduced to designate structures and features that affect flooding, and measures were introduced for the approval and adoption of sustainable drainage systems. The key roles and responsibilities of risk management authorities under the Act are outlined in full in Section A4.

Policy, Regulation, Legislation	Purpose
The National Flood and Coastal Erosion Risk Management Strategy for England (2011)	The National Flood and Coastal Erosion Risk Management (NFCERM) Strategy (available online at environment-agency.gov.uk) provides an overarching framework for future action by all risk management authorities (as defined by the Flood and Water Management Act) to tackle flood and coastal erosion risk in England. This strategy aims to make sure that Defra, the Environment Agency, local authorities, water companies, internal drainage boards and other flood and coastal erosion risk management partners work together to: ○ maintain and over time improve standards of protection against flood and coastal erosion risks where it is affordable to do so; ○ increase the overall level of investment in flood and coastal erosion risk management to supplement central government expenditure; ○ help householders, businesses and communities better understand and manage any flood and coastal erosion risks that they face; ○ ensure fast and effective responses to, and recovery from, flood events when they do occur; ○ give priority to investment in actions that benefit those communities which face greatest risk and are least able to afford to help themselves; ○ encourage and support local innovation and decision making within the framework of river catchments and coastal cells; and ○ achieve environmental gains alongside economic and social gains, consistent with the principles of sustainable development.
The Flood Risk Regulations (2009)	The Flood Risk Regulations transposed the EC Floods Directive (2007/60/EC) on the assessment and management of flood risk into domestic law and implemented its provisions. The regulations outline the roles and responsibilities of the various authorities consistent with the Flood and Water Management Act and provide for the delivery of the outputs required by the directive. The regulations require that the Environment Agency prepare preliminary flood risk assessments, as well as flood risk maps, hazard maps and flood risk management plans where required in relation to flood risk from the sea, main rivers and reservoirs. Lead local flood authorities (LLFAs) are to perform the same responsibilities for all forms of local flooding (excluding sewer flooding) including that caused by surface water runoff, groundwater and ordinary watercourses. The

Policy, Regulation, Legislation	Purpose
	Environment Agency is required to collate and co-ordinate such LLFA plans and mapping and publish the findings. Review of such plans and maps occurs on a six-yearly basis.
Department for Environment, Food and Rural Affairs (Defra) (2011) 'Future Water- The Government's water strategy for England'	*'Future Water'* sets out the Government plan for future water provision and management in England. The strategy calls for the better management of surface water drainage by 2030, with Surface Water Management Plans (SWMPs) seen to be a key in achieving this. SWMPs are recommended to be undertaken in areas where there is a significant risk from surface water flooding, and should aim to co-ordinate drainage stakeholders, and clarify their responsibilities in the management of surface water. The plan aims to ensure that SWMPs provide a stronger influence in the coordination of future development and planning.
Land Drainage Act (1991)	The Land Drainage Act outlines the duties and powers to manage land drainage for a number of bodies including the Environment Agency, internal drainage boards, local authorities, navigation authorities and riparian owners. In addition to permissive powers for land drainage, there are also further duties with respect to recreation and the environment. Schedule 2 of the Flood and Water Management Act amended the Land Drainage Act. This gave ESCC a new responsibility for consenting works upon ordinary watercourses (a responsibility transferred from the Environment Agency). Internal drainage boards have retained the responsibility for consenting works within their districts.
Planning	
National Planning Policy Framework (2012) and supporting technical guidance	The National Planning Policy Framework sets out Government policy on development and flood risk. It states that planning authorities should adopt proactive strategies to mitigate and adapt to climate change, taking full account of flood risk, coastal change and water supply and demand considerations. It outlines that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing the risk of flooding elsewhere.

Policy, Regulation, Legislation	Purpose
	Strategic flood risk assessments (SFRAs) are prepared by planning authorities and should cover all forms of flood risk. A SFRA is used in the planning process to identify suitable sites for development.
House of Commons: Written Statement (HCWS161) made by The Secretary of State for Communities and Local Government (Mr Eric Pickles) on 18 December 2014.	In conjunction with the National Planning Policy Framework, this statement outlined the procedure for ensuring the installation of Sustainable Drainage Systems (SuDS) in major development (planning applications of 10 or more dwellings or land of over **1 hectare**) to manage surface water runoff. From April 2015 onwards, local planning authorities are responsible for ensuring that SuDS are installed in major developments and maintenance is arranged for the lifetime of the development. The Lead Local Flood Authority acts as a statutory consultee on planning applications for surface water management.
The Town and County Planning (Development Management Procedure) (England) Order 2015 No.595	Schedule 4 of The Town and County Planning (Development Management Procedure) (England) 2015, defines the Lead Local Flood Authority as a statutory consultee to the planning system for all major development with surface water drainage, coming into effect from 15th April 2015.
Planning Practice Guidance: Flood Risk and Coastal Change (2014)	The Planning Practice Guidance for Flood Risk and Coastal Change outlined the way in which risks of flooding and coastal erosion can be accounted for in planning future developments. The guidance covers where considerations or formal assessments of flood risk and coastal erosion are required for development.
Department for Environment, Food and Rural Affairs (March 2015) Sustainable	This document provides the technical standards for sustainable drainage systems (SuDS), including the design, operation, and maintenance of the systems. Drainage strategies for new developments should be produced in-line with these standards, and Lead Local Flood Authorities (LLFAs) should review applications according to these principles. However, the standards are non-statutory, and therefore LLFAs may tailor drainage strategy requirements to meet the requirements

Policy, Regulation, Legislation	Purpose
Drainage Systems: Non-statutory technical standards for sustainable drainage systems	of their own regions. The technical standards should be used in conjunction with the National Planning Policy Framework and Planning Practice Guidance 2012.
Environmental, Sustainability and Nature Conservation	
The Water Framework Directive (2000) Water Framework Directive Regulations England and Wales (2003)	The Water Framework Directive (WFD) transposed to the WFD Regulations for England and Wales, established a legal framework to manage, protect and improve the water environment across Europe and ensures its long-term sustainable use. The directive established an integrated river basin approach to the management and protection of aquatic ecosystems. The directive addresses inland surface waters, transitional waters, coastal waters and groundwater – the central requirement of the Treaty being that the environment is protected to a high level in its entirety. Fundamental to the WFD is that member states must aim to achieve at least 'good ecological status' for all inland, transitional and coastal water bodies and 'good ecological potential' for all artificial or heavily modified water bodies by 2015 (this may be delayed until 2021 or 2027 if there are technical difficulties). Further deterioration of water status is prohibited. Compliance is also required with other directives, with good status required for all Natura 2000 sites by 2015 (Habitat Regulations 2010, *see below*). The Environment Agency has produced river basin management plans for all 11 river basin districts across England and Wales including the South East with the aim to develop new and better ways of protecting and improving the aquatic environment. The other risk management authorities (including ESCC) are required to take measures to manage flood risk in such a way as to not cause further water body deterioration. They will also be required to consider and pursue opportunities to improve water bodies in conjunction with flood risk management activities.
The Conservation of Habitats and Species Regulations	The Habitats Directive (92/43/EEC) and Birds Directive (2009/147/EC) were transposed into UK law by the Conservation of Habitats and Species Regulations. The objective of the Regulations is to protect and enhance biodiversity through the conservation of natural habitats and species of wild fauna and flora, maintaining a coherent network of

Policy, Regulation, Legislation	Purpose
(2010)	protected areas known as Natura 2000 sites. The Regulations apply to European sites i.e. Special Protection Areas (SPA) and Special Areas of Conservation (SAC). This same level of protection is applied and extended to International Ramsar sites, thus Ramsar sites are treated as if they are designated European sites. Within East Sussex, the following European and International sites have been identified: o Lewes Downs SAC; o Castle Hill SAC; o Ashdown Forest SAC and SPA; o Pevensey Levels SAC and Ramsar; o Hastings Cliffs SAC; o Dungeness SAC and o Dungeness, Romney Marsh and Rye Bay SPA/Ramsar (extension of SPA and designation of Ramsar site). It is the responsibility of the risk management authorities to ensure that the requirements of the Habitat Regulations are met before undertaking or permitting any project. A habitat regulations assessment screening opinion should be sought from Natural England to determine whether a plan or project is likely to have a significant effect on any European (SAC or SPA) or International (Ramsar) site designated for environmental conservation purposes, and hence whether or not an appropriate assessment is required.

Policy, Regulation, Legislation	Purpose
The Natural Environment and Rural Communities Act (2006)	Local Authorities play a vital role in conserving biodiversity and Section 40 of The Natural Environment and Rural Communities Act (NERC) sets out the duty that "*every public authority must, in exercising its functions, have regard, so far is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity"*. The Local Flood Risk Management Strategy is informed by the County Council's Environment (2011) and Sustainable Community (2008) strategies, which are geared toward protecting and enhancing East Sussex's natural and built environment in light of climate change. These commitments are complementary to other national and local conservation and sustainability initiatives, including the Biodiversity Strategy 2020; the South East Biodiversity Strategy (2009) and local biodiversity action plans.
The Wildlife and Countryside Act (1981) *Amended by:* The Countryside and Rights of Way Act (2000)	The Countryside and Rights of Way Act (CroW) is the principal mechanism for environmental protection in England and Wales. The Act provides for public access on foot to certain types of land; increases measures for the management and protection of Sites of Special Scientific Interest (SSSI); strengthens wildlife enforcement legislation and provides for better management of Areas of Outstanding Natural Beauty (AONB). The risk management authorities are required to adhere to the provisions in the Act, with a focus on protecting and providing measures to enhance the natural environment and nature conservation interests.
The Salmon and Freshwater Fisheries Act (1975) The Eels (England and Wales) Regulations (2009)	Any works affecting watercourses should not limit or affect the passage of eels, salmon and freshwater fish. This is important to consider when granting flood defence consent applications.
Strategic Environmental Assessment Directive (2001)	The Strategic Environmental Assessment (SEA) Directive (2001/42/EC) aims to ensure environmental issues are considered during the development of plans, programmes or strategies. In England, the Directive is implemented through the Environmental Assessment of Plans and Programmes Regulations. A SEA identifies the significant environmental

The Environmental Assessment of Plans and Programmes Regulations (2004)	effects that are likely to result due to the implementation of a plan, programme or strategy and is mandatory for plans or programmes which: o are prepared for agriculture, forestry, fisheries, energy, industry, transport, waste/ water management, telecommunications, tourism, town and country planning or land use and which set the framework for future development consent of projects listed in the Environmental Impact Assessment Directive; o or have been determined to require an assessment under the Habitats Directive.
Climate Change Act (2008)	The Climate Change Act requires a UK-wide climate change risk assessment every five years, accompanied by a national adaptation programme that is also reviewed every five years. The Act has given the Government powers to require public bodies and statutory organisations such as water companies to report on how they are adapting to climate change. For ESCC the key accountability relates to adapting to climate change, ensuring that the Local Flood Risk Management Strategy takes into account climate change and issues such as changes in rainfall and how that could affect local flooding.
Other	
Civil Contingencies Act (2004)	The Civil Contingencies Act aims to deliver a single framework for civil protection in the UK and sets out the actions that need to be taken in the event of a flood. Emergency services, NHS and primary care trusts, the Environment Agency and local authorities have a responsibility as category one general responders under the Act and as such must adhere to its provisions and take action in response to a flood event.
Highways Act (1980)	The Highways Act provides for the creation, improvement and maintenance of roads and for the acquisition of land. The Act consolidates Highway Acts 1959 to 1971 and related enactments. The Act establishes the County Council as the highway authority for East Sussex; responsible for the maintenance of the local or 'public' road network. This includes ensuring that highway drainage systems are clear and that blockages on the highway are removed. A highway authority also has the power to deliver works considered necessary to protect the highway from flooding. These can be on the highway or on land that has been acquired by the highway authority for that purpose. The authority may divert parts of a watercourse or carry out any other works on any form of watercourse if it is necessary for the construction, improvement or alteration of the highway or provides a new means of access to any

	premises from a highway. The Highways Agency is responsible for the strategic road network of trunk roads and motorways.
Coast Protection Act (1949)	The Coast Protection Act amended the law relating to the protection of the coast of Great Britain against erosion and encroachment by the sea. Part 1 of the Act establishes and identifies coast protection authorities (CPAs); their roles and responsibilities. A coast protection authority is the Council for each maritime district and thus all district and borough councils in East Sussex are such an authority (Eastbourne and Hastings boroughs; Lewes, Rother and Wealden districts). CPAs have powers to carry out such coastal protection work (whether it be new schemes, maintenance or repair works) seen as necessary for the protection of land within their area. Land can also be acquired by agreement for the delivery of, or maintenance of such works. CPAs also have powers to serve notice on an owner or occupier to carry out coastal maintenance and repair works.

A3. The risk management authorities and their functions

A3.1. This section provides details of the Risk Management Authorities (RMAs) that operate within East Sussex and outlines the risk management functions they are to exercise.

A3.2. The key RMAs for managing flooding within East Sussex are:

- **East Sussex County Council –** as both a Lead Local Flood Authority and Highways Authority
- **The Environment Agency**
- **Southern Water**
- **Upper Medway and Romney Marshes Area Internal Drainage Boards, and Pevensey and Cuckmere Water Level Management Board**
- **Lewes District Council**
- **Eastbourne Borough Council**
- **Wealden District Council**
- **Hastings Borough Council**
- **Rother District Council**

A3.3. As a Lead Local Flood Authority (LLFA), the County Council also works with a wide range of other partners and stakeholders to manage flood risk. The roles and responsibilities of these authorities, partnerships, associations, groups and businesses are outlined under *Other Key Partners and Stakeholders*.

Lead Local Flood Authority (LLFA)

A3.4. In its role as a LLFA, ESCC has a strategic role in overseeing the management of local flood risk. This includes flooding from ordinary watercourses (any river, stream or channel which is not identified as an Environment Agency Main River or critical ordinary watercourse), from surface water runoff, and from groundwater.

A3.5. ESCC has duties and powers to assist in delivering effective local flood risk management.

Duties

- To develop, maintain, apply and monitor a strategy for local flood risk management within East Sussex;
- To investigate flood incidents (to the extent it considers necessary and appropriate), or determine which authority has flood risk management responsibilities and whether they propose to exercise those functions;

- To maintain a register of structures or features considered to significantly affect flood risk, and record ownership and state of repair. This should be available for inspection by the public at all reasonable times; and
- To advise local planning authorities on surface water management for major developments.

Powers

- To designate structures and features that affect flood risk;
- To undertake works to manage flood risk from surface water runoff and groundwater (permissive powers to undertake works on ordinary watercourses remain with district/borough councils and internal drainage boards, where these exist);
- To request information from any person in connection with the authority's flood risk management functions;
- To determine applications for works affecting water flow and cross-sectional area of ordinary watercourses; and
- To serve notice on responsible parties, to ensure they carry out the necessary works to an ordinary watercourse.

Summary

A3.6. The primary roles of ESCC as LLFA are as follows:

- Management of local flood risk (including flooding from ordinary watercourses, surface water runoff and groundwater).
- Developing, maintaining, applying and monitoring a local flood risk management strategy.
- Maintaining a register of flood risk assets.
- Providing a co-ordinating role and promoting partnership working between the various flood risk management authorities.
- Acting as a statutory consultee to the planning system on major planning applications (under the revised Development Management Procedure (England) Order 2015).

Risk Management Authority	Function	Roles, Duties, Powers and Responsibilities in Flood Risk Management
County Council (East Sussex County Council)	**Lead Local Flood Authority** **and Land Drainage Authority**	• Responsible for managing local flood risk (from surface water, groundwater and ordinary watercourses) in East Sussex. • Developing, maintaining, applying and monitoring a local flood risk management strategy. • Providing a co-ordinating role with the risk management authorities. • Advising local planning authorities on surface water management for major developments. • Determining applications for works affecting water flow and cross-sectional area of ordinary watercourses. • Investigating flood incidents (to the extent it considers necessary and appropriate).
	Highway Authority	• Responsible for managing the local highway drainage network • Managing and maintaining structures in its ownership which pass under the highway. Maintaining the highway and its assets, through regular inspection and maintenance. • Duty of care for those who use the County Council's roads. • Power to deliver works considered necessary to protect the highway from flooding (on the highway or on land acquired by the Highway Authority). • A 'right to discharge' surface water runoff from the highways into any inland or tidal waters. • Power to prevent water running onto the highway from adjoining land.
	Emergency Planning (East Sussex Resilience &	• Planning for and responding to local flood events • Providing a service for Eastbourne, East Sussex, Hastings, Lewes and Wealden Councils. Supports affected communities and help limit the impacts of flooding.

Risk Management Authority	Function	Roles, Duties, Powers and Responsibilities in Flood Risk Management
County Council	Emergencies Partnership (ESREP))	• Producing and contributes to multi-agency flood plans. • Monitoring flood guidance and Met Office weather information. • Assisting in resilience and recovery from flood events.
	Planning Authority	• Delivering development management function for: a) waste and minerals applications. b) County Council development applications e.g. roads, schools and libraries. • Monitoring of minerals and waste sites. • Investigating alleged breaches of planning control and undertaking enforcement activities. • Development and adoption of waste and minerals local plans. • Observing national policy guidance and relevant development plan policy on flood risk in determining applications and developing planning policy. • Ensuring that appropriate SuDS are installed within any county development considered to be major.
District and Borough Councils (Lewes District Council,	**Land Drainage Authority**	• Maintaining or improving existing works in their ownership. • Use permissive powers to allow works to be undertaken on ordinary watercourses in order to help prevent, mitigate or remedy flood damage • Advise the LLFA on land drainage consent applications

Risk Management Authority	Function	Roles, Duties, Powers and Responsibilities in Flood Risk Management
Eastbourne Borough Council, Wealden District Council, Hastings Borough Council, Rother District Council)		• Carry out riparian owner responsibilities as a landowner.
	Local Planning Authority (LPA)	• Determination of all planning applications which are not the responsibility of the County Council. • Considering flood risk when allocating sites for development in development plans. • Undertaking a strategic flood risk assessment. • Ensuring that, where appropriate, SuDS are implemented in developments. Surface Water Management Plans (SWMPs) may be used to inform decision making in settlements with a high surface water flood risk.
	Coastal Erosion Risk Management Authority	• Coast protection authorities (under the Coast Protection Act (1949) and coastal erosion risk management authorities (under the Flood and Water Management Act 2010).Planning and delivering shoreline management activities (with input from the Environment Agency). • Developing flood and coastal erosion risk policies in their area. • Using permissive powers to undertake coastal defence works and schemes. • Supporting collaboration, knowledge-building and sharing of good practice including provision of capacity-building schemes such as trainee schemes and officer training via South East Coastal Group.
	Emergency Planning Authority	• 'Category one' responders to emergencies • Maintaining site-specific flood plans for their areas. • Monitoring flood guidance and Met Office weather information. • Assisting in resilience and recovery from flood events.

Risk Management Authority	Function	Roles, Duties, Powers and Responsibilities in Flood Risk Management
The Environment Agency (Solent and South Downs, Kent and South London)	**National Strategic Role**	• Publishing the National Strategy, a clear national framework for all forms of flood and coastal erosion risk management. • Use strategic plans to set the direction for flood and coastal erosion risk management. • Collating and reviewing flood risk regulations assessments, plans and maps produced by LLFAs. • Providing the data, information and tools to inform government policy and aid RMAs in delivering their responsibilities. • Supporting collaboration, knowledge-building and sharing of good practice including provision of capacity-building schemes such as trainee schemes and officer training. • Managing the Regional Flood and Coastal Committees (RFCCs) and support their decisions in allocating funding for flood and coastal erosion risk management (FCERM) schemes. • Reporting and monitoring on flood and coastal erosion risk management. • Providing grants to RMAs to support the implementation of their incidental flooding or environmental powers.
	Local Operational Role	• Managing flooding from main rivers, critical ordinary watercourses, the sea and reservoirs. • Permissive powers to carry out works to maintain and improve its assets on main rivers. • Ablility to bring forward flood defence schemes through the RFCCs/FECRMs, and work with LLFAs and local communities to shape local schemes.
	Coastal Flooding and Erosion	• Lead authority for all flooding from the sea. • Accountable to both the government and the public for all coastal flood risk management decisions.

Risk Management Authority	Function	Roles, Duties, Powers and Responsibilities in Flood Risk Management
The Environment Agency	**Coastal Flooding and Erosion**	• Assesses the risk of coastal erosion and flooding. • Undertakes coastal works. • Allocates capital funding for projects. • Ensures the sustainability of third party coastal defences.
	Reservoirs	• Enforcement authority in England and Wales, for reservoirs that are greater than 10,000m^3 • Ensuring that flood plans are produced for specified reservoirs produced by reservoir owner/operator. • Establishing and maintaining a register of reservoirs. • Publishing flood maps for reservoirs, and categorising 'high-risk' reservoirs.
	Emergency Planning	• Contributing to the development of multi-agency flood plans to co-ordinate the organisations involved in responding to a flood. • Contributing to the National Flood Emergency Framework for England. • Providing the flood warning system throughout England and Wales in areas at risk of flooding from rivers or the sea.
	Planning Process	• Regulatory role in consenting works carried out by others in or adjacent to main rivers and sea/tidal defences. • Statutory consultee and advisor to the planning system for development (excluding minor development) in areas of fluvial and coastal flood risk. • Ensuring that proposed developments regard flood risk and do not cause unnecessary environmental damage.

Risk Management Authority	Function	Roles, Duties, Powers and Responsibilities in Flood Risk Management
The Environment Agency	**Planning Process**	• Monitoring flood and coastal erosion risks. • Supporting emergency responders when floods occur.
Internal Drainage Boards (Upper Medway and Romney Marshes Area IDBs, Cuckmere and Pevensey Levels WLMB)	**Land Drainage Authority**	• Managing water levels within defined internal drainage districts (IDDs) for land drainage, flood risk management, irrigation and environmental benefit. • Undertaking routine maintenance of drainage channels, ordinary watercourses, pumping stations (although responsibility of maintenance remains with riparian owner).
	Emergency Planning	• Contributing to the development of multi-agency flood plans.
	Development Management	• Consenting works carried out by others in, or adjacent to, watercourses within the operational district.
	Planning Guidance	• Provide comments to LPAs on developments in their operational district and when asked, make recommendations.

Risk Management Authority	Function	Roles, Duties, Powers and Responsibilities in Flood Risk Management
Water and Sewerage Company (Southern Water)	**Water and Sewerage Company**	• Statutory consultee in the development planning process for shale oil and gas extraction. • Responding to flooding incidents involving their assets. • Producing reports of the flooding incidents. • Maintaining a register of properties at risk of flooding due to a hydraulic overload in the sewerage network (DG5 register). • Undertaking capacity improvements to alleviate sewer flooding on the DG5 register. • Consulting on local planning applications, often regarding the implementation of SuDS.

Other Key Partners and Stakeholders		
Partner/Stakeholder	**Function**	**Activities**
Regional Flood and Coastal Committees (RFCC)	• Established with a remit to include balancing local priorities, making sure that investment is co-ordinated at the catchment and shoreline scale. • Provide for local democratic input through membership of LLFA representatives. • Assist in scrutiny of local authority risk assessments, maps and plans, required by the Flood Risk Regulations. • Help to balance local priorities to ensure co-ordinated investment at a catchment and shoreline scale. o ESCC is represented on the Southern Regional Flood and Coastal Committee that takes in the County Councils of: o East Sussex o West Sussex o Kent o Hampshire; and the Unitary Authorities of: o Brighton and Hove o Medway o Portsmouth o Southampton	• Guiding flood and coastal management activities within catchments and along the coast • Advising on and approve programmes of work for their areas • Continuing to raise local levies under existing arrangements to fund local priority projects and works. • Distributing central government funding.

Other Key Partners and Stakeholders		
Partner/Stakeholder	**Function**	**Activities**
Regional Flood and Coastal Committees (RFCC)		
The South Downs National Park Authority (SDNPA)	As statutory planning authority for the national park area: • Determination of all planning applications which are not the responsibility of the County Council. • Consider flood risk when allocating sites for development in development plans • Undertaking a strategic flood risk assessment. • Ensuring that, where appropriate, SuDS are implemented in developments. Surface Water Management Plans (SWMPs) may be used to inform decision making in settlements with a high surface water flood risk. • Consider flood risk when developing flood and coastal erosion risk policies in their area.	• Although not a RMA, the SDNPA is a key partner, due to the extent of its coverage in the county, interest in water sustainability, and its role as a planning authority and land manager. • Important consultee to flood risk works and plans.
Highways England	• Highways England (known as the Highways Agency, prior to April 2015) is a new government company which works with the Department for Transport. • Operating England's motorways and major A roads. In East Sussex, these are:	• Responsible for the drainage of these major A roads • Must ensure that road projects do not increase local flood risk or adversely affect local water bodies. • In its Delivery Plan 2015-2020, Highways England sets out

Other Key Partners and Stakeholders		
Partner/Stakeholder	**Function**	**Activities**
Highways England	○ A21; ○ sections of both the A27 and A259; and ○ A26 (south of the A27).	plans to develop a flood risk management strategy.
Association of Drainage Authorities (ADA)	• (ADA) is the membership organisation for water level management authorities in the UK. • It is also recognised as the national representative for IDBs in England and Wales.	• Providing technical support and information to members; • Working with Government in support of their members; • Linking members to Europe's other water level managers, through the European Union of Water Management Authorities.
National Farmers Union	• The NFU is the 'voice of British farming'; providing professional representation for its 55,000 farmer and grower members. • Through its Brussels office the NFU also has a voice at the heart of Europe.	• Raise key concerns regarding: - the lack of insurance for agricultural land and crops against flood damage, disadvantaging productive land during cost-benefit analysis of flood alleviation schemes. - the targeting of agricultural land for the storage of water in flood mitigation works, which can have significant financial impacts on the landowner.
The South East Coastal Group	• Strategic coastal group which brings together local authorities, the Environment Agency and other maritime operating organisations. • Work to deliver co-ordinated strategic management of the shoreline between the Isle of Grain (on the Thames) and	• One of seven similar that cover the coastline of England. • Supporting the development and delivery of plans, studies and schemes by providing co-ordination, facilitating communication and offering advice and guidance to member organisations.

Other Key Partners and Stakeholders		
Partner/Stakeholder	**Function**	**Activities**
The South East Coastal Group	Selsey Bill (in West Sussex).	• Play a key role in development of Shoreline Management Plans. • Providing a forum for the exchange of information, staff and knowledge.
Utility and Infrastructure Providers	• Including Network Rail, energy and telecommunication companies • Are not RMAs, however their assets may be of considerable importance in regard to planning for flood events.	• Ensuring that essential infrastructure is resilient. • Factoring flood risk management issues into their investment plans, to ensure continuity of service in an emergency.
Parish Councils and Communities	• Communities have a good understanding of site-specific issues and can therefore make important contributions to the management of local flood risk. • Parish councils can act as a primary means of informing and engaging residents about local flood risk issues. • Through neighbourhood planning, councils also provide a steer for local development within their parish. • The Sussex and Surrey Associations of Local Communities (SSALC) provide representation, advice and training to communities across West and East Sussex. • The town and parish councils are further coordinated and represented by the East Sussex Association of Local	• If a parish is at risk from flooding, the council are advised to create an emergency plan, detailing: - who can be contacted to lead and assist in an emergency; - what equipment is available; and - which locations can be used for accommodation in emergency situations. • Assisting local residents in emergency situations. • Monitoring floods on ground at local level. • Providing planning policy for their local area through producing neighbourhood plans, and grant permission for certain forms of development through neighbourhood

Other Key Partners and Stakeholders		
Partner/Stakeholder	**Function**	**Activities**
Parish Councils and Communities	Communities (ESALC).	development orders.
The National Flood Forum (NFF)	• The NFF is a national charity dedicated to supporting and representing communities and individuals at risk of flooding. • It also works with Government, agencies and local authorities on issues such as flood risk insurance, property level protection and recovery to ensure that the needs of flood risk communities are represented.	• The NFF aids residents and communities by: - Helping people to prepare for flooding as part of efforts to prevent it, or minimise its impacts; - Helping communities to recover from flooding; - Facilitating and supporting community flood groups; - Campaigning on behalf of flood risk communities, working with government and agencies to ensure that they develop a community perspective. • The forum provides support via: - A dedicated telephone helpline for all flood related enquiries including insurance; - Information and guidance through their website and regular bulletin; - Flood surgeries and exhibitions to raise awareness; - Their blue pages directory of products; and - Training for local authorities, agencies and the voluntary sector.

Other Key Partners and Stakeholders		
Partner/Stakeholder	**Function**	**Activities**
Local Flood Groups	• Local flood groups represent the views of local residents and businesses, and their purpose is to work to find ways of minimising future flood risk.	• Community-led groups work with the Environment Agency, local authorities, water companies and emergency planning authorities in East Sussex in order to find solutions to, or achieve acceptable levels of flood risk. • Providing a means of voicing local concerns and priorities in a structured manner. • Monitoring floods on the ground at local level. • Providing information and assistance to local residents.

A4. Revised Assessment of Local Flood Risk

A4.1. The Assessment of Local Flood Risk aims to provide an overview of the nature and extent of flood risk in East Sussex. The analysis of both recorded and predicted flood risk data, determines the distribution of flood risk in the county, and indicates where future issues are most likely to occur. This informs the focus of the Local Flood Risk Management Strategy, and allows the Council can focus its efforts and resources most effectively.

A4.2. An Assessment of Local Flood Risk was undertaken as part of the first Local Flood Risk Management Strategy (2013 – 2016). Using data from the Preliminary Flood Risk Assessment of East Sussex (PRFA) (2011) and modelled flood risk data, the assessment indicated 14 'hotspots' of flood risk across the county (Figure X).

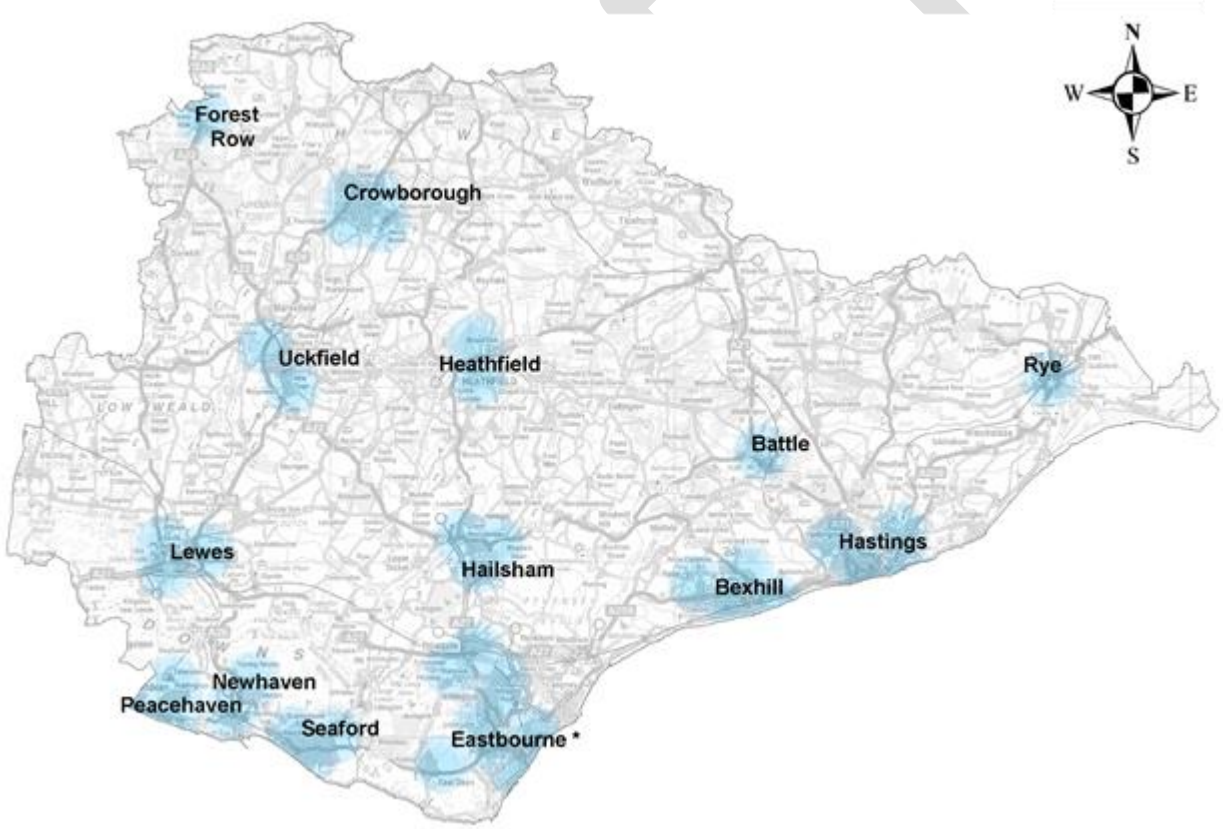

Figure X. Location of local flood risk hotspots in East Sussex, identified through analysis of outputs from the preliminary flood risk assessment (PFRA), refined PFRA and local in-depth studies. *Not to Scale*

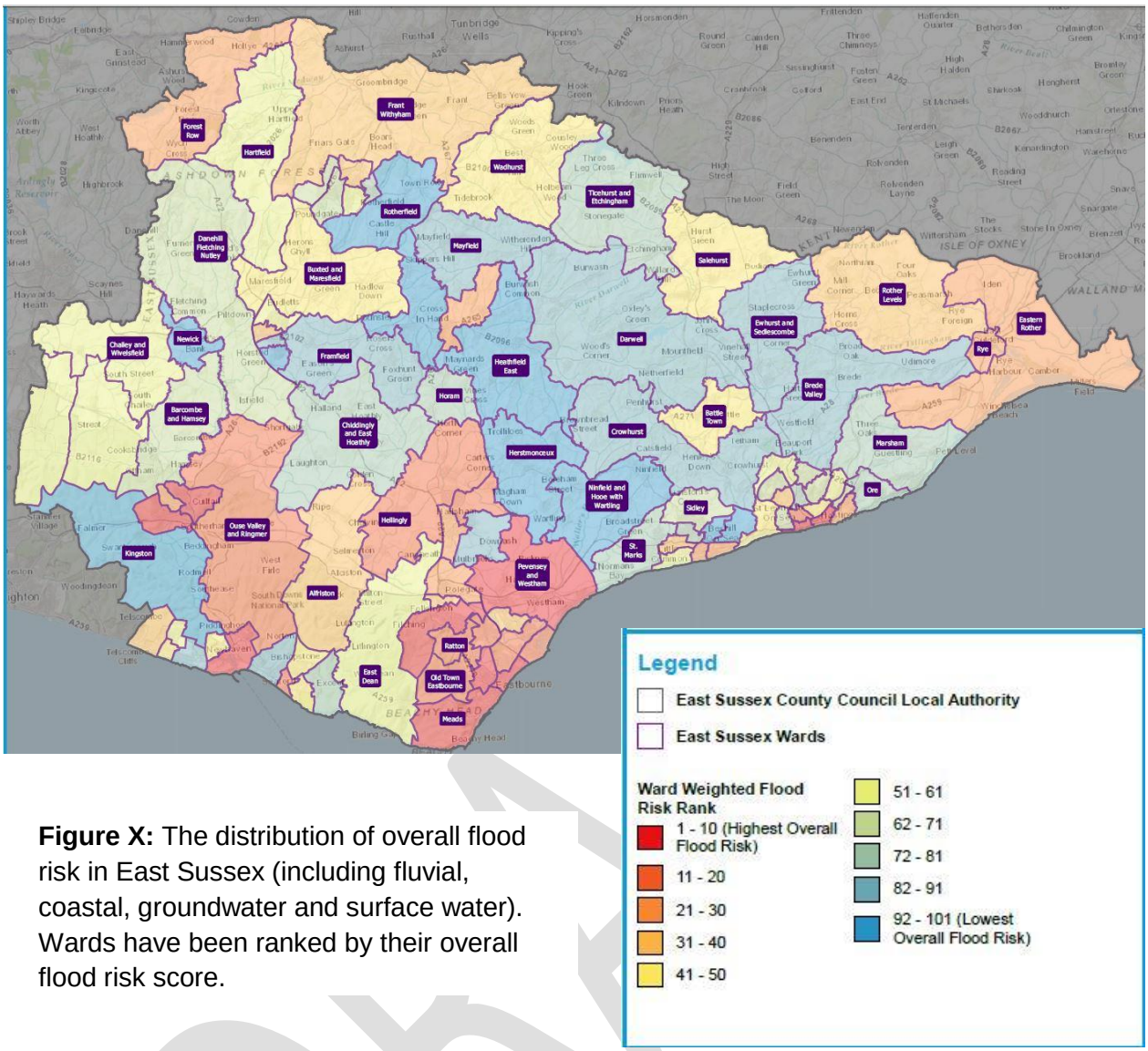

Figure X: The distribution of overall flood risk in East Sussex (including fluvial, coastal, groundwater and surface water). Wards have been ranked by their overall flood risk score.

A4.3. These settlements became the focus of the Council's flood risk management activities, and a number of further investigations were undertaken, including twelve Surface Water Management Plans and surface water modelling in Uckfield and Eastbourne Town Centre. This work has led to a better understanding as to the underlying causes of flood risk in East Sussex, as well as the issues experienced in urban settlements.

A4.4. However, since the initial Assessment of Local Flood Risk in 2012, there have been significant advances in the accuracy and reliability of flood risk data. As such, the numbers of people, properties and services at risk of flooding may have changed.

A4.5. Furthermore, through experience of delivering the Lead Local Flood Authority role, it has become apparent that flood risk in East Sussex can be disperse and localised. As such, a more detailed, graded analysis of flood risk was required for the revised assessment, to better indicate the relative distribution of flood risk across all of East Sussex, rather than focusing on urban areas at with the highest risk.

Method

A4.6. The assessment was undertaken using methods consistent with the 2013-2016 Assessment of Local Flood Risk. This involved dividing the county into a grid of 1km^2 squares, and providing detailed property counts and an overall flood risk score for each square, based on the extent of flood risk data and the affected receptors within. In this assessment the same analysis was also undertaken over district and borough ward boundaries.

A4.7. All buildings across the county were classified into the following types of receptor:

- Residential properties
- Non-residential properties
- Monuments
- Vulnerable infrastructure (including prisons, education facilities, energy production facilities, water supply and treatment works, and residential accommodation)
- Emergency services (fire, ambulance and police stations, and hospitals)

A4.8. Receptor counts were undertaken within each district and borough ward and 1km square. Where the outline of predicted or historic flood risk data intersected with the footprint of a building, it was classified as 'at risk'.

A4.9. To generate an overall flood risk score for each ward and 1km square, the sources of flood risk and categories of receptor were weighted. A number of weightings were applied to the data.

Weighting 1: *Sources of Flood Risk*

A4.10. The sources of flood risk were weighted to emphasise the local sources of flooding for which East Sussex County has management responsibility, in particular groundwater and surface water.

A4.11. A lesser emphasis was placed on the flooding from main rivers and the sea, partially because they fall under the responsibility of the Environment Agency, but also because this risk was indirectly represented in the groundwater and surface water flood risk data, as well as the historic incidents.

	Source of Flood Risk Extent	Risk Weight		Overall Source Weight
Predicted	**Rivers and Sea**	High	6%	**10%**
		Medium	3%	
		Low	1%	
	Surface water	1 in 30 year	30%	**50%**
		1 in 100 year	10%	
		1 in 1000 year	10%	
	Groundwater	High	12%	**20%**
		Moderate	6%	
		Low	2%	
Historic	**Recorded flood incidents** (all sources of flooding)			**20%**

Table X: The weighting of flood risk data within the assessment.

Weighting 2: *Receptor groups*

A4.12. Emergency and vulnerable receptors were given the highest weighting, to reflect the greater impact which flooding would have to these groups, followed by residential properties. Non-residential properties and monuments were given the lowest ranking, as the threat to life was deemed to be low.

A4.13. Where there was a record of a receptor being affected by an historic flooding incident, this was also given a higher weighting, as it demonstrated the actual, rather than predicted risk.

Receptor Class	Weight Assigned
Residential Property	10%
Non-residential Property	5%
Monument	5%
Emergency Receptor	15%
Vulnerable Receptor	15%
Historic Flood Event Point	50%

Table X: The weighting of receptor classes in the assessment.

Findings of the revised Assessment of Local Flood Risk

A4.14. The top 20 ranked wards in terms of overall flood risk – surface water, groundwater, coastal and fluvial flood risk, as well as recorded flood incidents – are outlined in Table X below. The wards at highest risk are situated in the larger settlements on the coastal strip, in particular Eastbourne and Hastings, as well as smaller towns which lie on major river flood plains, such as Willingdon and Hellingly.

Rank	Ward Name
1	Devonshire, **Eastbourne**
2	Meads, **Eastbourne**
3	Upperton, **Eastbourne**
4	Lewes Bridge
5	Central St. Leonards, **Hastings**
6	Castle, **Hastings**
7	Willingdon
8	Newhaven Denton and Meeching
9	Pevensey and Westham
10	Lewes Priory
11	St. Anthony's, **Eastbourne**
12	Sovereign, **Eastbourne**
13	Ratton, **Eastbourne**
14	Seaford Central
15	Hampden Park, **Eastbourne**
16	Hellingly
17	Ouse Valley and Ringmer
18	Gensing, **Hastings**
19	Hailsham Central and North
20	Old Town Eastbourne, **Eastbourne**

Table X: The 20 wards in East Sussex at highest overall risk, from all forms of flooding

A4.15. The numbers of properties affected under different sources of flood risk and probabilities of event were also considered in the assessment. The following tables (Tables X and Y) provide a ranking of settlements and wards according to the flood risk identified during the assessment process.

A4.16. Where there were concentrations of risk within a defined urban area (or study area in the case of Eastbourne and Southern Wealden) the settlement was identified. Where rural, and much larger, wards displayed a high risk these were included in the ranked list, as they often encompassed several smaller settlements.

A4.17. The towns with the highest numbers of properties affected by surface water flood risk were the Eastbourne Area (here defined as the wards within Eastbourne, North and South Polegate), Hastings and Bexhill, whereas the effects of groundwater flood risk were greatest in the Eastbourne Area, Newhaven and Lewes.

1 in 100 surface water flood risk		
Rank	**Settlement/ward**	**Banding**
1	Eastbourne Area	**>3000 properties**
2	Hastings	
3	Bexhill	
4	Pevensey and Westham (ward)	**1500 - 3000 properties**
5	Seaford	
6	Eastern Rother (ward)	
7	Lewes	**1000 - 1500 properties**
8	Uckfield	
9	Newhaven	
10	Peacehaven	
11	Hellingly (ward)	**500-1000 properties**
12	Alfriston (ward)	
13	Ouse Valley and Ringmer (ward)	
14	Danehill/Fletching/Nutley (ward)	
15	Hailsham	**<500 properties**

Table X: The number of properties (both residential and non-residential) at risk from surface water flooding within the top settlements and wards of East Sussex. Where a settlement is composed of several wards, the property counts from each ward are totalled to give the overall number of properties at risk in that settlement.

Groundwater - medium flood risk		
Rank	**Settlement/ward**	**Banding**
1	Eastbourne Area	**>1500 properties**
2	Newhaven	
3	Lewes	
4	Eastern Rother (ward)	**1000-1500 properties**
5	Hastings	
6	Uckfield	
7	Rye	**500-1000 properties**
8	Seaford	
9	East Saltdean and Telscombe Cliffs (ward)	
10	Hailsham	
11	East Dean (ward)	**150-500 properties**
12	Bexhill	
13	Brede Valley (ward)	
14	Hellingly (ward)	
15	Ditchling and Westmeston (ward)	**<150 properties**

Table X: The number of properties (both residential and non-residential) at risk from groundwater flooding within the top settlements and wards of East Sussex. Where a settlement is composed of several wards, the property counts from each ward are totalled to give the overall number of properties at risk in that settlement.

Comparison with previous assessment

A4.18. The results of the Revised Assessment of Local Flood Risk correspond relatively closely with the previous assessment. The highest risk areas largely remain the same, with the major settlements of Eastbourne, Hastings, Lewes, Newhaven, Seaford and Hailsham presenting the highest overall risk of flooding.

A4.19. There has been a difference in focus between the two assessments. The previous assessment concentrated on areas at highest surface water flood risk, which led to the identification of fourteen 'hotspots' centred around the most densely populated urban areas. The revised assessment has focused on the variability of risk across East Sussex and has provided more detailed flood risk analysis in both urban and rural areas of the county.

A4.20. Table XX shows a direct comparison of results, over the same grid squares, between the 2013-2016 and 2016-2026 Assessments of Local Flood Risk.

	Residential Properties at risk	
Settlement	**2013 - 2016 Assessment**	**2016 - 2026 Assessment**
Eastbourne	Greater than 1000	Greater than 1000
Seaford	500 to 1000	500 to 1000
Newhaven	50 to 150	50 to 150
Peacehaven	150 to 500	150 to 500
Lewes	50 to 150	50 to 150
Hailsham	150 to 500	150 to 500
Bexhill	500 to 1000	500 to 1000
Battle	50 to 150	50 to 150
Hastings	Greater than 1000	Greater than 1000
Rye	Fewer than 50	Fewer than 50
Heathfield	150 to 500	50 to 150
Crowborough	50 to 150	50 to 150
Uckfield	Fewer than 50	Fewer than 50
Forest Row	Fewer than 50	Fewer than 50

Table X: A comparison of residential properties at risk from a 1 in 30 year surface water flood event (3% chance in any given year) between the 2013-2016 and 2016-2026 Assessments of Local Flood Risk. **Note:** An average between deep and shallow flood depths was used for the 2013-2016 assessment.

Settlement	Non-residential Properties at risk	
	2013 - 2016 Assessment	2016 - 2026 Assessment
Eastbourne	100 to 200	Greater than 200
Seaford	50 to 100	25 to 50
Newhaven	25 to 50	Fewer than 25
Peacehaven	25 to 50	Fewer than 25
Lewes	50 to 100	Fewer than 25
Hailsham	Fewer than 25	25 to 50
Bexhill	50 to 100	25 to 50
Battle	Fewer than 25	Fewer than 25
Hastings	100 to 200	Greater than 200
Rye	Fewer than 25	Fewer than 25
Heathfield	Fewer than 25	Fewer than 25
Crowborough	25 to 50	Fewer than 25
Uckfield	Fewer than 25	Fewer than 25
Forest Row	Fewer than 25	Fewer than 25

Table X: A comparison of non-residential properties at risk from a 1 in 30 year surface water flood event (3% chance in any given year) between the 2013-2016 and 2016-2026 Assessments of Local Flood Risk. **Note:** An average between deep and shallow flood depths was used for the 2013-2016 assessment.

A4.21. Although there is relatively good correlation between the results, there are a number of differences between the original (2013-2016) and revised (2016-2026) assessments:

Changes in data analysed:

- The original assessment analysed two data sets, the predicted surface water flood risk and historic flood incidents. The revised assessment provides a more complete picture of flood risk in the county, through including predicted groundwater, fluvial and coastal flood risk data, as well as additional historic flood incident records.
- There have been several improvements made between the Environment Agency Flood Map for Surface Water (FMfSW) used to assess the surface water flood risk in the original assessment, and the updated Flood Map for Surface Water (uFMfSW) used in the revised assessment. The two datasets were produced using distinctly different parameters, including storm duration, grid size and representation of buildings. In particular, the coverage of 1 in 30 and 1 in 200 year flood events in the FMfSW was increased in the uFMfSW to cover 1 in 30, 1 in 100 and 1 in 1000 year events. In general, the uFMfSW is more tightly constrained than in earlier versions of the mapping, however in some areas it picks out flowpaths previously unmapped by the FMfSW, This has led to variability between the numbers of receptors defined as at risk in the two assessments, as well as difficulties in directly comparing results from events of differing magnitudes and time periods.

Changes in method:

- The original assessment applied one weighting, to place more emphasis on predicted rather than historic flood risk data. In the revised assessment, additional weightings were applied, to account for the likelihood of each type of flooding. This has altered the ranking of settlements; with a greater emphasis placed on settlements at more immediate flood risk e.g. 1 in 30 year surface water flooding.

How will it inform flood risk management in East Sussex

A4.22. The revised assessment confirms our current understanding, that the majority of flood risk is concentrated in the highly populated coastal towns, and in settlements situated in the flood plains of the rivers Ouse, Cuckmere and Rother.

A4.23. However, this revised method provided a more comprehensive picture of flood risk across the county, and that highlighted the localised variability. This is particularly apparent in the level of flood risk identified in more rural wards, and inland settlements.

A4.24. The results of this assessment have directed the focus of the Local Flood Risk Management Strategy 2016-2026. A key message is ensuring that new drainage systems and works to watercourses remain sensitive to local conditions and flood risk to the immediate area.

A4.25. The results will also inform more detailed investigations in the areas of highest risk, to better understand the complex flood mechanisms present, and the most appropriate means of management.

Data Reliability

Dataset	Use	Limitations	Implications for results
Environment Agency Updated Flood Map for Surface Water (uFMfSW)	The uFMfSW was used to map the extent of predicted surface water flooding at different intensities of rainfall events: **High risk** (1 in 30 year event) **Medium risk** (1 in 100 year event) **Low risk** (1 in 1000 year event)	As the modelled surface water collects on low points in topography and flatter surfaces, it overlies existing watercourses and the coastline. Where the uFMfSW is analysed alongside the RoFRS dataset, this can place a stronger emphasis on areas of fluvial or coastal flood risk.	The uFMfSW is the best indication of surface water flood risk which the Council currently hold. Due to the county-wide scale of analysis, the impacts of any 'double counts' of properties at risk of flooding will be relatively low.
Environment Agency Risk of Flooding from Rivers and Sea (RoFRS)	The dataset was used to map the risk of flooding from rivers and seas. The data takes into account of local water levels and flood defences. **High risk** (greater/equal to 1 in 30 year event) **Medium risk** (less than 1 in 30 but greater/equal to 1 in 100 year event) **Low risk** (less than 1 in 100 but greater/equal to 1 in 1000 year event)	The dataset is supplied as 50m gridded squares, which is relatively coarse. The majority of data is suitable for town to county levels of analysis, which is suitable for this assessment; however certain sections are only suitable for national to county level analysis.	Property counts are likely to be less accurate in areas of East Sussex where the data is only suitable for national to county level analysis. However, the proportion of the county covered by this level of suitability is very low, so the impact on results should be minimal.
Environment Agency Recorded Flood Outlines	The data was used to map the extent of recorded historic flood events from rivers, the sea and groundwater	The dataset is provided as a polygon, which prevents interrogation of the individual properties affected, or details of the flooding.	In the assessment, the polygon coverage was beneficial, as it gave the opportunity for flood incident correlation with the point data of the ESCC

Dataset	Use	Limitations	Implications for results
	springs.		Flood Incident Database.
Environment Agency National Receptor Dataset (NRD)	The NRD was used to indicate the type of property at risk of flooding, which was used, alongside AddressBase Plus (see below) to classify the data into receptor groups.	The 2011 version of the NRD was used, which was four years old at the time of the assessment.	Since this period a number of receptors ae likely to have changed over this period
Ordinance Survey AddressBase Plus	The dataset was used to represent receptor points. It marks the centre of the location of a property or site of interest. With the aid of the NRD, all relevant receptors were classified into the following groups: **Residential properties, non-residential properties, monuments, emergency receptors, and vulnerable receptors.**	The previous addressed-base OS dataset, AddressPoint, has been shown to omit non-addressable receptors, or commercial properties which do not receive post at that site. The same limitations are likely to be present in AddressBase Plus.	Due to the omission of certain types of buildings, based on their postal arrangements, the number of receptors at risk may be underestimated using AddressBase Plus. However the limitations in receptor data were minimised by correlating the results from both the NRD and AddressBase Plus datasets.
Boundary-Line (District and Borough wards)	The Boundary-Line data was used to indicate the 101 District and Borough wards in East Sussex.	Ward boundaries in East Sussex are set to change by 2017-2019, which may slightly alter the distribution of property counts within wards.	Compared to other options, including parishes and Office for National Statistics output areas, ward boundaries gave the most continuous coverage across the county, with good representation in both rural and urban areas.

Dataset	Use	Limitations	Implications for results
ESI Environmental Groundwater Flood Map (GWFM)	The GWFM provides fine-scale data of the likelihood of a 1 in 100 (>1%) probability groundwater flooding event across East Sussex. The data has four classifications, relating to the likelihood and severity of a 1 in 100 (1%) probability event: **High risk** **Medium risk** **Low risk** **Negligible risk**	The majority of the county is covered by the 'negligible' risk category, which due to its high coverage had the potential to skew results. A key advantage of the dataset is its Unlike many groundwater datasets, the GWFM indicates the risk rather than susceptibility of an area to groundwater flooding.	The negligible risk category was excluded from analysis, which prevented bias within the assessment results.
East Sussex County Council Flood Incident Database	This database is a collation of flood incidents from all sources of flooding, as reported to the Risk Management Authorities. The reported incidents were included to represent the locations of historic flood events.	The reliability of the database depends on accurate reporting of incidents, and their mapped location. There are multiple reports of the some incidents. The database also includes sewer flooding incidents, which are not indicative of the natural flood risk.	The inclusion of multiple reports of the same incident may lead to overestimation of receptor counts, particularly due to the higher weighting applied to historic data. The inclusion of sewer flooding incidents may also lead to higher counts. However as sewer flooding often occurs as part of integrated flood mechanisms alongside surface water, groundwater, fluvial and coastal flooding, the impacts on results should be minimal.

A5 Drainage Risk Areas: technical note

A5.1. The Drainage Risk Areas are intended to inform the preparation of drainage strategies within development proposals, so that appropriate Sustainable Drainage System (SuDS) techniques are implemented across the county.

A5.2. An overview of the DRAs and standing advice for drainage strategies can be found in *Section XX: Sustainable Drainage Systems (SuDS) in New Development* within the main Strategy, whereas further detail is available within *Section 2: Drainage Risk Areas* within the appendix of the Strategy.

A5.3. This standing advice has been produced using the following information:

- Topography
- Geology
- Drainage issues raised in flood risk investigations
- Surface Water Management Plans within East Sussex
- Guide to Sustainable Drainage Systems in East Sussex (East Sussex County Council, 2015)
- Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems. (Department for Environment, Food and Rural Affairs, 2015)
- Water. People. Places - a guide for master planning sustainable drainage into developments (Lead Local Flood Authorities of the South East of England, 2013)

Method

A5.4. In order to prevent arbitrary boundaries being drawn, the extent of the DRAs was determined statistically, by calculating the average characteristics of the drainage data. The following method was used:

a) A database of constraints was created, using three datasets:

- British Geological Society (BGS) Depth to groundwater
- British Geological Society (BGS) Potential for infiltration
- Environment Agency updated Flood Map for Surface Water (uFMfSW): flood extent at a 1 in 30 year rainfall event (3% probability in any given year)

b) East Sussex was divided into a grid of over 250,000 75m hexagons, to provide a relatively fine-scale assessment of conditions across the county.

c) A computer script was run to produce four categories from the data, each containing a set of average surface water, groundwater and infiltration characteristics.

d) Each hexagon was then sorted into one of these groups, depending on which of the four sets of characteristics their values corresponded most closely with.

Exceptions

A5.5. The settlements identified in each profile are classified based on the predominant coverage of that Drainage Risk Area.

A5.6. Due to the variability in conditions across the county, in many settlements, such as Hailsham, significant coverage of two or more DRAs can occur within a settlement. When this occurs, the settlement is included in several Drainage Risk Areas.

A5.7. The division may be clear-cut, for example, as in Eastbourne, where there is a distinct transition between DRAs, at the boundary between chalk to sandstone geologies (see Figure Xa).

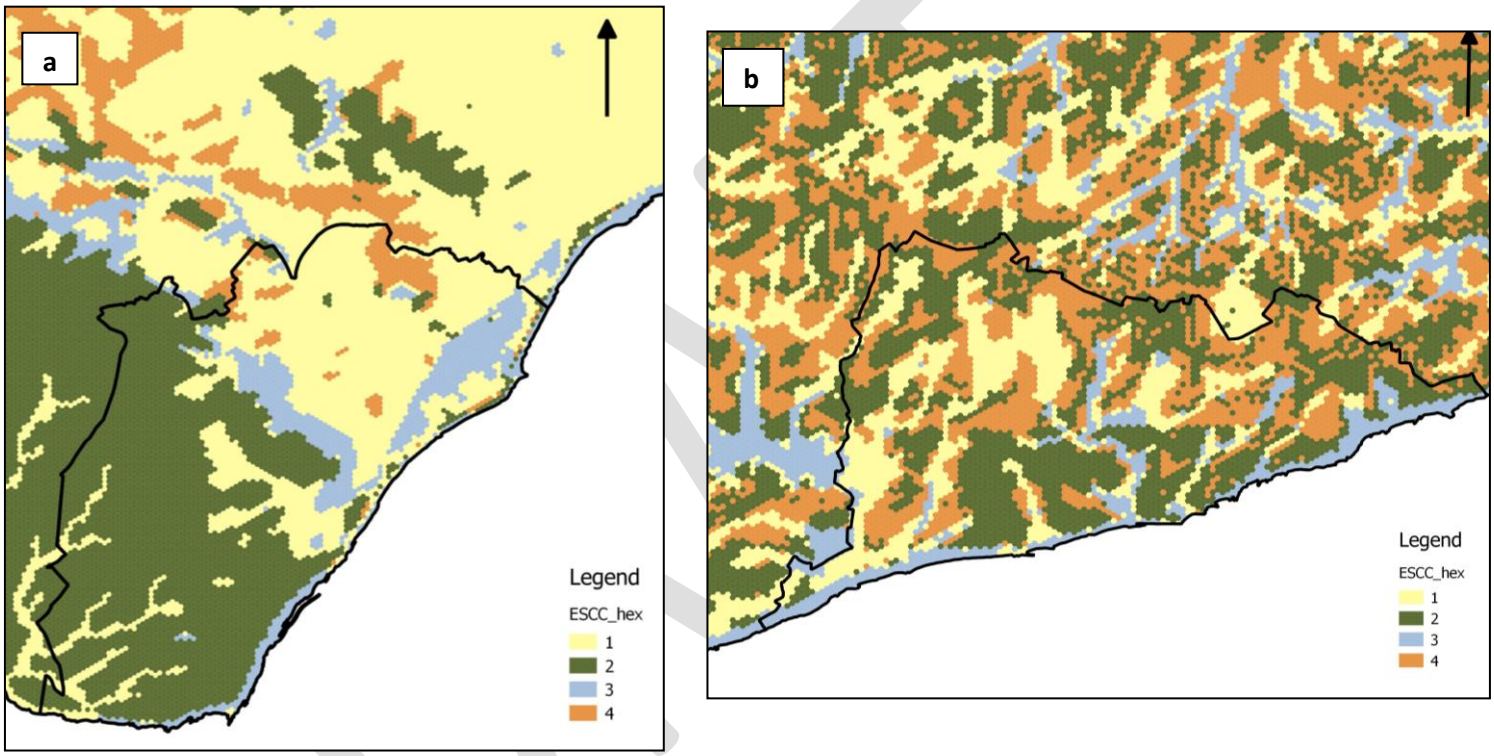

Figure X: a) The clear distinction between DRAs within Borough of Eastbourne. The transition between DRA 2 and DRAs 1 marks the boundary between the chalk geologies in west and clay in the east b) In contrast, the large number of DRAs within the Borough of Hastings, reflecting

A5.8. Where are a number of DRAs lie in close proximity within a settlement, it suggests some complexity in the physical characteristics of the landscape. The potential for using certain drainage techniques is likely to vary considerably over a relatively small area, and as such further, further detailed site investigations are likely to be required to inform the drainage strategy.

A5.9. This variability is best seen in Hastings, where physical characteristics in the Borough vary significantly over short distances, resulting in all four DRAs being present within one settlement (Figure Xb). Due to this particularly complex combination of geology and topography, separate specific advice was produced for Hastings Borough.

A5.10. If the DRAs data is required on a more detailed scale, an enquiry should be placed with County Council via watercourse.consenting@eastsussex.gov.uk.

A6 Local Study Summaries

A6.1. A number of studies have already been undertaken across the county on local flood risk. This section summarises the outcomes of each. .

Surface Water Management Plans (SWMPs)

A6.2. Surface Water Management Plans (SWMPs) are studies undertaken to ascertain the risk of local flooding to an urban area. SWMPs are identified in the Department for Environment, Food and Rural Affairs (Defra) *'Future Water'* strategy as the primary vehicle for management of surface water flood risk in England, and this was further reflected in Recommendation 18 of the *Pitt Review*.

A6.3. The plans are supported by a partnership of flood risk management authorities who have responsibilities for aspects of local flooding. These include the County Council, District or Borough Council, Environment Agency, Sewerage Undertaker and Internal Drainage Boards.

A6.4. The Eastbourne and Hastings SWMPs, were funded by Defra and commissioned by the County and Borough Councils, respectively. The remaining SWMPs were commissioned by East Sussex County Council.

A6.5. For twelve of the fourteen flood risk hotspots as identified in the review of the 2011 Preliminary Flood Risk Assessment (PRFA) within East Sussex (see section A5), Stage (or Phase) 1 Surface Water Management Plans were produced. These twelve are Battle, Bexhill, Crowborough, Eastbourne, Forest Row, Hailsham, Hastings, Heathfield, Newhaven, Peacehaven, Seaford and Rye.

A6.6. SWMPs were not undertaken in Lewes, where an Integrated Urban Drainage Pilot Study was produced, however the SWMP for Uckfield is underway and is due for completion in April 2016. .

A6.7. These plans used similar methods. Surface water flood risk was determined through the compilation of flood incident records, drainage layouts and flood risk modelling data for each town. Significant flood prone areas were identified, where repeated flood incidents and complex flood mechanisms were present. These formed the focus for an action plan, in which operations to manage flood risk in each town were assigned to the relevant SWMP partners.

Surface Water Management Plan (SWMP)	Settlement characteristics	Identified Flood Prone Areas (or 'Hotspots')	Prioritised Actions	Partners involved
Hastings (2011)	Hastings is a major conurbation, situated on the East Sussex coast. A number of flood mechanisms interact to cause a complex flood risk in Hastings. The steep topography of the High Weald surrounding Hastings causes significant overland flow problems, which can be compounded by high river flows, blockages, high tide and groundwater.	Identified 16 medium to large flood hotspots across the borough, and it was agreed that the following four flood hotspots would be looked at in more detail: • Town Centre • Old Town • Hollington Stream • Warrior Square	• Retrofit Sustainable Drainage Systems (SuDS) at the Hollington Primary School. • Installation of property level flood resilience measures at pilot locations (dependent on available funding). • Restore functionality of penstocks on the Upper Hollington Stream and review maintenance arrangements. • Review maintenance for all assets in accordance with their criticality.	Hastings Borough Council ESCC Flood Risk Management ESCC Highways Southern Water Environment Agency
Eastbourne Area (2012)	Eastbourne was ranked as the 38th most susceptible settlement in England to surface water flooding in a national assessment conducted by the Department for Environment, Food and Rural Affairs (Defra) in 2009. The SWMP area includes the Borough of Eastbourne and the settlements of Polegate, Wannock and Willingdon in Southern Wealden.	Thirty six intermediate hotspot areas were identified in total across the dataset. The top four ranked intermediate hotspots were progressed to a more detailed risk assessment/modelling stage. • Mill Stream Gardens, Willingdon	A number of generic catchment-wide actions and specific actions in the high priority hotspot areas were identified. The SWMP action plan undergoes quarterly review, with actions including: • Survey of assets to further understand current condition and plan future maintenance e.g. Eastbourne Park lakes. • Investigation and feasibility studies of flood reduction	ESCC Flood Risk Management ESCC Highways Eastbourne Borough Council Wealden District Council Southern Water

Surface Water Management Plan (SWMP)	Settlement characteristics	Identified Flood Prone Areas (or 'Hotspots')	Prioritised Actions	Partners involved
		• Langley • Firle Road and Arndale Shopping Centre, Eastbourne town centre • Bourne Stream/Motcombe Park, east of Eastbourne town centre	measures in the priority hotspots. • Production of a Bourne Stream Management Plan to better understand the condition, maintenance requirements and operational responsibilities of the asset.	Environment Agency
Forest Row (2013)	Forest Row is situated on the edge of the River Medway floodplain, and is intersected by a number of steep catchments, which drain through the village and out into the Medway. As in other settlements of the High Weald, the steep gradients, impermeable geology and fast response to rainfall within the Forest Row catchments culminate in surface water flooding issues. This results in a significant removal of sediment from the upper catchments, and its deposition within the urban area of	• Kidbrooke Stream area – long Priory Road, Swans Ghyll and Riverside • Hartfield Road • Shalesbrook area – covering Post Horn Lane and Post Horn Close	The village has an active local flood group, the Forest Row Flood Network (FRFN), which is responsible for monitoring and delivering the action plan, and observing the progress of actions on the ground. The prioritised actions within the key flood prone areas include: • The commission of a study to investigate flood risk management solutions in the Shalesbrook catchment, where significant risk is caused by integrated flood	ESCC Flood Risk Management ESCC Highways Forest Row Flood Network Wealden District Council Southern Water Environment Agency

Surface Water Management Plan (SWMP)	Settlement characteristics	Identified Flood Prone Areas (or 'Hotspots')	Prioritised Actions	Partners involved
Forest Row (2013)	Forest Row.		mechanisms • An asset inspection of highway gullies, and identification of whose blockages are producing surface water flooding, before undertaking further maintenance • Investigating the capacity of the foul sewer network across all three flood prone areas	

Surface Water Management Plan (SWMP)	Settlement characteristics	Identified Flood Prone Areas (or 'Hotspots')	Prioritised Actions	Partners involved
Bexhill (draft) (2016)	Located on the coast, Bexhill is the largest town in Rother District.The steep topography and mixture in permeability of the geology compounds in a high surface water flood risk within Bexhill. These steep slopes also result in a number of flashy watercourses, with small catchment areas and urban inflows. Many of these have been 'enmained' by the Environment Agency, due to their high flood risk, however some remain ordinary watercourses.	• Collington Wood; • Bexhill Down; • Greenleigh Park; • Picknell Green Stream; • Sidley; • Pebsham; and • Egerton Stream.	• Asset inspection and documentation of flood risk assets, including possible culverted watercourses in the Collington Wood and Bexhill Down priority areas; • Maintenance of drainage ditches on Turkey Road; and • Detailed flood risk mapping and options appraisal for the priority areas.	ESCC Flood Risk Management ESCC Highways Rother District Council Southern Water Environment Agency
Crowborough (2014)	Crowborough is the largest inland town in East Sussex, situated in the north of Wealden District. A combination of steep relief, bedrock with relatively poorly infiltration and increasing development around the town perimeter, has culminated in a	• High Street – covering Crowborough High Street and the A26 Mill Lane to Eridge Gardens • Whitehill – covering Hurtis Hill, Fermor Road	Within the Crowborough SWMP action plan there were several prioritised actions. These included: • Commission of a study to identify solutions for managing the interconnected surface water and sewer flood risk in the Jarvis Brook	ESCC Flood Risk Management ESCC Highways Wealden District Council

Surface Water Management Plan (SWMP)	Settlement characteristics	Identified Flood Prone Areas (or 'Hotspots')	Prioritised Actions	Partners involved
Crowborough (2014)	considerable risk of surface water flooding.	and Whitehill Road • Jarvis Brook – covering Western Road and Crowborough Hill	area; Asset inspection of highway gullies and culverts, to be followed by the undertaking of further preventative maintenance in the Whitehill and High Street areas, where blockages lead to surface water flooding.	Southern Water Environment Agency
Heathfield (2014)	Heathfield is a small town situated in the High Weald AONB, within Wealden District. The town contains a number of small, urban catchments, which are responsive and flashy in nature. This leads to erosion and issues of sediment mobilisation and deposition in drainage systems. The high velocities of this surface water runoff are also of concern, as it may have an impact on flood risk downstream.	• Waldron Thorns – covering Waldron Thorns, Tilsmore Road and Ghyll Road • Meadow Way – covering Meadow Way, Sandy Cross and Ghyll Road	The major issues within these hotspots were the high levels of surface water runoff produced by rainfall, and the blockage of highway gullies by high levels of eroded sediment. As such, the resultant prioritised actions from the SWMP action plan were: • To commission a soil erosion study to better understand the erosion mechanisms and land use management practices within the Heathfield catchments. The intention is to restrict the quantities of sediment entering the highway drainage network, and thus manage surface water flooding. • Encouraging the interception of surface water by homeowners	ESCC Flood Risk Management ESCC Highways Wealden District Council Southern Water Environment Agency

Surface Water Management Plan (SWMP)	Settlement characteristics	Identified Flood Prone Areas (or 'Hotspots')	Prioritised Actions	Partners involved
Heathfield (2014)			through promotion of Southern Water's "Your Water Meter" campaign which provides water butts for customers. The aim is to target the source of the flooding. • The inspection of highway gullies in the Waldron Thorns and Meadow Way, and implementation of a programme of preventative maintenance.	
Peacehaven, Newhaven and Seaford (2014)	The coastal towns of Peacehaven, Newhaven and Seaford in Lewes District are situated within the River Ouse catchment. In addition to fluvial flooding from the tidally influenced River Ouse, high levels of urbanisation and the underlying chalk geology lead to a considerable risk of surface water and groundwater flooding.	Ten Local Flood Risk Zones (LFRZs) were identified across the three towns, where surface water flooding affected properties businesses and/or infrastructure. Two LFRZs were identified in Peacehaven, five in Newhaven and three in Seaford: **P1.** West of Telscombe Cliffs **P2.** Sutton Avenue **N1.** Court Farm Road and	• A key finding was that flooding in the three towns was heavily influenced by existing and historical watercourse valleys, and as such further research was recommended within each of the LFRZs. Short and medium term actions for ESCC and Lewes District Council were: • To communicate the local flood risk to residents, and raise awareness of flood resilience and their responsibilities for property drainage. • To inform residents of possible measures for mitigating surface water	ESCC Flood Risk Management ESCC Highways Lewes District Council Southern Water Environment Agency

Surface Water Management Plan (SWMP)	Settlement characteristics	Identified Flood Prone Areas (or 'Hotspots')	Prioritised Actions	Partners involved
Peacehaven, Newhaven and Seaford (2014)		Gibbon Road **N2.** South Road and the northern part of Fort Road. **N3.** Meeching Valley – Valley Road, Lewes Road and Willow Walk. **N4.** Denton Road – including Wellington Road, The Close and Cantercrow Hill. **N5.** Industrial area of Avis Road and New Road. **S1.** Junction of Earls Close and Princess Drive. **S2.** Blatchington Road and Brooklyn Road.	flooding to/around their property. • To raise awareness and communicate surface water flood risk to both stakeholders and the public. • To improve drainage system maintenance regimes to target areas which regularly flood, or are known to have blockages.	
Battle (2015)	Battle is a small historic town within the High Weald AONB in Rother District. The town is situated on a ridge which separates three river catchments.	• The Knights Meadow Brook catchment – including Harrier Lane and Falconer Drive • North Trade Road	• Regular inspection and maintenance of the trash screen at Battle Wastewater Treatment Works. • Prioritised maintenance of the curb inlet drainage along North Trade Road.	ESCC Highways ESCC Flood Risk Management Rother District Council

Surface Water Management Plan (SWMP)	Settlement characteristics	Identified Flood Prone Areas (or 'Hotspots')	Prioritised Actions	Partners involved
Battle (2015)		• Battle Wastewater Treatment works	• Review of drainage design at the Emmanuel Centre and remedial works to replace broken drainage. • Continuing to monitor future flood incidents on Harrier Lane and Falconer Drive to better understand the flood mechanisms in operation.	Southern Water Environment Agency
Hailsham and Hellingly (2015)	Hailsham, a market town, and Hellingly, a small village, are both situated in the district of Wealden. The area has undergone significant growth since the 1970s, and is expected to see further growth in future years. A high surface water flood risk is produced by impermeable Wealden Group clays, localised steep topography, and increasing levels of urbanisation.	• Harebeating Stream catchment - including Harebeating Crescent, Oak Tree Way and Danum Close • Horse Eye Sewer catchment - including Station Road, Butts Field and Bell Banks Road • Knockhatch Stream catchment - including the Diplocks housing estate and Diplocks trading estate	• Commission a CCTV survey to understand the route and condition of the culverted streams, in the Harebeating Stream priority area. • Address the fly tipping issue in Hailsham at Butts Field, in the Horse Eye Sewer priority area and Danum Close, in the Harebeating Stream priority area. • Target highway gully maintenance on Station Road, in the Horse Eye Sewer priority area.	ESCC Flood Risk Management ESCC Highways Wealden District Council Environment Agency Southern Water

Surface Water Management Plan (SWMP)	Settlement characteristics	Identified Flood Prone Areas (or 'Hotspots')	Prioritised Actions	Partners involved
Rye (2015)	Rye is an historic harbour town in Rother District. - Restricted by Walland Marshes to the east and the High Weald AONB to the west, development of the town is constrained by environmental features.	• The Strand • The Tilling Green Estate – including Tilling Green School • North Salts • The Grove	• Commissioning a study to understand the flood mechanisms operating at the Strand. • Targeting highway gully maintenance on North Salts. • Undertaking investigation works to understand the culvert condition under The Old Brickyard.	ESCC Flood Risk Management ESCC Highways Rother District Council Romney Marshes Area Internal Drainage Board Rye Emergency Action Community Team (REACT) Environment Agency Southern Water

A7 Funding Mechanisms

Funding for Local Authorities

A7.1. Over recent years, the Department for Communities and Local Government (DCLG) has provided a general formula grant to local authorities across England. Along with locally collected council tax, the two have provided the general resources to fund the wide range of local services provided by the County Council including flood risk management. In fact the range of local services provided is very broad including children's services, adult social care, waste disposal, highways maintenance, as well as many others. Therefore, East Sussex County Council (ESCC) must decide how much to spend on local flood risk management, subject to overall cash limits and the need for investing in other service priorities. From time to time, funding may also be re-allocated from related service areas where joint benefits can be delivered; an example of this might be Highway Drainage.

A7.2. In April 2013, the formula grant was replaced in part by retaining a proportion of business rates locally. A nationally determined start point for funding will continue to constrain the remainder of the funding and thereby limit the overall spending of local authorities year on year, according to the Government's on-going austerity programme.

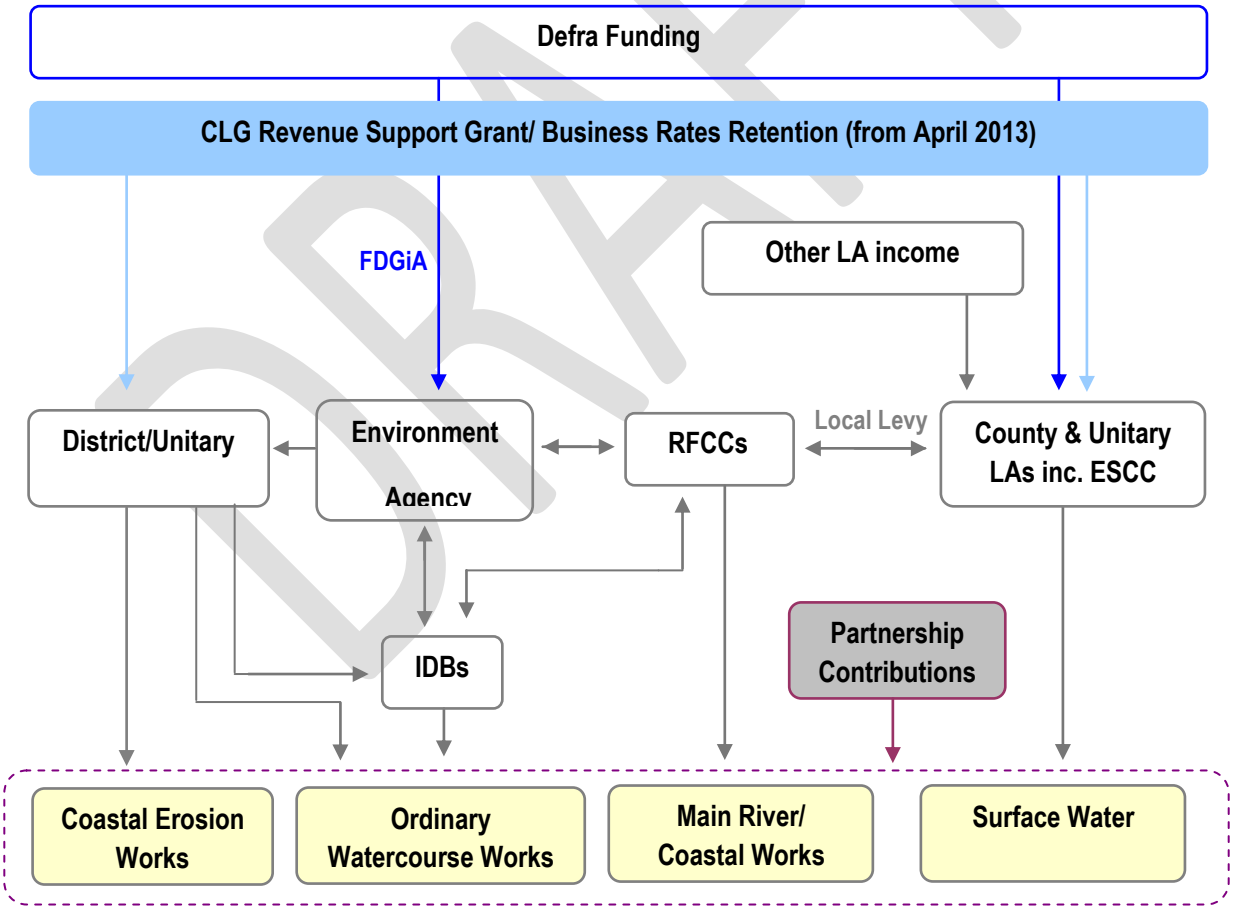

Figure 13. Diagram illustrating the funding avenues available for flood and coastal erosion risk management schemes and for delivering the County Council's lead local flood authority service. (LA – Local Authority; RFCCs – Regional Flood and Coastal Committees; ESCC – East Sussex County Council; IDBs - internal drainage boards)

A7.3. Defra also separately funds the lead local flood authority service. Funding is currently provided directly to county council or unitary authorities to deliver their risk management functions. The amount of money provided is dependent upon the overall level of local flood risk within each county or unitary area.

A7.4. Defra continues to distribute, £15 million per annum, but the remaining £21 million now transfers into the general funding of the county council or unitary authority, as described above.

A7.5. These grant and revenue sources are also complemented by small incomes from ordinary watercourse consent applications, and pre-application advice on Sustainable Drainage Systems (SuDS) within development proposals. With recent changes to the planning system which make the Lead Local Flood Authorities statutory consultees to the planning system on major development applications, Government has provided one off funding to establish this new role. However, the level funding provided in subsequent years of this "new burden" is limited.

Funding for Schemes

Resilience Partnership Funding

A7.6. In the past Government funding for flood and coastal defence projects, Flood Defence Grant in Aid (FDGiA), could only be secured for schemes that offered the most cost-effective solutions, providing complete funding in an 'all or nothing' approach. However, this meant that only a limited number of schemes could be progressed.

A7.7. Defra has implemented a new system – resilience partnership funding - which allows a far greater number of schemes to achieve at least partial government FDGiA funding based upon the benefits that will be delivered (payment for outcomes). Benefits may include the number of households protected (a higher level of funding is available for deprived areas), damage prevented, or wider environmental/amenity benefits.

A7.8. Working with partners is key to delivering flood and coastal erosion risk management projects, helping to top-up centrally (or locally) secured funds. Partnership contributions (*see* Figure 13) can be made by risk management authorities or local stakeholders who may benefit from the project implementation, for example private sector developers, landowners, non-governmental organisations, or infrastructure providers. This approach encourages communities and stakeholders to take more responsibility for the flood risk they face and aims to increase overall investment beyond that which government can provide.

A7.9. Full funding is still available for schemes that can display significant cost-benefit values.

Regional Funding

A7.10. The 'local levy' is an Environment Agency levy placed upon upper tier authorities and it is administered and allocated by the Regional Flood and Coastal Committees. Local Levy

can be allocated to regional priority flood and coastal schemes that could not display high enough cost/benefits to be awarded central funding.

Additional Funding Sources

A7.11. Where flood and coastal erosion risk management projects help to deliver wider benefits then additional funding sources may be secured. For example, a scheme may help to deliver mitigation measures detailed within a river basin management plan. For East Sussex this is the Thames and South East River Basin Management Plans (Water Framework Directive).

A7.12. Following the flooding of Winter 2013/2014, Defra introduced the Repair and Renew Grant for homeowners and businesses which were flooded during these storms. Through the Local Authorities, up to £5000 could be claimed, in order to improve the resilience of properties to future flooding. Provision of the Repair and Renew Grant ended, however similar schemes may be implemented after future significant flood events.

A7.13. Top-up funds may also potentially be secured from the Community Infrastructure Levy or grants for Woodland Creation from the Forestry Commission.

Current Fluvial and Coastal Schemes

A7.14. A number of fluvial and coastal schemes are being progressed across East Sussex by the Environment Agency, district and borough councils. These schemes include ongoing maintenance of key assets such as beach management, outfalls and tidal walls; flood alleviation works and strategy development. They to have acquired funding through the new resilience partnership funding approach, though many schemes may still receive full funding from central government due to the high levels of protection they provide, such as tidal or fluvial defences.

A7.15. The full list of flood and coastal erosion risk management schemes, approved by the Southern Regional Flood and Coastal Committee, for the coming year can be found online at environment-agency.gov.uk.

Current Local Flood Risk Schemes

A7.16. The risk management authorities in East Sussex – including East Sussex County Council - will continue to bid for funds to deliver local flood risk management schemes across the county under the new partnership funding regime.

A7.16. Current local flood risk schemes and assessments that have received funding (either via FDGiA or local levy and topped up by partnership contributions) are detailed within the Strategy's Delivery Plan. The Local Flood Risk Management Strategy – informed by continuing local studies and assessments – will act as the evidence base for subsequent funding bids.

A7.17 Current flood and coastal erosion risk management schemes are also detailed online at environment-agency.gov.uk.