Southend-on-Sea Local Flood Risk Management Strategy

November 2015

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southend onsea BOROUGH COUNCIL

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List of Acronyms

BGS	British Geological Survey
CDA	Critical drainage area
CDC	Critical drainage catchment
CFMP	Catchment Flood Management Plans
DEFRA	Department for Environment, Food and Rural Affairs
DG5	Director General 5
ERDF	European Regional Development Fund
FCRM GiA	Flood and Coastal Risk Management Grant in Aid
FRMS	Flood Risk Management Strategy
GIS	Geographical Information System
IDB	Internal Drainage Board
LFRMS	Local Flood Risk Management Strategy
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
NRD	National Receptors Dataset
PFRA	Preliminary Flood Risk Assessment
RFCCs	Regional Flood and Coastal Defence Committees
RMA	Risk Management Authority
SAB	SuDS Approval Body
SEP	Stakeholder Engagement Plan
SFRA	Strategic Flood Risk Assessment
SMP	Shoreline Management Plans
SSP	Shoreline Strategy Plan
SuDS	Sustainable Drainage System
SWMP	Surface Water Management Plan
TE2100	Thames Estuary 2100
WRMP	Water Resources Management Plan
WFD	Water Framework Directive

Glossary

Term	Description
Act	A Bill approved by both the House of Commons and the House of Lords and formally agreed to by the reigning monarch (known as Royal Ascent).
Assets	Feature or system of structures used to manage flood risk.
Catchment Flood Management Plan	A high-level planning strategy through which the Environment Agency works with their key decision makers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk.
Climate Change	Long term variations in global temperature and weather patterns caused by natural and human actions.
Critical Drainage Area	Areas of significant flood risk, characterised by the amount of surface runoff that drains into the area, the topography and hydraulic conditions of the pathway (e.g. sewer, river system), and the receptors (people, properties and infrastructure) that may be affected.
Critical Drainage Catchment	Alternative to Critical Drainage Area but includes entire catchment as opposed to specific area.
Culvert	A channel or pipe that carries water below the level of the ground.
Flood	The temporary inundation with water of an area of land that is not normally covered with water.
Flood defence	Infrastructure used to protect an area against floods such as floodwalls and embankments; they are designed to a specific standard of protection.
Flood and Water Management Act 2010	Part of the UK Government's response to Sir Michael Pitt's Report on the Summer 2007 floods, the aim of which is to clarify the legislative framework for managing surface water flood risk.
Flood Risk Regulations 2009	Transposition of the EU Floods Directive into UK law. The EU Floods Directive is a piece of European Community (EC) legislation to specifically address flood risk by prescribing a common framework for its measurement and management.
Fluvial Flooding	Flooding resulting from water levels exceeding the bank level of a main river.
Local Planning Authority	A multi-agency forum, bringing together all the organisations that have a duty to cooperate under the Civil Contingencies Act, and those involved in responding to emergencies. They prepare emergency plans in a co-ordinated manner.
Main river	A watercourse shown as such on the Main River Map, and for which the Environment Agency has responsibilities and powers.
Ordinary watercourse	All watercourses that are not designated main river. These are the responsibility of the LLFA or, where they exist, IDBs.
Pitt Review	Comprehensive independent review of the 2007 summer floods by Sir Michael Pitt, which provided recommendations to improve flood risk management in England.
Pluvial Flooding	Another term for surface water flooding meaning flooding from water flowing over the surface of the ground which often occurs when the soil is saturated and/or natural drainage channels or artificial drainage systems have insufficient capacity to cope with additional flow.
Probability of occurrence	A term used to describe the probability of an event occurring in any given year. A flood event with a 1% probability of occurrence means that there is a 1% chance that a flood of that magnitude will occurrence within any given year.
Reservoir	A natural or artificial water body where water is collected and stored until needed. Reservoirs can be used for irrigation, recreation, providing water supply for municipal needs, hydroelectric power or controlling water flow.
Resilience Forum	A multiagency partnership, made up of local councils, emergency services, health providers and the voluntary sector, amongst other organisations, that work together to prepare for a multi-agency response to a major emergency.
Risk	The product of the probability of a hazard and consequence.
Risk Management Authority	In accordance with the Flood and Water Management Act, a Risk Management Authority may include the Environment Agency, LLFA, a District Council for an area for which there is no Unitary Authority, an internal drainage board, a water company and a highway authority.
Sewer flooding	Flooding caused by a blockage, under capacity or overflowing of a sewer or urban drainage system.
Standard of protection	Expressed as an annual exceedence probability, the standard or design event to which an asset, structure or area is defended again flooding.
Sustainable Drainage Systems	Methods of management practices and control structures that are designed to mimic natural drainage processes to achieve quantity, quality and ecological benefits through surface water management. Drainage should be managed as close to source as possible.

Executive Summary

The Flood Risk Regulations 2009 ('the Regulations') and the Flood and Water Management Act 2010 ('the Act') have been enacted by Government in response to the 2007 flooding and the recommendations of The Pitt Review. This gave unitary and county councils, as Lead Local Flood Authorities, new responsibilities for leading and co-ordinating the management of local flood risk; namely the flood risk arising from surface water, groundwater and smaller watercourses and ditches, known as ordinary watercourses. This includes a statutory duty to develop, maintain, apply and monitor a strategy for the management of local flood risk.

Southend-on-Sea Borough Council is the Lead Local Flood Authority for Southend-on-Sea. This Local Flood Risk Management Strategy (LFRMS) outlines our long term plan for managing local sources of flood risk across the Borough.

As part of the South Essex Flood Risk Area, Southend-on-Sea Borough Council is required to contribute to the preparation of the Flood Risk Management Plan for the Anglian River Basin District. The LFRMS has been developed to meet the requirements of the Act as well as the Regulations.

Recently, Southend-on-Sea has experienced multiple events of extensive flooding, causing widespread disruption across the Borough. In these instances, flooding has primarily resulted from intense rainfall coinciding with high tidal levels resulting in flooding from surface water, sewer and fluvial sources.

In December 2013 the Environment Agency published the national surface water flood mapping, the Flood Risk from Surface Water Map. Utilising this mapping, it has been identified that within the Southend-on-Sea:

- Up to 813 residential properties and 249 non-residential properties could be at high risk of surface water flooding (for a rainfall event with a 3.3% probability of occurring in any given year).
- Up to 2,152 residential properties and 571 non-residential properties could be at medium risk of surface water flooding (for a rainfall event with a 1% probability of occurrence in any given year).
- Up to 7,084 residential properties and 1,434 non-residential properties could be at low risk of surface water flooding (for a rainfall event with a 0.1% probability of occurrence in any given year).

Southend-on-Sea Borough Council, with the Environment Agency and Anglian Water Services Ltd. (Anglian Water) has formed a Local Flood Risk Management Partnership. The aim of this partnership is to work together to manage local sources of flooding.

The LFRMS outlines the priorities for local flood risk management and provides a delivery plan to manage the risk over the next six years. The LFRMS complements and supports the National Flood and Coastal Erosion Risk Management Strategy published by the Environment Agency which outlines a National framework for flood and coastal risk management. The Environment Agency has a strategic overview role of all flood and coastal erosion risk management.

The following objectives for the management of local flood risk have been developed:

1. Improve understanding of flood risk including likely effects of climate change.
2. Encourage future development to provide a betterment to flood risk.
3. Pursue flood risk management measures using a risk based approach that provide multiple social, economic and environmental benefits to the borough.
4. Raise awareness of flood risk and available management measures to communities, residents and businesses.
5. Use knowledge of flooding to inform the emergency response.
6. Continue to manage local flood risk and coastal flooding & erosion.

The LFRMS is accompanied by an Action Plan setting out how Southend-on-Sea Borough Council will deliver the objectives of the Strategy over the next six years and a Strategic Environmental Assessment (SEA) assessing the impacts of the Strategy on the environment.

The LFRMS will be reviewed periodically to ensure that its content and emphasis remains relevant.

This draft LFRMS will undergo a period of public consultation, offering the opportunity for residents, business and stakeholders to provide feedback. Following the public consultation the draft LFRMS will be updated with appropriate comments, before being adopted and published.

1 Introduction

1.1 Why has this LFRMS been produced?

In 2008, Sir Michael Pitt published a report entitled 'Learning Lessons from the 2007 Floods'[1]. This report outlined the need for changes in the way the UK is adapting to the increased risk of flooding. In response to this, the Flood and Water Management Act 2010[2] ('the Act') was implemented.

The Act sets out that Lead Local Flood Authorities ((LLFA) unitary authorities or county councils) have a duty to take the lead in the management of local flood risk in their area for groundwater, surface water runoff and ordinary watercourses. Southend-on-Sea Borough Council, as a designated LLFA, must 'develop, maintain and apply a Local Flood Risk Management Strategy (LFRMS)' which will clarify who is responsible for local flood risk within the Borough and enable effective partnerships to be formed between relevant Flood Risk Management Authorities (RMAs).

This LFRMS will address local flood risk, which is defined as the risk of flooding from surface water runoff, groundwater and ordinary watercourses.

It is not possible to prevent all forms of flooding; however, over time, Southend-on-Sea Borough Council will use this LFRMS, and future iterations, to increase our level of understanding of local flood risk posed to the community and to take the lead in effectively implementing measures to manage the risk where appropriate.

This document establishes the starting point for a long-term strategy to manage flood risk which will influence future capital investment, maintenance, public engagement and understanding, land-use planning and emergency planning and future developments across Southend-on-Sea.

1.2 Flood Risk Management Plan

As well as the duties under the Act to prepare the LFRMS, Southend-on-Sea Council has legal obligations under the EU Flood Directive[3], which transposes to UK Law through the Flood Risk Regulations 2009[4] ('the Regulations').

As part of the South Essex Flood Risk Area, Southend-on-Sea Borough Council is required to contribute to the preparation of a Flood Risk Management Plan (FRMP) for the Anglian River Basin District outlining areas of significant flood risk, receptors and consequences across their administrative area.

This LFRMS has been developed to meet the requirements of the Regulations as well as the Act, and so will be capable of incorporation into the regional FRMP, being prepared by the Environment Agency in collaboration with Local Authority partners.

Southend-on-Sea Borough Council has the responsibility for the management of sources of 'local' flooding, including:

- Surface water (pluvial);
- Groundwater; and,
- Ordinary Watercourses (fluvial).

Main rivers, the sea, sewers and artificial sources are not considered to be 'local' sources of flooding.

[1] Cabinet Office (2008) Pitt Review – Learning Lessons from the 2007 Floods. Available online at: http://webarchive.nationalarchives.gov.uk/20100807034701/http://archive.cabinetoffice.gov.uk/pittreview/thepittreview/final_report.html
[2] HMSO and the Queen's Printer of Acts of Parliament (2010) Flood and Water Management Act. Available online at: http://www.legislation.gov.uk/ukpga/2010/29
[3] European Union (2007) EU Floods Directive http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32007L0060:EN:NOT
[4] HMSO (2009) The Flood Risk Regulations 2009 http://www.legislation.gov.uk/uksi/2009/3042/made

1.3 Who is the LFRMS aimed at?

This LFRMS is primarily intended as a document for use by Southend-on-Sea Borough Council to assist us in the management of flood risk within our administrative area.

In this respect, the document should also be of interest to RMAs (identified in Section 4) as well as individuals, communities, businesses and the general public who have an interest in the management of flood risk within the Southend-on-Sea administrative area. Following consultation and formal adoption by Southend-on-Sea Borough Council, this LFRMS will be publicly available to promote community engagement in managing flood risk within the Borough.

1.4 Aim

The aim of this LFRMS is to outline the approach which Southend-on-Sea Borough Council, as LLFA, will take to manage local flood risk in both the short term and long term, with proposals for actions that will help to manage the risk in a way that delivers the greatest benefit to its residents, business and the environment.

In order to achieve the above aim, the Act[5] states that: *'a Lead Local Flood Authority for an area in England must develop, maintain, apply and monitor a strategy for local flood risk management in its area (a Local Flood Risk Management Strategy)'*. The Act states a list of items that a LFRMS must specify and these are reproduced as:

a) The Risk Management Authorities in the authority's area;

b) The flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area;

c) The objectives for managing local flood risk (including any objectives included in the authority's flood risk management plan prepared in accordance with the Regulations);

d) The measures proposed to achieve those objectives;

e) How and when the measures are expected to be implemented;

f) The costs and benefits of those measures, and how they are to be paid for;

g) The assessment of local flood risk for the purpose of this strategy;

h) How and when the LFRMS is to be reviewed; and

i) How the LFRMS contributes to the achievement of wider environmental objectives.

[5] Part 1, Article 2, Section 9, Sub-Section 1

The requirements above are covered within this LFRMS in the following sections:

Assessment of flood risk	•Section 3: Flood Risk in Southend •Appendix A: Figures
Roles and responsibilities for flood risk management	•Section 2: Legislation and Supporting Documents •Section 3: Managing Flood Risk in Southend
Objectives for managing local flood risk	•Section 5: Southend Local Flood Risk Management Objectives
Measures proposed to deliver the objectives	•Section 6: Delivery of LFRM Objectives •Appendix C: Southend LFRM Action Plan
How the Strategy contributes to the achievement of Environmental Objectives	•Section 7: Wider Environmental Objectives
How the Strategy will be monitored and reviewed	•Section 8: Monitor, Review and Maintain •Appendix C: Southend LFRM Action Plan
Summary of the Strategy	•Executive Summary

The LFRMS complements and supports the National Flood and Coastal Erosion Risk Management Strategy, published by the Environment Agency, which outlines a National framework for flood and coastal risk management.

The LFRMS has been developed by Southend-on-Sea Borough Council in partnership with Risk Management Authorities including the Environment Agency and Anglian Water. Further details of the roles and responsibilities of the Risk Management Authorities and other organisations are presented in Chapter 3.

In delivering local flood risk management, Southend-on-Sea Council has taken the opportunity to deliver wider environmental objectives and requirements, as set out in the European legislation including the requirements of the Water Framework Directive[6] (WFD). The WFD was transposed into UK national law through The Water Environment Regulations 2003[7] and states that Councils should have regard to the River Basin Management Plans (RBMPs) when exercising their functions as public bodies. The approach for addressing this, including the preparation of a Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) screening exercise, is outlined in Section 7.

1.5 Consultation

Public consultation has been undertaken for this LFRMS to allow for residents, businesses and stakeholders to provide feedback. This version of the report has been updated to include appropriate comments received from the consultation.

[6] European Union (2000) Water Framework Directive. Available online at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0060:EN:NOT

[7] HMSO (2003) The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 http://www.legislation.gov.uk/uksi/2003/3242/contents/made

2 Legislation and supporting Documents

2.1 Overview

Over recent years, a number of documents have been prepared detailing the assessment and management of flood risk within Southend-on-Sea. Each of these has built on emerging evidence, assessment and modelling technology to improve the knowledge of flood risk across the Borough.

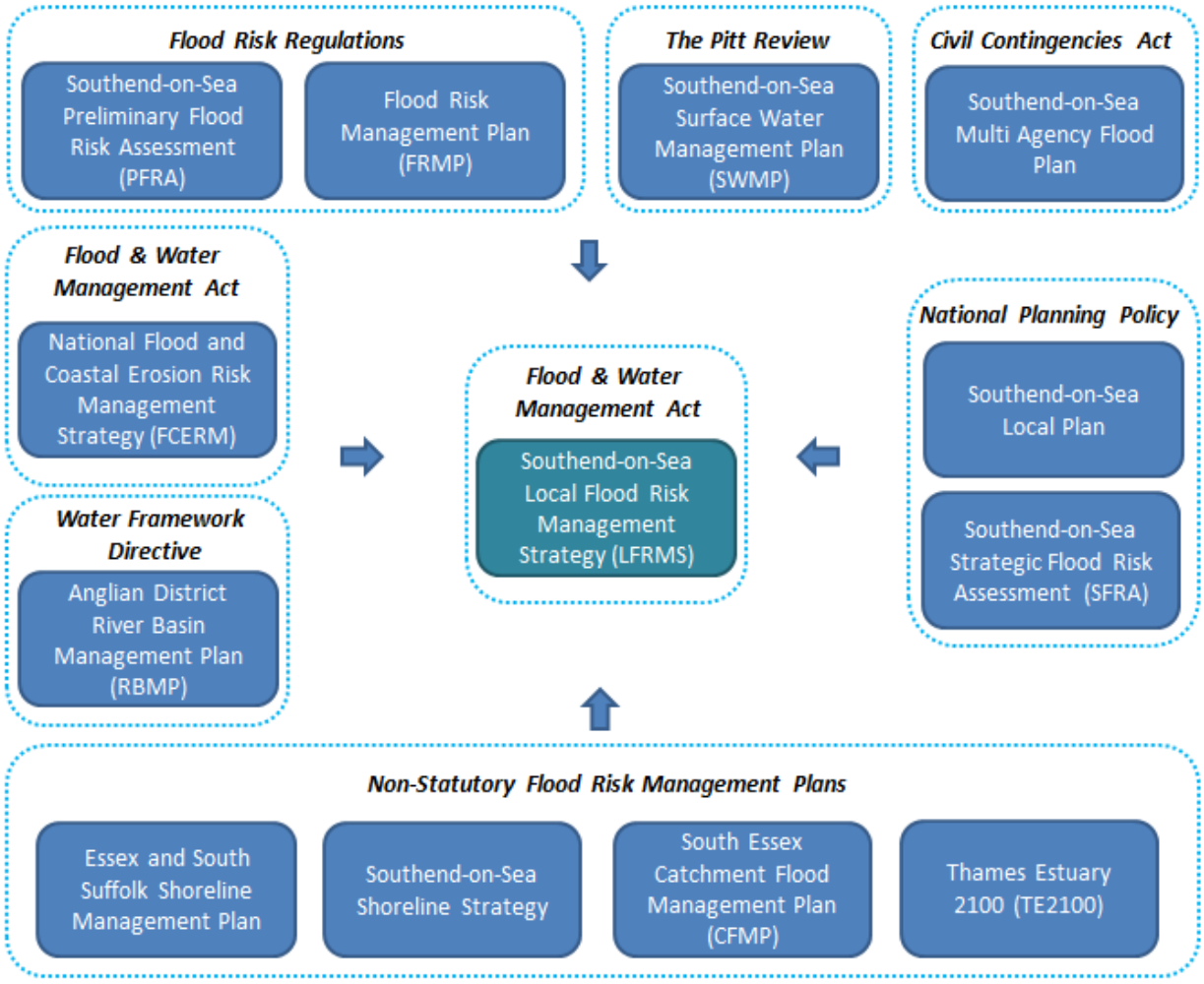
As part of the assessment of flood risk, the LFRMS draws on technical information and historic records of flooding represented in the Surface Water Management Plan[8] (SWMP), Level 1 Strategic Flood Risk Assessments[9] (SFRA), Level 2 SFRA[10] and the Preliminary Flood Risk Assessment[11] (PFRA).

As shown in Figure 2-1, the LFRMS also draws on wider environmental plans covering the Anglian Region including the Anglian District River Basin Management Plan[12], Essex and South Suffolk Shoreline Management Plan[13] and South Essex Catchment Flood Management Plan (CFMP)[14] to ensure a coordinated approach to flood risk management across the South Essex region.

The following paragraphs provide a brief overview of the key legislative and policy context for flood risk management in England and a summary of documents produced.

[8] URS (2014) 'Southend-on-Sea Borough Council Surface Water Management Plan', URS: Basingstoke
[9] URS (2010) 'Southend-on-Sea Borough Council Level 1 Strategic Flood Risk Assessment', URS: London. Available online at: http://www.southend.gov.uk/download/downloads/id/1636/southend_level_1_sfra_main_report_finalpdf
[10] URS (2010) 'Southend-on-Sea Borough Council Level 2 Strategic Flood Risk Assessment', URS: London. Available online at: http://www.southend.gov.uk/download/downloads/id/1692/southend_flood_risk_assessment_level_2pdf
[11] URS (2011) 'Southend-on-Sea Borough Council Preliminary Flood Risk Assessment', URS: London.
[12] Defra, Environment Agency (Dec 2009) Anglian District River Basin Management Plan. Available online at: https://www.gov.uk/government/publications/anglian-district-river-basin-management-plan
[13] Environment Agency (2010) Essex and South Suffolk Shoreline Management Plan 2. Environment Agency: Anglian Region. Available online at: https://www.gov.uk/government/publications/shoreline-management-plans-smps/shoreline-management-plans-smps
[14] Environment Agency (2009) 'South Essex Catchment Flood Management Plan', Environment Agency: Peterborough. Available online at: https://www.gov.uk/government/publications/south-essex-catchment-flood-management-plan

Figure 2-1: Flood risk management in policy and legislation



2.2 National Policy

2.2.1 Flood and Water Management Act (2010)

The Act empowers and requires Southend-on-Sea Borough Council, as a designated LLFA, to manage flood risks from local sources (surface water, groundwater and flooding from ordinary watercourses). The Act also requires LLFAs to co-operate with other RMAs in the management of flood risk.

The Act reinforces the need to manage flooding holistically and in a sustainable manner. This has grown from the key principles within Making Space for Water[15] and was further reinforced by the Pitt Review following the summer 2007 floods. The Pitt Review identified the need to examine the approach to flood risk management at a range of spatial scales, and from all flood sources, as opposed to focusing primarily on river and coastal flooding. The Act implements several key recommendations of the Pitt Review, whilst also protecting water supplies to consumers and protecting community groups from excessive charges for surface water drainage.

Further information regarding the duties and powers Southend-on-Sea Borough Council has as a LLFA under the Act is included within Chapter 3.

2.2.2 Flood Risk Regulations (2009)

The EU Floods Directive was transposed into UK law by the Flood Risk Regulations 2009 on 10 December 2009. The Regulations require LLFAs to provide three main types of assessment/plan:

[15] Defra (2005) 'Making space for water', Defra: London. Available online at: http://archive.defra.gov.uk/environment/flooding/documents/policy/strategy/strategy-response1.pdf

- Preliminary Flood Risk Assessment (PFRA): This details information on past and future (potential) floods, and identifying Flood Risk Areas. LLFAs are only required to undertake a PFRA for local sources of flooding, which principally includes surface water, groundwater and ordinary watercourses. It is the responsibility of the Environment Agency to assess the flood risk from main rivers, the sea and reservoirs. Southend-on-Sea Borough Council completed their PFRA report[16] in 2011 in accordance with the deadline stipulated by the Flood Risk Regulations. Southend-on-Sea Borough Council will need to review the PFRA every 6 years as a requirement of their responsibilities as LLFA, as defined in Part 2 of the Flood Risk Regulations.
- Flood Hazard Maps and Flood Risk Maps: Following the identification of Flood Risk Areas, the Environment Agency and LLFAs have been required to produce Hazard and Risk maps for sea, main river and reservoir flooding as well as other relevant sources. Flood Hazard and Flood Risk Maps were produced in 2013 for the Anglian River Basin District[17].
- Flood Risk Management Plans: The Environment Agency and LLFAs are required to produce Flood Risk Management Plans for sea, main river and reservoir flooding as well as other relevant sources by 22nd December 2015.

2.2.3 National Planning Policy Framework (2012)

The National Planning Policy Framework (NPPF)[18] and Planning Practice Guidance[19], sets out the Government's planning policies for England and how these are expected to be applied.

Section 10 of the NPPF sets out the approach for meeting the challenge of climate change, flooding and coastal change. It also highlights the role that Local Planning Authorities (LPAs) such as Southend-on-Sea Borough Council have to ensure that inappropriate development in areas at risk of flooding is avoided by directing development away from areas at highest risk. Where development is necessary, the LPA should ensure that it is safe without increasing flood risk elsewhere.

2.2.4 National Flood and Coastal Erosion Risk Management Strategy for England (2011)

The Act states that the Environment Agency must *'develop, maintain, apply and monitor a strategy for flood and coastal erosion risk management in England'* as part of its strategic overview role for flood and coastal erosion risk management. In response to this, the Environment Agency has developed their National Flood and Coastal Erosion Risk Management Strategy jointly with Defra (Department for Environment, Food and Rural Affairs) to ensure that it reflects government policy. Southend-on-Sea Borough Council also has a key role in the day to day management of flood and coastal defences in the Borough.

The National Flood and Coastal Erosion Risk Management Strategy[20] was published in 2011 and sets out strategic aims and objectives for managing flood and coastal erosion risks and the measures proposed to achieve them. As required by the Act, Southend-on-Sea Borough Council has sought to ensure that our LFRMS is consistent with the approach and guiding principles that have been set out in the National Flood and Coastal Erosion Risk Management Strategy.

2.2.5 Civil Contingencies Act

Under the Civil Contingencies Act (2004)[21], Southend-on-Sea Borough Council is a Category 1 Responder and therefore has the duty to put in place emergency plans and assess local risks to inform emergency planning. Southend-on-Sea Borough Council is also required to make information available to the public about civil protection matters and maintain arrangements to warn and advise the public in the event of an emergency.

2.3 Southend-on-Sea Borough Council Local Flood Risk Documents

The increased focus on flood risk over recent years is an important element of adaptation to climate change. It is important that this LFRMS is not viewed as an isolated document, but one that connects with other strategic and local

[16] Southend-on-Sea Borough Council (2011). Preliminary Flood Risk Assessment, Available online at: http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/research/planning/135522.aspx
[17] Environment Agency (2013). Flood Hazard and Flood Risk Maps (2013). Available online at: https://www.gov.uk/government/collections/river-basin-districts-flood-risk-maps#anglian-river-basin-district
[18] Communities and Local Government (March 2012) National Planning Policy Framework. Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf
[19] Communities and Local Government (2014) Planning Practice Guidance: Flood Risk and Coastal Change: http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/
[20] Environment Agency (2011) 'National Flood and Coastal Erosion Risk Management Strategy', Environment Agency: Bristol. Available online at: https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england
[21] Civil Contingencies Act 2004: http://www.legislation.gov.uk/ukpga/2004/36/pdfs/ukpga_20040036_en.pdf

plans. The Southend-on-Sea LFRMS links into a number of regional and local plans which are discussed in more detail below.

2.3.1 South Essex Catchment Flood Management Plan (CFMP)

A CFMP is produced by the Environment Agency to review the current and future flood risk in a catchment and set out policies for managing flood risk in the future. The South Essex CFMP identifies Policy Option 5 as being relevant to Southend-on-Sea. This policy relates to 'areas of moderate to high flood risk where we can generally take further action to reduce risk.' A key aim for Southend-on-Sea in relation to this policy is to investigate methods for managing flood risk. The CFMP also encourages development of flood awareness and emergency response plans, as well as an integrated approach from organisations to address urban drainage and surface water flooding issues.

2.3.2 Southend-on-Sea Borough Council Preliminary Flood Risk Assessment (PFRA)

In accordance with the requirements of the Regulations, Southend-on-Sea Borough Council prepared a PFRA for our administrative area in 2011. The PFRA contains information regarding past and future (potential) floods from local sources of flooding, which principally includes surface water, groundwater and ordinary watercourses.

As part of the PFRA, areas at risk of flooding are identified. In order to ensure a consistent national approach in identifying risk areas, Defra utilised national flood risk information to identify 1km squares where local flood risk is considered to be an issue. Where a cluster of grid squares leads to an area where flood risk is more concentrated and over 30,000 people are predicted to be at risk of flooding, this area has been identified as an 'Indicative Flood Risk Area'.

Of the ten national Indicative Flood Risk Areas, one falls partly within Southend-on-Sea Borough Council's administrative boundary. The PFRA provided an opportunity for Southend-on-Sea Borough Council to contest the Indicative Flood Risk Area. The PFRA identified that whilst there is a potential risk of surface water flooding causing 'significant harmful consequences', limitations with the data available at the time of writing the PFRA provided insufficient evidence for Southend-on-Sea Borough Council to contest the Indicative Flood Risk Area, instead an alteration to the boundary of the risk area was made to include the entire extent of the Borough.

2.3.3 Southend-on-Sea Borough Council Strategic Flood Risk Assessment (SFRA)

Under the NPPF, LPAs are required to produce an SFRA to support their Local Plan. This provides an important tool to guide planning policies and strategic land use decisions. Current SFRAs have a strong emphasis on fluvial flooding from main rivers and the sea and are widely considered to be relatively weak in evaluating flooding from other sources including surface water, groundwater and ordinary watercourses. The information from the LFRMS and work carried out under the Regulations will improve this understanding. A Level 1 SFRA[9] was completed for Southend-on-Sea in September 2010 and a Level 2 SFRA[10] in November 2010.

2.3.4 Southend-on-Sea Borough Council Surface Water Management Plan (SWMP)

The Southend-on-Sea SWMP[8], 2011 has been prepared for Southend-on-Sea's administrative area and will primarily inform the Flood Risk Management Plan required under the Flood Risk Regulations for Southend-on-Sea. As part of the SWMP, Critical Drainage Areas (CDAs) are defined to highlight the areas within the borough at greatest risk of surface water flooding. The SWMP has been used to inform this LFRMS with regards to identifying current flood risk from surface water, groundwater and ordinary watercourses. The flood risk to receptors from surface water flooding has been identified in Section 3 of this LFRMS.

It should be noted that for the purposes of delivering a SWMP and in line with Environment Agency recommendations, Critical Drainage Areas should now be referred to as Critical Drainage Catchments (CDCs).

2.3.5 Essex and South Suffolk Shoreline Management Plan (SMP)

A SMP is a strategic-scale assessment of the risk associated with coastal processes and risks to people and the environment and identifies the best was to manage coastal flood and erosion risk. Southend-on-Sea falls within the management unit of Essex and South Suffolk. The first SMP was completed in 1997, and was revised in 2010 (SMP2, 2010). It is outlined that for Southend-on-Sea, the preferred management strategy will be to maintain the line and standard of the current defences, including taking into account the effects of climate change.

2.3.6 Thames Estuary 2100 Plan (TE2100)

The Environment Agency Thames Estuary 2100 (TE2100) Plan[22] sets out the strategic plan for managing tidal flood risk in the Thames Estuary to the end of the century and beyond. TE2100 covers the Southend frontage as far as the Ness at Shoeburyness. The plan recommends the required flood risk management measures as well as when and where these will be needed, based on climate changes and rising sea level. The plan, which is adaptive, currently sets out recommended future flood defence levels for the tidal frontages in Southend-on-Sea and will be an important factor in planning sustainable development in areas at risk of flooding in future years.

Within the TE2100, the following policy units fall within the Southend-on-Sea administrative area:

- Action Zone 6 – Hadleigh Marshes: P3, to continue with existing or alternative actions to manage flood risk. The Environment Agency will continue to maintain flood defences at their current level, accepting the likelihood and/or consequence of a flood will increase because of climate change.
- Action Zone 8 – Leigh Old Town & Southend-on-Sea: P4, to take further action to keep up with climate and land use change so that flood risk does not increase.

The TE2100 Plan makes 8 recommended actions to deliver the TE2100 aspirations over the next 100 years in the Hadleigh Marshes policy unit and 9 recommended actions for the Leigh Old Town and Southend-on-Sea policy unit.

Southend-on-Sea Borough Council is an Operating Authority for coastal and tidal defences within the Leigh Old Town and Southend-on-Sea policy unit. Southend-on-Sea Borough Council is therefore responsible for the preparation of Project Appraisal Reports for works flowing from the TE2100 plan in this Action Zone. The Environment Agency will be involved in works at Hadleigh Marshes and Leigh High Street, but most of the other schemes from the TE2100 will be promoted and delivered by Southend-on-Sea Borough Council.

2.3.7 Southend-on-Sea Shoreline Strategy Plan (SSP)

The Southend-on-Sea SSP 1997[23] was completed following from the SMP to outline in greater detail how to achieve the preferred management strategy. The SSP looked at the engineering, economic and environmental constraints associated with various defence systems. Following this assessment, the most appropriate defence strategy was selected in order to achieve the overarching SMP objectives.

Southend-on-Sea Borough Council is currently in the process of updating the SSP.

2.3.8 Core Strategy

The Core Strategy (2007)[24] forms part of the Southend-on-Sea Local Development Framework. This provides overarching planning policies and strategies for spatial development within Southend-on-Sea. The Core Strategy sets out policies for planning applications including policy requirements for the enhancement and protection of the natural environment.

[22] Environment Agency (2012) The Thames Estuary 2100 Plan http://www.environment-agency.gov.uk/homeandleisure/floods/125045.aspx
[23] Mouchel (1997) Southend-on-Sea Shoreline Management Strategy. Mouchel, Surrey. Available online at: http://www.southend.gov.uk/download/downloads/id/1611/shoreline_strategy_plan_-_vol_1pdf
[24] Southend-on-Sea Local Development Framework 2001 – 2021: Core Strategy Development Plan Document (December 2007). Available online at: http://www.southend.gov.uk/info/200420/planning_policy_documents

3 Managing Flood Risk in Southend-on-Sea

3.1 Overview

The Act states that a LFRMS must specify *'the risk management authorities in the authority's area'*[25]. It also states that the LFRMS must specify *'the flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area'*.

3.2 Risk Management Authorities

In accordance with the Act, Risk Management Authorities may include the Environment Agency, an LLFA, a District/Borough Council for an area for which there is no Unitary Authority, an Internal Drainage Board (IDB), a water company and a highway authority. The following RMAs have therefore been identified across Southend-on-Sea Borough Council's administrative area:

- Southend-on-Sea Borough Council;
- Environment Agency;
- Southend-on-Sea Borough Council as the Highways Authority; and,
- Anglian Water.

The detailed roles and responsibilities of the RMAs are set out in the Southend-on-Sea Stakeholder Engagement Plan (Appendix B) and are summarised in Section 4.3.

Although not designated as RMAs by the Act, the following groups or organisations have an interest, roles and functions in flood risk management and have therefore been identified within the LFRMS:

- The public;
- Residence Associations': Shoebury Residents Association, Garrison Residents Association;
- Friends of Shoebury Common;
- Essex County Council;
- Regional Flood and Coastal Committee (FRCC);
- Leigh-on-Sea Town Council;
- Network Rail;
- Essex County Fire and Rescue Services;
- Essex Police;
- Land owners and land managers;Riparian Owners;
- Essex and Suffolk Water; and,
- The media.

3.3 Roles and Responsibilities

As stated in the Act: *'A relevant authority must co-operate with other relevant authorities in the exercise of their flood and coastal erosion risk management functions'*[26]. This will be particularly important in the case where there are interactions between different sources of flooding, for example when an ordinary watercourse flows into a main river, or where a surface water sewer flows into an ordinary watercourse.

[25] Part 1, Article 2, Section 9 Sub-Section 4a
[26] Part 1, Article 13, Section 1

3.3.1 Information and Skill Sharing

It is essential that RMAs work together to achieve the functions set out in the Act. Effective sharing of information between RMAs can go a long way towards this aim.

Section 14 of the Act gives Southend-on-Sea Borough Council (as the LLFA), the power to request information in connection with its flood risk management functions. It also states that information requested must be provided in the manner and within the period specified in the request.

'Information' can cover any data, documents or facts recorded in any form and includes paper files, notes, reports, databases, spreadsheets, drawings and plans, photographs and videos, electronic documents, emails, etc. There is a vast amount of data, in these different forms, held by a number of different RMAs; the challenge will be identifying what information exists and where it is held. This process was initiated during the preparation of the PFRA and continued though the completion of a number of Flood Investigation Reports. This data has provided the overall evidence base of flood risk information which will inform future flood risk management work. Suggested data sharing agreements between key stakeholders are presented in the Stakeholder Engagement Plan (Appendix B).

3.4 Southend-on-Sea Borough Council

As the LLFA, Southend-on-Sea has a number of duties and discretionary powers under the Act, the Regulations and the Land Drainage Act 1991.

3.4.1 As the Lead Local Flood Authority

Southend-on-Sea Borough Council, as the LLFA, has a strategic overview role and a responsibility to investigate flood incidents from surface water, groundwater and ordinary watercourses where it is considered necessary and appropriate (as per the thresholds outlined on in section 6.2.2). As part of this role, Southend-on-Sea Borough Council hold quarterly Local Flood Risk Management Partnership meetings with the RMAs to discuss and report on flood management.

The Act outlines that the LLFA has powers to designate structures and features that affect flooding in order to safeguard assets that are relied upon for flood risk management of surface water, groundwater and ordinary watercourses. Once a feature is designated, the owner must seek consent from the authority to alter, remove or replace it (Schedule 1, Section 1).

3.4.2 As a Highways Authority

The highway drainage system is integral in the management and behaviour of surface water during heavy rainfall events. As a Highways Authority, the Highways Act 1980[27] requires that Southend-on-Sea ensure that highways are drained of surface water and where necessary maintain all drainage systems.

3.4.3 As an Emergency Responder

Southend-on-Sea Borough Council is a Category 1 Responder under the Civil Contingencies Act 2004 and therefore has a responsibility, along with other organisations for developing emergency plans, contingency plans and business continuity plans to help reduce, control or ease the effects of an emergency. The complex and diverse nature of flooding and the consequences that arise, require a comprehensive and often sustained response from a wide range of organisations, and as such Southend-on-Sea Borough Council has prepared a Multi-Agency Flood Plan[28] to allow all responding parties to work together on an agreed coordinated response to severe flooding.

3.4.4 As a Local Planning Authority

As a Local Planning Authority Southend-on-Sea Borough Council has a responsibility to consider flood risk in their strategic land use planning and the development of our Local Plan. Southend-on-Sea Borough Council is the 'decision maker' on flood risk for planning applications for development, taking into consideration technical advice from other RMAs as statutory consultees.

The NPPF and the supporting Planning Practice Guidance require LPAs to undertake an SFRA and to use their findings, and those of other studies, to inform strategic land use planning. This includes a requirement to steer development towards areas of lowest flood risk before considering development in areas more prone to flooding, through the

[27] Highways Act 1980. Available online at: http://www.legislation.gov.uk/ukpga/1980/66/contents

[28] Essex County Council (2011) Southend-on-Sea Borough Council Multi-Agency Flood Plan (Draft)

application of the Sequential Test. The Southend-on-Sea Level 1 SFRA was produced in 2010 to support the Local Plan[29].

When considering applications for development, site-specific flood risk assessments are a requirement from the NPPF. In their role as LLFA, Southend-on-Sea Borough Council is statutory consultee on surface water flood risk and drainage strategies submitted as part of site specific Flood Risk Assessments for sites over 1ha.

3.4.5 As an Asset Owner

Southend-on-Sea Borough Council are responsible for the maintenance of Council owned assets which have a role in flood risk management including ordinary watercourses, drainage gullies, trash screens and culverts.

As owners of the majority of the coastal flood protection assets in Southend-on-Sea, the Council has an important role in maintaining and improving them.

3.4.6 As Regulator of Ordinary Watercourses

Southend-on-Sea Borough Council has the powers of ordinary watercourse consent under the Land Drainage Act 1991. Any works (either temporary or permanent), that may alter or impact the flow or storage of water within an ordinary watercourse will require consent from the Council prior to any work being carried out. Southend-on-Sea Borough Council therefore have:

- The power to serve notice on riparian landowners along ordinary watercourses who need to carry out maintenance to reduce flooding.
- The power to serve notice on a person to abate a nuisance in relation to an ordinary watercourse where that nuisance is an obstruction erected, raised or altered or any culvert erected or altered without prior consent as required under Section 23 of the Land Drainage Act 1991.
- Southend-on-Sea Borough Council has permissive powers to carry out flood defence works for ordinary watercourses at our discretion, in a similar manner to those powers used by the Environment Agency for main rivers.

3.5 The Environment Agency

The Environment Agency has the statutory responsibility for managing flood risk for main rivers, tidal sources and the sea, and reservoirs, as well as providing a strategic overview for all flooding sources and coastal erosion. The Environment Agency take a risk based approach to flood risk management and have a number of roles and responsibilities including as a statutory consultee on tidal and fluvial flood risk throughout the planning process and regulation of any works in, over, or near a main river or flood defences to secure the efficient working of the drainage system.

The Environment Agency has a duty to develop, maintain, apply and monitor a National Flood and Coastal Erosion Risk Management Strategy, and has the power to request information relating to its flood and coastal erosion risk management functions. Similarly, the Environment Agency has the power to designate structures as flood defences under the FWMA.

3.6 Anglian Water

Under the Act, Anglian Water is responsible for managing the risks of flooding from adopted sewers[30] (including surface water, foul and/or combined sewer systems) where the sewer flooding is wholly or partly caused by an increase in the volume of rainwater (including snow and other precipitations) entering or otherwise affecting the system. Within Southend-on-Sea there are sections of culverted watercourse that also fall under the responsibility of Anglian Water as they form part of the adopted sewer system.

The water and sewerage undertakers for Southend-on-Sea must cooperate with other RMAs in exercising their flood management functions and may share information relating to this duty. Under the Regulations, the water and sewerage

[29] See the Southend-on-Sea Borough Council website for the latest version of Local Plan: http://www.southend.gov.uk/info/200449/saved_planning_policies/495/southend-on-sea_borough_local_plan
[30] Adopted under the Water Industry Act 1991

undertakers must comply with a request of Southend-on-Sea Borough Council to provide information reasonably required in connection with their responsibility as LLFA.

In October 2011, water and sewerage companies in England and Wales became responsible for private sewers which were previously the responsibility of property owners. However, not all private sewers were included; there are some cases where the property owners remain responsible for the sections of pipe between the property and the transferred private sewer[31].

3.6.1 Essex and Suffolk Water

Essex and Suffolk Water is responsible for maintaining, improving and extending the water mains and other pipes under Section 37(1)(b) of the Water Industry Act 1991. If a water main bursts, it is Essex and Suffolk Water's responsibility, as the water undertaker and sewerage, to manage and repair this.

3.6.2 Developers

Developers have a vital role to play in delivering the outcomes of the LFRMS. The LFRMS should be considered as supplementary planning guidance and therefore form a material consideration in the planning process. Developers should take note of the information contained within the LFRMS and work collaboratively with the LLFA and other RMAs in Southend-on-Sea to assist the delivery of local flood risk management for the benefit of all who live or work in the Borough. Developers will have a key role in the development of Sustainable Drainage Systems (SuDS) throughout the borough.

3.7 Property Owners, Residents and Local Business

One of the key requirements for Southend-on-Sea Borough Council as we take on our role as LLFA and develop this LFRMS will be to continue to assess the local flood risk across the Borough and investigate areas of significant flood risk. In many cases, Southend-on-Sea Borough Council and other RMAs will be reliant on information from local residents and business owners in order to be able identify the mechanisms and impacts of flood events. It is important that this information is directed to Southend-on-Sea Borough Council and acted upon where appropriate to fulfil the requirements of the Act and thereby continue to assist in the management of local flood risk.

In order to fulfil these responsibilities of reporting flood incidents to Southend-on-Sea Borough Council and undertaking management measures for their own properties and local areas, local groups of residents or property owners may consider establishing local partnerships or flood working groups to tackle flood risk issues together.

As well as informing Southend-on-Sea Borough Council of areas experiencing flooding, the public also have a role to play in finding out whether they are at risk, and if so, implementing flood risk management measures where they are responsible for protecting their properties. It is important that householders, whose homes are at risk of flooding, take steps to ensure that their home is protected.

The National Flood Forum[32] provides advice for homeowners and businesses on how to protect their property from flooding. Practical guidance can also be found in the publication 'Prepare your property for flooding' available on the Environment Agency website[33].

3.7.1 Riparian Owners

Land owners, who have land bordering on a watercourse, or through which a watercourse runs, are riparian owners. As riparian owners, land owners have certain legal responsibilities to maintain the watercourse. Where a watercourse marks the boundary between adjoining properties, it is normally presumed the riparian owner owns the land up to the centre line of the watercourse. The Environment Agency have published a document entitled 'Living on the Edge'[34] which provides a useful guide to the rights and responsibilities of those who own land adjacent to main rivers and ordinary watercourses. Southend-on-Sea Borough Council aim to ensure that riparian ownership responsibility is communicated to residents via our quarterly newsletter.

[31] Information relating to sewer responsibility can be found on the Anglian Water website: https://www.anglianwater.co.uk/household/water-recycling-services/Private-sewers-and-lateral-drains.aspx
[32] National Flood Forum: http://www.nationalfloodforum.org.uk/
[33] Environment Agency website - 'Prepare your property for flooding' https://www.gov.uk/prepare-for-a-flood
[34] Environment Agency (2012) 'Living on the edge', Environment Agency: Bristol. Available online at: https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities

RMAs have powers and responsibilities to manage flood risk and work with others to improve river environments. This may often affect riparian owners, who must also adhere to certain responsibilities including:

- To maintain the watercourse and to clear any obstructions (natural or otherwise) so the normal flow of water is not impeded;
- To maintain the banks and bed of the watercourse and any flood defences that exist on it;
- To accept the natural flow from their upstream neighbour and transfer it downstream without obstruction, pollution or diversion;
- To maintain any structures on their stretch of watercourse including culverts, weirs and mill gates; and
- To apply to Southend-on-Sea Borough Council for formal consent for any works in or adjacent to an ordinary watercourse, or to the Environment Agency for works within 9m of a designated main river watercourse.

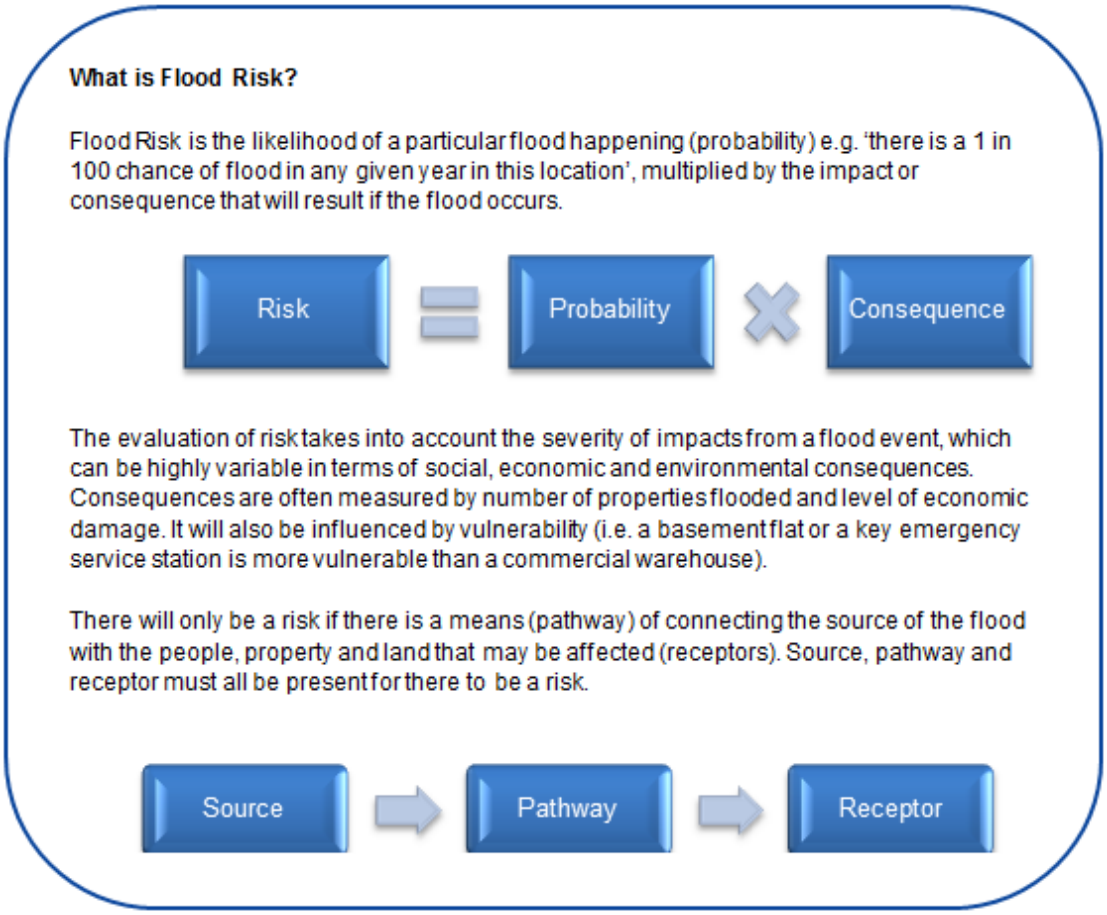
As described in Section 3.4.6, Southend-on-Sea Borough Council has permissive powers to carry out flood defence works for ordinary watercourses at their discretion, in a similar manner to those powers used by the Environment Agency for main rivers.

4 FLOOD RISK IN SOUTHEND-ON-SEA

4.1 What is flood risk?

Flood risk is not just the likelihood of flooding occurring, but a function of likelihood combined with the potential damage a flood could cause. Assessing risk in quantifiable, financial terms can help prioritise where available funding should be directed, as well as support applications for additional external funding.

However, it should be noted that the consequences of flooding can be far reaching and not always easy to evaluate, particularly the social impacts of displacement, loss and fear of repeat events. All available information and past experiences have been considered in developing the objectives for managing future flood risk within this strategy.



4.2 Overview of flood risk in Southend-on-Sea

This Section provides an overview of local flood risk from surface water, groundwater and ordinary watercourses across Southend-on-Sea, based upon previously completed studies. For more detailed information on the methodology used to quantify flood risk to Southend-on-Sea, the relevant report should be referred to as detailed in each sub-section below.

Across Southend-on-Sea there is a risk of flooding from a range of sources, including surface water runoff, groundwater, sewers, the sea, rivers and ordinary watercourses. In many areas, more than one of these sources could combine to cause a flood event.

4.3 Flooding from Surface Water

Surface water flooding, also known as pluvial flooding, occurs when high intensity rainfall generates runoff which flows over the surface of the ground and accumulates in low lying areas. The presence of impermeable surfaces, saturated soils and insufficient capacity within the drainage network can further exacerbate surface water flooding.

In December 2013, the Environment Agency published the "Risk of Flooding from Surface Water"[35] mapping which provides indicative extents of surface water flood risk across England and Wales. The maps identify the risk of surface water flooding of areas at a strategic scale and bands flood risk as follows:

- High Risk – at risk of flooding for a rainfall event with a 3.3% (or greater) probability of occurrence in any given year,
- Medium Risk – at risk of flooding for a rainfall event between a 3.3% and 1% probability of occurrence in any given year,
- Low Risk – at risk of flooding for a rainfall event between a 1% and 0.1% probability of occurrence in any given year, and,
- Very Low Risk – at risk of flooding for a rainfall event with less than a 0.1% probability of occurrence in any given year.

Based on available historic information, the dataset is considered to reflect surface water flood risk across Southend-on-Sea. This will be used as the surface water flood risk map for the Borough until such time as further updates or improved modelling of risk are undertaken.

Figures A3 to A5 within Appendix A presents the Risk of Flooding from Surface Water flood depth and hazard for the Borough.

The SWMP[8] identifies six Critical Drainage Areas (CDAs) within Southend-on-Sea which are considered to be the areas that contribute to hotspots of surface water flooding. These are Eastwood, Prittlebrook, Temple Sutton, Southchurch, Shoeburyness and Chalkwell and are shown in Figure A1 in Appendix A.

- Further information on surface water flooding within Southend-on-Sea can be found in the following documents:
- Southend-on-Sea SWMP;
- Southend-on-Sea PFRA; and
- Flood Risk from Surface Water Map[35].

4.3.1 Historic Flooding

As part of the SWMP historical flooding records were collated from numerous sources, including several Southend-on-Sea Borough Council departments, Essex County Fire & Rescue Service, Anglian Water and the Environment Agency.

Recently, Southend-on-Sea has experienced a number of significant surface water flooding events, the results of which have required Flood Investigations to be completed under Section 19 of the Act. These events are summarised as follows:

24th of August 2013[36]**:** Intense rainfall, coinciding with a high spring tide, is thought to have caused flooding across the Borough especially within the Eastwood, Chalkwell, Marine Parade and Eastern Esplanade areas. Flooding resulted primarily from intense rainfall, however sources of fluvial and sewer flooding further contributed to flooding. A total of 255 flooding incidents were reported, with 151 of these being internal flooding including three properties that required evacuation.

11th October 2013[37]**:** Widespread flooding was recorded on the 11th October 2013. This is thought to be as a result of heavy rainfall coinciding with high tides resulting in 19 recorded incidents of flooding. Three areas saw repeated flooding on the 13th October 2013 following further rainfall.

[35] Environment Agency (2013) Risk of Flooding from Surface Water. Available online: http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?&topic=ufmfsw#x=357683&y=355134&scale=2
[36] URS 2014, Southend-on-Sea Borough Council 24th August 2013 Flood Investigation Report.
[37] URS 2014, Southend-on-Sea Borough Council 11th October 2013 Flood Investigation Report

20th July 2014[38]**:** Flooding was observed, primarily to the west of the Borough following heavy rainfall. In total 30 incidents of flooding were recorded, including the internal flooding of Southend General Hospital.

19th September 2014[39]**:** Intense rainfall was observed within the southern extents of the Borough. 61 incidents of flooding were recorded including internal property flooding.

In addition Southend-on-Sea has experienced ongoing flooding within the Rebels Lane area. This has been documented within the Rebels Lane, January 2014 Flood Investigation Report[40].

These records of flooding have been mapped and are presented in Figure A2 in Appendix A.

4.3.2 Properties and Risk of Surface Water Flooding

High-level, Borough-wide property counts have been undertaken using the Risk of Flooding from Surface Water mapping to determine the extent of surface water flood risk across the Borough. This considers the flood risk posed to residential and non-residential (including commercial & industrial properties and critical infrastructure) properties.

Table 4.1 below outlines these results. Figure A10 plots the locations of the critical infrastructure against the risk of flooding from surface water mapping.

If a property is deemed to be at a 'high risk' (i.e. at risk of surface water flooding from a 3.3% probability of occurrence event) the same property will also be at risk of surface water flooding from a 1% and 0.1% probability of occurrence event which will result in wider flood risk across the Borough. Simultaneously, property deemed at 'low risk' i.e. at risk of surface water flooding from a 0.1% probability of occurrence event, will not necessarily be at risk of surface water flooding as a result of a 1% or 3.3% probability of occurrence event. Therefore figures in Table 4.1 for properties at low risk will also include properties at medium and high risk of surface water flooding. Figures for properties at medium risk will also include properties at high risk of surface water flooding.

Table 4.1: Surface Water Flood Risk Property Counts

Property Type			Risk (cumulative i.e low includes medium and high, medium includes high etc.)		
			Low (1% to 0.1% probability of occurrence)	Medium (3.3% - 1% probability of occurrence)	High (3.3% probability of occurrence or greater)
Residential			7084	2152	813
Non - Residential	Commercial & Industrial		673	264	136
	Critical Infrastructure	Emergency Services	3	3	1
		Hospitals	1	1	1
		Schools & Education Facilities	34	16	8
		Surgery or Health Care	13	4	3
		Residential Homes	5	1	0
		Sewage Treatment	0	0	0
		Electricity Substation	9	29	1
	Other		696	253	99
	Non- Residential Total		**1434**	**571**	**249**
TOTAL			**8518**	**2723**	**1062**

The uFMfSW along with historic records of flooding, show the properties at greatest risk of surface water flooding are predominantly within the areas of low lying land at:

- Southend-on-Sea seafront (Marine Parade and Eastern Esplanade);

[38] URS 2014, Southend-on-Sea Borough Council 20th July 2014 Flood Investigation Report
[39] URS 2014, Southend-on-Sea Borough Council, Flood Investigation Report Interim Report
[40] URS 2014, Southend-on-Sea Borough Council, Rebels Lane January 2014 Flood Investigation Report

- Victoria Road, Shaftesbury Avenue and Northumberland Crescent;
- The Ridgeway, Chalkwell Avenue and Chalkwell Esplanade;
- Roads adjacent to Gunners Park;
- Land adjacent to Eastwood Brook, Prittle Brook and Willingale Brook and,
- The area of Bournes Green.

4.4 Flooding from Groundwater

Groundwater flooding occurs as a result of water rising up from the underlying aquifer or from water flowing from springs. This tends to occur after long periods of sustained high rainfall, and the areas at most risk are often low-lying where the water table is more likely to be at shallow depth. Groundwater flooding is known to occur in areas underlain by principal aquifers, although increasingly it is also being associated with more localised superficial deposits associated with floodplain sands and gravels.

Groundwater flooding tends to last longer than fluvial, pluvial or sewer flooding. Basements and tunnels can flood, buried services may be damaged, and storm sewers may become ineffective, exacerbating the risk of surface water flooding.

It is also important to consider the impact of groundwater level conditions on other types of flooding (e.g. fluvial, pluvial and sewer flooding). High groundwater level conditions may not lead to widespread groundwater flooding. However, they have the potential to exacerbate the risk of pluvial and fluvial flooding by reducing rainfall infiltration capacity, and to increase the risk of sewer flooding through sewer/groundwater interactions.

Figure A6 (Appendix A) shows Figure B7 from the SWMP and details reported groundwater flooding incidents in Southend-on-Sea, as well as the superficial and bedrock geology.

As part of the SWMP an intermediate assessment of groundwater flooding susceptibility was carried out through reviewing the geology and hydrogeology of the Borough (refer to the SWMP for the full methodology).

Based on the current hydrogeological conceptual understanding, there are five key groundwater flooding mechanisms that may exist and these mechanisms are described in detail in the SWMP:

- Superficial aquifers along Prittle Brook (Priory Park and downstream of the Park), Eastwoood Brook (Eastwood Area) and River Shoe (upstream of the Barge Pier Ditch);
- Superficial aquifers in various locations, not hydraulically connected to surface watercourses;
- Superficial aquifers along the coastline (Two Tree Island and east of Southend Pier to Pigs Bay);
- Impermeable (silt and clay) areas downslope of superficial aquifers in various locations; and
- Made ground in various locations.

The British Geological Survey (BGS) has produced a dataset showing areas susceptible to groundwater flooding on the basis of geological and hydrogeological conditions (Figure A7, Appendix A, an extract of Figure B9 from the SWMP). The map indicates that susceptibility to groundwater flooding is high to very high in some areas where Head deposits and River Terrace Deposits are present at the surface; along Prittle Brook, Eastwood Brook, Shoeburyness (eastern part of the study area) and around Southchurch in the central part of the study area. As expected, these locations coincide with those areas where the BGS has identified higher permeability (see Figure A8, Appendix A, an extract of Figure B10 from the SWMP).

Finally, those areas identified by the BGS as having no susceptibility to groundwater flooding could still be affected where groundwater springs/seepages form minor flows and ponding over impermeable strata. This mechanism may have resulted in the regular ponding of water observed adjacent to the River Shoe, where it is possible that groundwater seepages from the River Terrace Deposits seep onto the relatively impermeable Tidal Flat Deposits.

4.5 Flooding from Ordinary Watercourses

Ordinary watercourses include every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows, above ground or culverted, which is not designated as a main river[41].

The responsibility for managing and maintaining ordinary watercourses fall to riparian owners who typically own land on either bank and therefore are deemed to own the land to the centre of the watercourse. Southend-on-Sea Borough Council, as the LLFA, have responsibility to manage the risk of flooding arising from the watercourses through engagement with riparian owners and enforcing maintenance responsibilities in accordance with the Land Drainage Act 1991[42].

In addition, the Council has riparian duties where watercourses run through or border the Councils own land.

In total there is approximately 5.3 km of ordinary watercourse in Southend-on-Sea, most of which are tributaries of main rivers. Table 4.2 below details the ordinary watercourses. Figure A9 in Appendix A shows the locations of these along with the main rivers.

Table 4.2: Ordinary Watercourses in Southend-on-Sea

Watercourse	Length (km)
Barge Pier Ditch	0.80
C-X Ditch	0.84
Tributaries of Prittle Brook (south-west of Belfairs Park)	0.85 (combined length)
Tributary of Prittle Brook (within Priory Park)	0.14
Tributary of Prittle Brook (Alton Gardens)	0.09
Tributaries of the Eastwood Brook within Southend-on-Sea, at Glenwood Avenue, Brendon Way and Aviation Way) excluding tributaries upstream	0.87 (combined length)
Tributary of Mucking Hall Brook (north of Royal Artillery Way)	0.39
Six small watercourses within Thorpe Hall Golf Course	0.963 (combined length)

The majority of the ordinary watercourses within the Borough are located within Gunners Park. The C-X Ditch and Barge Pier Ditch form the lower reaches of what was previously known as the River Shoe. The River Shoe is now largely culverted and considered to be part of Anglian Water's surface water drainage network.

The C-X Ditch has been adopted by Southend-on-Sea Borough Council, who is the riparian owner. This watercourse functions to drain the Shoeburyness catchment and discharge to the Thames Estuary beyond the sea wall. As identified within the PFRA, this watercourses and the Barge Pier Ditch, have previously been associated with groundwater flooding. In addition, flooding has been observed from these watercourses on the 24th of August 2013, 11th October 2013 and 20th July 2014 as described previously in Section 3.3.1.

No modelling of the flood risk from ordinary watercourses has been undertaken to date across Southend-on-Sea. Therefore future flood risk is based on the potential risk that might arise based on knowledge of known flooding hotspots and potential mechanisms for flooding. Often flooding from ordinary watercourses can combine with other sources of flooding, such as surface water or main river flooding to exacerbate flood risk. Therefore it is important to consider all these sources in combination.

The majority of ordinary watercourses within the Borough are open channel; however there are also sections that are culverted. Trash screens at the entrances to culverts, as well as the culverts themselves have the potential to become blocked by items such as plant debris and rubbish. Blockages can restrict the natural flow of water, increasing the chance of water flowing out of bank and causing local flooding due to the reduced conveyance potential of the associated watercourse. Therefore the risk of flooding from ordinary watercourses can be very localised and

[41] Main Rivers are watercourses shown on the statutory main river maps held by the Environment Agency, the Department of Environment, Food and Rural Affairs (in England) and the Welsh Assembly Government (in Wales). They can include any structure or appliance for controlling or regulating the flow of water into, in or out of the channel.
[42] HMSO (1991) The Land Drainage Act: http://www.legislation.gov.uk/ukpga/1991/59/contents As amended by the Flood and Water Management Act 2010

management of it requires adoption of appropriate inspection and maintenance regimes to ensure this risk is minimised where possible. New maintenance contracts established by the Council include provisions for regular inspection and maintenance of ordinary watercourses.

4.6 Flood Risk from Other Sources

Under the Act and the Regulations, Southend-on-Sea Borough Council is not responsible for managing flood risk from reservoirs, sewers, main rivers or the sea. Flood risk in Southend-on-Sea from these sources is however, described below in order to provide a full overview of flood risk from all sources in the Borough.

4.6.1 Flooding from Main Rivers

River flooding occurs when water levels rise as a result of high or intense rainfall which flows into them, resulting in watercourses overflowing or overtopping their banks. A main river is defined by the Environment Agency on its Main River Map[43] and is usually a larger river or stream. Table 4.1Table 4.3 details the main rivers present within Southend-on-Sea, as shown in Figure A9 in Appendix A.

Table 4.3: Main Rivers within Southend-on-Sea

Watercourse	Length (km)
Eastwood Brook	7.6
Tributary of Eastwood Brook at Brendon Way and Snakes Lane	0.3
Prittle Brook	8.4
Prittle Brook Tunnel	2.8
Mucking Hall Brook	3.4
Willingale Brook	2.4

Further information on flood risk from main rivers within Southend-on-Sea can be found in the following documents and web-based sources:

- Southend-on-Sea Level 1 Strategic 1 Flood Risk Assessment;
- Southend-on-Sea Level 2 Strategic Flood Risk Assessment;
- Anglian River Basin District: Flood Risk Management Plan Scoping Report (2014)[44];
- The South Essex Catchment Flood Management Plan (2009)[45];
- Environment Agency Flood Map for Planning (Rivers and Sea)[46]; and
- Environment Agency Risk of Flooding from Rivers and the Sea mapping[47].

The Level 1 SFRA identifies the main sources of fluvial flooding within the Borough as being within the main rivers (Prittle Brook, Eastwood Brook and Willingale Brook).

The NPPF defines Flood Zones associated with tidal and river flooding based upon the probability of flooding. The extent of land adjacent to main rivers within Flood Zone 2 (between a 1% and 0.1% probability of flooding occurring in any given year and Flood Zone 3 (greater than 1% probability of flooding in any given year) varies throughout the Borough, as shown in Figure A9 in Appendix A.

[43] As set out by the Water Resources Act 1991
[44] Environment Agency (2014) Anglian River Basin District: FRMP Scoping Report. Available online at: https://www.gov.uk/government/publications/anglian-river-basin-district-flood-risk-management-plan-frmp-scoping-report
[45] Environment Agency (2009).The South Essex Catchment Flood Management Plan . Available online at: https://www.gov.uk/government/publications/anglian-river-basin-district-flood-risk-management-plan-frmp-scoping-report
[46] Environment Agency (2014) Flood Map for Planning (Rivers and Sea), Available online at: http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683&y=355134&scale=1&layerGroups=default&ep=map&textonly=off&lang=_e&topic=floodmap
[47] Environment Agency (2014) Risk of Flooding from Rivers and the Sea, Available online at: http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?&topic=floodmap#x=357683&y=355134&scale=2

Within Southend-on-Sea, the main area within Flood Zone 2 and 3, associated with fluvial flooding, is Eastwood and the Eastwood Brook.

4.6.2 Flooding from Tidal Sources and the Sea

Tidal flooding within Southend-on-Sea is present from the North Sea and Thames Estuary. The risk of tidal flooding is greatest when extreme water levels occur during storm surge events. Tidal defences are present along the Southend-on-Sea seafront; however the crest level (the top level of the wall) in some areas is lower than the extreme water levels. In these areas, there is a potential for tidal flooding from overtopping of the sea defences as well as the residual risk of failure of the flood defences. The Environment Agency is responsible for managing flood risk from tidal sources and the sea. However, there is a strong relationship between the Environment Agency and Southend-on-Sea Borough Council as the Council own and maintain the majority of sea walls. Southend-on-Sea Borough Council are currently finalising our Coastal Strategy for managing tidal flood risk. The strategy identifies a range of measures for the future to deal with future sea level rise and deficiencies in standard of protection.

The Environment Agency TE2100 Plan, previously described previously in section 2.3.6, sets out the strategic plan for managing tidal flood risk in the Thames Estuary to the end of the century. TE2100 covers the Southend frontage from the eastern end of Hadleigh Marsh to the west and extends as far east as the Ness at Shoeburyness. The TE2100 Plan recommends the required flood risk management measures as well as when these will be needed, based on climate changes and rising sea level. The plan, which is adaptive, currently sets out recommended future flood defences for the tidal frontages in Southend-on-Sea (Action Zones 6 and 8) and will be an important factor in planning sustainable development in areas at risk of flooding in future years.

Further details are provided within the following documents:

- Southend-on-Sea Level 1 Strategic Flood Risk Assessment;
- Southend-on-Sea Level 2 Strategic Flood Risk Assessment;
- Essex and South Suffolk Shoreline Management Plan; and
- Thames Estuary 2100 Plan for the Tidal Thames.

Extensive areas in Southend-on-Sea within Flood Zones 2 and 3, associated with coastal flooding are:

- Shoeburyness around Gunners Park; and
- Southchurch Park and surrounding areas as far as Bournes Green.

4.6.3 Flooding from Sewers

Within Southend-on-Sea, Anglian Water is the drainage undertaker and Essex and Suffolk Water is the potable water supplier. The sewer network across Southend-on-Sea is largely separate; however there are sections of old combined sewers within the southern and central parts of the Borough.

Anglian Water has a duty to provide and maintain a system of public sewers so that the areas for which they are responsible are effectually drained (Water Industry Act, 1991[48]). Since the late 1970s, and with the publication of Sewers for Adoption[49] in 1980, sewer systems have typically been designed and constructed to accommodate a rainfall event with a 3.3% probability of occurrence in any given year or less. Therefore, rainfall events with a rainfall probability of greater than 3.3% would be expected to result in surcharging of some of the sewer system.

Essex and Suffolk Water is responsible for maintaining, improving and extending the water mains and other pipes under Section 37(1)(b) of the Water Industry Act 1991. If a water main bursts, it is Essex and Suffolk Waters' responsibility to manage and repair this as the water and sewerage undertaker.

Sewer flooding can occur through several mechanisms:

- **The rainfall event exceeds the capacity of the sewer / drainage network**

[48] Water Industry Act (1991): http://www.legislation.gov.uk/ukpga/1991/56

[49] The Sewers for Adoption guide was first issued in 1980 by WRc. Since then the document has become the standard for the design and construction of sewers to adoptable standards in England and Wales. It acts as a guide to assist developers in preparing their submission to a sewerage undertaker before they enter into an Adoption Agreement under Section 104 of the Water Industry Act 1991

The majority of modern sewer systems are designed to accommodate rainfall events with a 3.3% probability of occurrence rainfall event. The majority of sewers in Southend-on-Sea were however constructed in the 1880s. Older sewer systems and combined sewers can have a lower capacity. As a result, the sewer system is expected to more frequently become overload and for flooding to occur.

- **The system becomes blocked by debris or sediment**

Depending on their location, gullies and drains can accumulate debris e.g. leaves, rubbish or silt. This can reduce the capacity or block the drain potentially leading to flooding from the drainage system. To mitigate this flood risk, Southend-on-Sea Borough Council Highways Department clear each gully twice a year as part of their maintenance regime. Where a complaint is received, each call is dealt with separately.

- **The system becomes blocked by domestic waste products**

As highlighted by Anglian Water's 'Keep it Clear' Campaign, sewer blockages may be caused by fats, oils, grease and un-flushable items which are largely derived from domestic waste streams and results in the majority of Anglian Water's flooding issues.

- **The system surcharges due to high water levels in rivers and sea**

Where a drainage system discharges into a river or sea, there is the potential that the system can become tide-locked when the outlet is submerged by high water levels; this means water cannot freely discharge from the drainage system. If the capacity in the sewer system is exceeded, flooding on the surface will occur which can be exacerbated if this occurs simultaneously with an extreme rainfall event. Flooding within Chalkwell, Eastern Esplanade and Marine Parade on the 24th of August was largely a result of this mechanism of sewer flooding.

4.6.4 Flooding from Reservoirs

A reservoir can be defined as a natural or artificial waterbody where water is collected and stored until needed.

Under the Act, The Environment Agency is responsible for managing flood risk from large raised reservoirs.

Large raised reservoirs are defined in the Act as:

- A large, raised structure designed or used for collecting and storing water;
- A large, raised lake or other area capable of storing water which was created or enlarged by artificial means;
- A structure or area is "raised" if it is capable of holding water above the natural level of any part of the surrounding land;
- A raised structure or area is "large" if it is capable of holding 25,000 m^3 of water or more, above the natural level of any part of the surrounding land.

There are presently no known large-raised reservoirs identified in the Southend-on-Sea Borough Council area. The Environment Agency flood risk from Reservoirs mapping indicates that there is no risk of flooding to the borough from large-raised reservoirs outside of the Borough.

4.7 Flood risk from combined sources

Within Southend-on-Sea there are numerous interactions between the different sources of flooding. These are discussed in further detail within the SWMP. In summary, the following interactions are present:

Surface water, sewer and tidal flooding: The influence of surface water, sewer and tidal flooding is most predominant in the southern extent of the Borough around the areas of Chalkwell, Eastern Esplanade, Marine Parade and Shoeburyness. This interaction occurs when heavy rainfall coincides with high tides. Heavy rainfall causes the sewer network to fill rapidly and high tide levels restrict the discharge from gravity drained surface water sewers. This causes the surface water sewer to reach capacity rapidly, resulting in flooding where surface water is either unable to enter the sewer network, or where the surface water sewers surcharge. In some areas, flooding is relieved by surface water pumping stations, located along the sea front. This mechanism of flooding is further exacerbated where flap valves on the sewer outfalls fail to close, allowing the ingress of tidal water into the sewer network, further reducing the storage capacity.

Surface water and fluvial flooding: Along Eastwood Brook and Prittle Brook, there is the tendency for surface water to accumulate adjacent to the river channels. The rivers within Southend-on-Sea respond rapidly to rainfall events due to the extensive impermeable coverage increasing the rate of surface water runoff into river systems.

Fluvial and tidal flooding: The Rivers that run through Southend-on-Sea discharge either to the Thames Estuary or to the River Roach, both of which are tidally influenced. Eastwood Brook, Prittle Brook and Mucking Hall Brook all discharge to the River Roach. The Prittle Brook Flood Relief Tunnel, C-X Ditch and Barge Pier Ditch all discharge to the Thames Estuary. During times of high tide or storm surges, there is the potential for the discharge from the rivers to be restricted by tide levels.

Fluvial and groundwater flooding: In areas where there are River Terrace Deposits, such as along the Prittle Brook, Eastwood Brook and River Shoe, there is the potential for groundwater flooding following periods of raised river levels. Stream levels may rise following high rainfall events but still remain “in-bank”, and this can trigger a rise in groundwater levels in the associated superficial deposits.

4.8 Impact of Climate Change

Current predictions of future rainfall indicate that we should expect increasing numbers of severe and extreme weather events in the future. Intense storms are the main cause of surface water flooding. It is predicted that the frequency of heavy rainfall events could double by the 2080s according to the UK Climate Projections[50]. By the 2080s, it is predicted that there could be around three times as many days in winter with heavy rainfall (25mm or more) and that the amount of rain in extreme storms (20% probability of occurrence or greater) could increase locally by 40%. Consequently, the number of properties, business and critical infrastructure at risk will increase.

The impacts of climate change on rainfall will depend largely on local conditions and vulnerability. Wetter winters may increase river flows across river catchments whereas more intense rainfall will increase the risk of surface water and sewer flooding. Groundwater levels are likely to increase during the winter and may decrease during prolonged dry periods. Increased groundwater levels could lead to groundwater flooding and higher flows in groundwater fed rivers.

The TE2100 report states that sea level rise in the Thames Estuary by 2100 could be between 0.2m and 0.9m due to thermal expansions of the oceans and melting glaciers and polar ice. In addition, climate change could potentially increase storm surge heights.

Past emissions means some climate change is inevitable, therefore future planning is essential to respond to the likely impacts.

Climate change predictions are used to define the likely percentage change in rainfall intensities, river flows and increases in sea levels. These predications are used to ensure that any design of drainage systems and flood defence measures will accommodate the likely future increase in flows/levels as a result of climate change.

Further information on climate change allowances and adaption to climate change can be found here:

- Climate change allowance for planners[51]; and,
- Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities[52].

[50] United Kingdom Climate Projections 2009 http://ukclimateprojections.defra.gov.uk//
[51] Environment Agency, September 2013, Climate change allowances for planners
[52] Environment Agency, Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities.

5 Southend-on-Sea Local Flood Risk Management Objectives

5.1 Overview

The Act states that a LFRMS must specify *'the objectives for managing local flood risk, (including any objectives included in the authority's flood risk management plan prepared in accordance with the Flood Risk Regulations 2009)'*[53].

Approach to identification of Flood Risk Management Objectives

In order to steer the development of local flood risk management objectives for Southend-on-Sea Borough Council, a review of the objectives set out in the Environment Agency's overarching National Flood and Coastal Erosion Risk Management Strategy for the whole of England (Defra, Environment Agency 2011) has been undertaken. In addition to the national objectives, the National Flood and Coastal Erosion Risk Management Strategy also sets out six high-level principles which, it suggests, should guide decisions relating to flood risk management and the processes by which they are taken:

1. Proportionate and risk based approach;
2. A catchment based approach;
3. Community focus and partnership working;
4. Beneficiaries encouraged to invest;
5. Sustainability; and
6. Multiple Benefits.

The Environment Agency's National Flood and Coastal Erosion Risk Management Strategy sets out the following national objectives for flood risk management:

1. Understand the risks;
2. Prevent inappropriate development;
3. Manage the likelihood of flooding;
4. Help people to manage their own risk; and
5. Improve flood prediction, warning and post-flood recovery.

The local objectives for Southend-on-Sea Borough Council's LFRMS have therefore been developed in line with the five national objectives and the six guiding principles set out in the National Flood and Coastal Erosion Risk Management Strategy.

A workshop was held with officers of the Council to identify and capture our flood risk management objectives. Representatives were invited from a range of departments including Highways, Strategic Planning, Parks and Leisure, Coastal and Flood Defence, Waste Management and Street Cleansing to contribute to the development of the Council's LFRMS objectives.

[53] Part 1, Article 2, Section 9 Sub-Section 4c

5.2 Southend-on-Sea Borough Council's Objectives

Southend-on-Sea Borough Council has developed the following objectives:

Southend-on-Sea LFRMS Objectives:

1. Improve understanding of flood risk including likely effects of climate change.
2. Encourage future development to provide a betterment to flood risk.
3. Pursue flood risk management measures using a risk based approach that provide multiple social, economic and environmental benefits to the Borough.
4. Raise awareness of flood risk and available management measures to communities, residents and businesses.
5. Use knowledge of flooding to inform the emergency response.
6. Continue to manage local flood risk and coastal flooding & erosion.

6 Delivery of Local Flood Risk Management

6.1 Overview

This section will outline how the local flood risk management objectives will be delivered through a series of measures. A number of measures and actions have been identified to achieve this and are set out within the Action Plan, presented in Appendix C.

As the LLFA, Southend-on-Sea Borough Council has already undertaken a number of activities to deliver duties under the Act and take a proactive approach to delivering local flood risk management in the Borough. Some of the key activities undertaken to date include:

- Production of the Southend-on-Sea SWMP;
- Production of the Southend-on-Sea PFRA;
- Setting up the Local Flood Risk Management Partnership, to enable discussions between the RMAs;
- Setting up procedures and delivering legislative duties as required under the Act;
- Improving awareness of flood risk through the collation of historic flooding incident details, asset locations, and flood risk information on a central database;
- Enhanced resources available for Emergency Planning purposes through the utilisation of WaterRide emergency planning software;
- Completion of numerous Flood Investigation Reports following incidents of extensive and ongoing flooding (see section 6.2.2); and,
- Development and maintenance of the council's asset register, including details of Anglian Water and Environment Agency assets within the Borough (see section 6.2.3).

6.2 Delivery of Legislative Duties to Date

Under the Act, Southend-on-Sea Borough Council has a number of duties and powers relating to the management of local flood risk. The existing procedures which are in place and the proposed measures to deliver these are outlined in the following sections.

6.2.1 Forge Partnerships and Lead on Local Flood Risk Management

An external partnership exists with the Council and the RMAs within the Local Flood Risk Management Partnership. Workshops have been held to determine the ownership of assets across the Borough and the exchange of details of flooding incidents.

Southend-on-Sea Borough Council is in the process of setting up an online data sharing service for use between council departments and the RMAs. Quarterly meetings are held to provide updates, coordinate actions and implement partnership working.

The Southend-on-Sea Emergency Planning department work as part of the Essex Resilience Forum, where coordinated approaches to emergency response, including management of flooding incidences, are developed.

6.2.2 Investigate Flood Incidents

Under Section 19 of the Act, Southend-on-Sea Borough Council has a duty to report and investigate flooding incidents that are considered to be 'significant'. Southend-on-Sea Borough Council must investigate which RMAs have relevant flood risk management functions and whether they have carried out, or intend to carry out, those functions. Where an investigation is carried out, Southend-on-Sea Borough Council will subsequently publish the results, and notify the relevant RMAs.

Southend-on-Sea Borough Council has developed a set of criteria in order to determine a 'significant' flood risk. This is based on the assessment of the consequences of flooding that are considered to be sufficiently serious. Where any of these criteria, as outline below, are met, an investigation will be undertaken.

Is there, or have there been:

- more than four reports of the interior of a single residential property flooding,
- any reports of the interior of critical infrastructure flooding,
- flooding of a transport link such that it has been made impassable for a significant amount of time,
- more than 14 reports of flooding within 50m of a receptor within the past three years,
- potential for accidents or health implications, or
- effects on vulnerable people through service or amenity impacts.

Where the answer to any of the below is 'yes', the need for a Flood Investigation will be considered based on a risk based approach:

- Has there been more than one report of the interior of a commercial property flooding?
- And has this had an economic impact?
- Has the natural environment been affected?
- And is there a threat to a local ecosystem?
- Is the localised flooding known to occur according to historic records?
- Has a request for investigation been received?
- Is a single source of flooding evident?
- Are other Risk Management Authorities investigating?

The criteria are not limiting and the significance of each flood event will be assessed on a case-by-case basis.

A Flood Incident Proforma has been developed by Southend-on-Sea Borough Council to outline the necessary steps to be taken by the Flood Risk Officer upon becoming aware of a flooding incident. Initial information is recorded in order to determine whether any of the criteria set out above have been met. Should this be the case, a formal flood investigation will be initiated. All flood incidents which are reported to Southend-on-Sea Borough Council will be recorded in Council's Flood Incident Database, regardless of whether the flood incident has been deemed to be significant.

Upon completion of a flood investigation, a Flood Investigation Report will be completed and published on the Southend-on-Sea Borough Council website. Further details can be found within Appendix D. Section 3.3.1 provides a summary of the Flood Investigation Reports completed to date.

6.2.3 Maintain an Asset Register

Southend-on-Sea Borough Council has compiled a register of ordinary watercourses, drainage ditches and other structures within the Borough that are considered to potentially affect or have an influence of the management of flood risk within the Borough. For each flood risk asset, key information has been compiled where possible, for example; dimensions, current condition, ownership and maintenance responsibility.

Southend-on-Sea has undertaken workshops with Anglian Water and the Environment Agency to determine asset ownership, where current datasets show uncertainty, across the Borough.

In addition, Southend–on-Sea Borough Council has undertaken a survey to identify the location of each road gully within the Borough. This dataset sits alongside the asset register to provide a comprehensive overview of assets associated with flood risk.

6.2.4 Powers to do Works and Designate Structures

Southend-on-Sea Borough Council is in the process of developing internal and external guidance relating to the power to designate features and undertake works under the Act and Land Drainage Act 1991.

Guidance will be made available on the Council website once this has been completed.

6.2.5 Regulation of Ordinary Watercourses

Southend-on-Sea Borough council has consenting and enforcement responsibility for ordinary watercourse regulation.

Southend-on-Sea Borough Council has developed a database of ordinary watercourses and drainage ditches with the Borough as part of the Asset Register. These will be included in the Councils annual asset inspection program.

The Council is currently developing the procedure for consenting to works within ordinary watercourses. Once this has been developed, the procedure and guidance will be made available on the council website.

6.2.6 Consult on SuDS and Surface Water Drainage Proposals

The UK government launched a consultation on 12th September 2014 proposing a new way to approach the implementation of SuDS responsibilities through the existing planning system effectively replacing the duty to form a separate SuDS Approving Body (SAB) as laid out in Schedule 3 of the Act. In the government response to the consultation on 18th December 2014, it was confirmed that this approach would be taken forward and take effect from 6th April 2015. Local planning authorities now require all major development applications to include proposals for SuDS.

Southend-on-Sea Borough Council as the Local Planning Authority will now consult on SuDS systems and drainage strategies submitted as part of planning applications.

6.3 Delivery of Local Flood Risk Management Measures

The Act states that a LFRMS must specify *'the measures proposed to achieve those objectives'*. It also states that a LFRMS must specify *'how and when the measures are expected to be implemented'*54.

6.3.1 Approach to Identification of Measures

In order to identify appropriate measures to achieve the flood risk management objectives set by Southend-on-Sea Borough Council, a second workshop event was held with officers of the Council, representing a range of departments including Emergency Planning, Coastal and Flood Defence, Waste Management and Highways.

For each of the objectives, initial ideas for potential measures were identified for further consideration. These are presented in Table 6.1.

Table 6.1: Southend-on-Sea Council Measures for Local Flood Risk Management

Objective	Measures	Guiding Principles
Improve understanding of flood risk including likely effects of climate change.	1a. Develop and maintain the existing information from internal and external stakeholders to understand the local flood risks to the Borough.	• Proportionate & risk based approach • Catchment based approach.
	1b. Monitor flood risk and take account of the cumulative effect of new development, urban creep and climate change on the risk of flooding.	
	1c. Complete Flood Investigation Reports following flooding events deemed significant using the criteria outlined in the LFRMS and implement resulting actions.	
	1d. Develop a risk based modelling programme to understand the current and future flood risk from ordinary watercourses, surface water and groundwater.	
Encourage future development to provide a betterment to flood risk.	2a. Develop planning policy to be consistent with wider flood risk management policies presented at a national and regional level and provide clear and unambiguous advice on how to achieve those policies within Southend.	• Sustainability. • Multiple benefits. • Catchment based approach.
	2b. Give consideration to development proposals that assist in addressing flood risk management across regeneration areas as well as individual development sites.	
	2c. Develop a policy that requires all development to seek to provide a betterment to flood risk resulting to and from the proposed development, utilising SuDS.	
	2d. Consider the designation of existing features believed to positively influence flood risk to safeguard their function in the event of future development.	
Pursue flood risk management measures using a risk based approach that provide multiple social, economic and environmental	3a. Prioritise flood risk management by implementing a risk-based approach to capital investment decisions, maintenance programmes and activities.	• Proportionate & risk based approach. • Community focus & partnership
	3b. Give consideration to the economic, social and environmental benefits and limitations of flood risk management measures when making strategic investment decisions.	

[54] Part 1, Article 2, Section 9 Sub-Section 4d

Objective	Measures	Guiding Principles
benefits to the borough.	3c. Consider how future infrastructure improvements (such as highways, rail and public realm works) and/or changes could be used to deliver flood risk/ surface water management benefits.	working. • Multiple benefits. • Catchment based approach.
	3d. Consider measures that would provide a benefit to the environment including the protection/enhancement of biodiversity, habitats; water quality and hydromorphology of watercourses.	
Raise awareness of flood risk and available management measures to communities, residents and businesses.	4a. Openly share information with respect to flood risk across Southend-on-Sea with all Risk Management Authorities and the public.	• Community focus & partnership working.
	4b. Seek to increase public awareness (property owners, developers) with respect to flood risk and the responsibilities of the Risk Management Authorities.	
	4c. Seek to increase public awareness of the public's responsibilities with regards flood risk, namely riparian ownership, maintenance of drainage systems and management of flood risk,	
	4d. Encourage residents, businesses and stakeholders to report incidents of flooding to the council.	
Use knowledge of flooding to inform the emergency response.	5a. Use information on flood risk as a tool for flood prediction and warning.	• Proportionate & risk based approach.
	5b. Use information on flood risk to identify property / people / groups at risk, in order to inform emergency planning and emergency response priorities.	
Continue to manage local flood risk and coastal flooding & erosion.	6a. Manage flood risk from local flood sources owned and maintained by Southend-on-Sea Borough Council	• Catchment based approach. • Multiple benefits.
	6b. Update Southend-on-Sea Shoreline Strategy to consider the requirements of local flood risk and environmental benefits.	
	6c. Identify where scheme can be developed that provide coastal as well as local flood risk and environmental benefits, considering TE2100 recommendations for Action Zone 6 and 8.	
	6d. Continue to work in partnership with the AWS to examine areas at risk of surface water and sewer flooding.	

6.3.2 Implementation of Measures

Each measure in this LFRMS has been split into a number of actions which are outlined in the draft Action Plan in Appendix C. the Action Plan is a live document, which will be used by the Council to monitor and record the progress of each action. Section 8.3 outlines the approach to monitoring the actions.

The draft Action Plan outlines the following details for the delivery of each action:

- Delivery: Lead Risk Management Authority / stakeholder and supporting stakeholders
- Program: Anticipated start data, approximate duration, review period and current status.
- Funding: Estimated cost, source of funding and status of funding allocation.
- Location: Coverage for each action.
- Priority: Priority of the action (high, medium, low).
- Contribution to other strategies: Links to other strategies.
- Category of action: The category into which the action falls (social, economic, environmental).

6.3.3 Prioritising Local Flood Risk Management Measures

As it is not possible to manage and prevent all flooding, Southend-on-Sea will take a risk based approach to managing flood risk across the Borough. Each of the actions outlined in the Action Plan, has been assigned a priority of high, medium or low. The prioritisation is based on the current understanding of the local flood risk and the resources and funding available to address the action.

As understanding of flood risk improves, specific mitigation schemes and activities will be developed to address the flood risk in the areas at greatest risk. This will require a clear protocol in terms of identifying which actions should be taken forward. It will be important to consider:

- Risk: the risk of doing nothing in terms of social, economic and environmental terms;
- Consequence: what social, economic or environmental benefits are likely to be achieved following the implementation of a scheme;
- Deliverability: the cost, resource, technical deliverability of a measure and the benefits achieved.

6.3.4 Quick Wins

The draft Action Plan in Appendix C outlines a range of actions to achieve each of measures. As previously described in Section 6.3.3, the actions have been prioritised based on understanding of flood risk and resources and funding available. Many of the actions can be considered 'Quick Wins', which can be implemented with minimal funding and resource requirements.

6.3.5 Planning for Climate Change

Southend-on-Sea Borough Council will seek to use the best available information and evidence on climate change to inform ongoing local flood risk management. Climate change predictions will be used to ensure that future development and flood risk management schemes are designed to accommodate future effects of climate change.

In taking forward local flood risk management measures Southend-on-Sea Borough Council will:

- Seek to understand how climate change might impact flood risk to communities and businesses;
- Explore what options could be used to manage those impacts of climate change on flood risk; and,
- Raise awareness within communities and businesses on the causes and potential impacts of climate change and how they can reduce these by taking action now.

Climate change predictions are used to define the likely percentage change in rainfall intensities, river flows and increases in sea levels. These predications are used to ensure that any design of drainage systems and flood defence measures will accommodate the likely future increase in flows/levels as a result of climate change.

6.3.6 Links to the Anglian River Basin District Flood Risk Management Plan

As noted in Section 1.2, in addition to the LFRMS, Southend-on-Sea Council, as part of the South Essex Flood Risk Area, is required to contribute to the preparation of the FRMP for the Anglian River Basin District. This LFRMS has been developed to meet the requirements of the Flood Risk Regulations as well as the Flood and Water Management Act to ensure it can be incorporated into the regional FRMP.

A technical document has been produced by the European Commission providing guidance on reporting requirements under the EU Floods Directive[55], and is therefore applicable to the Anglian River Basin District FRMP. The guidance document details flood risk management measures which may be referred to in FRMPs. Each measure is given a corresponding Reporting Code, which is detailed in a guidance sheet produced by Defra and the Environment Agency[56] (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/307111/FRMPs_Measures_and_EU_Reporting_codes.pdf).

Where a measure or action included in the LFRMS Action Plan also meets an EU flood risk management measure this is noted in Appendix C by including the EU Reporting Code. This analysis encourages compatibility between measures and actions included in the LFRMS and those to be included in the FRMP.

6.4 Communication and Engagement

In order to assist in the delivery of effective local flood risk management across Southend-on-Sea, mechanisms need to be established for clear and meaningful communication and partnership between each of the RMAs.

A Stakeholder Engagement Plan (Appendix B) has been developed which sets out how Southend-on-Sea Borough Council intend to engage and communicate with the other RMAs, the public and stakeholders. The Southend-on-Sea Stakeholder Engagement Plan contains the following:

- Roles and responsibilities of RMAs;
- Contact details of all relevant representatives from each of the departments across Southend-on-Sea Borough Council;
- Contact details of all relevant representatives from each of the RMAs;

[55] European Commission (2013) Guidance for Reporting under the Floods Directive (2007/60/EC)
[56] Defra and the Environment Agency (2014) Flood Risk Management Plans – Measures and EU Reporting Codes

- Programme for regular meetings between RMAs;
- Essential agenda items that will need to be covered at initial meetings;
- Common procedure for flood incident recording and investigation, to be agreed by all RMAs.

6.5 Funding Options

6.5.1 Overview

The Act states that the LFRMS must specify *'the costs and benefits of those measures, and how they are to be paid for'*[57].

The approximate costs, benefits and potential funding sources for each of the measures and actions are presented within the Action Plan (Appendix C). Within the Action Plan, the costs are detailed under the item of 'Funding' in which estimated costs, source of funding and status of funding (allocated, to be allocated etc.) are specified. The benefits are outlined in terms of the Category of Action, outlining if the action has social, environmental or economic, or multiple benefits. The following section outlines in more detail the various funding options available.

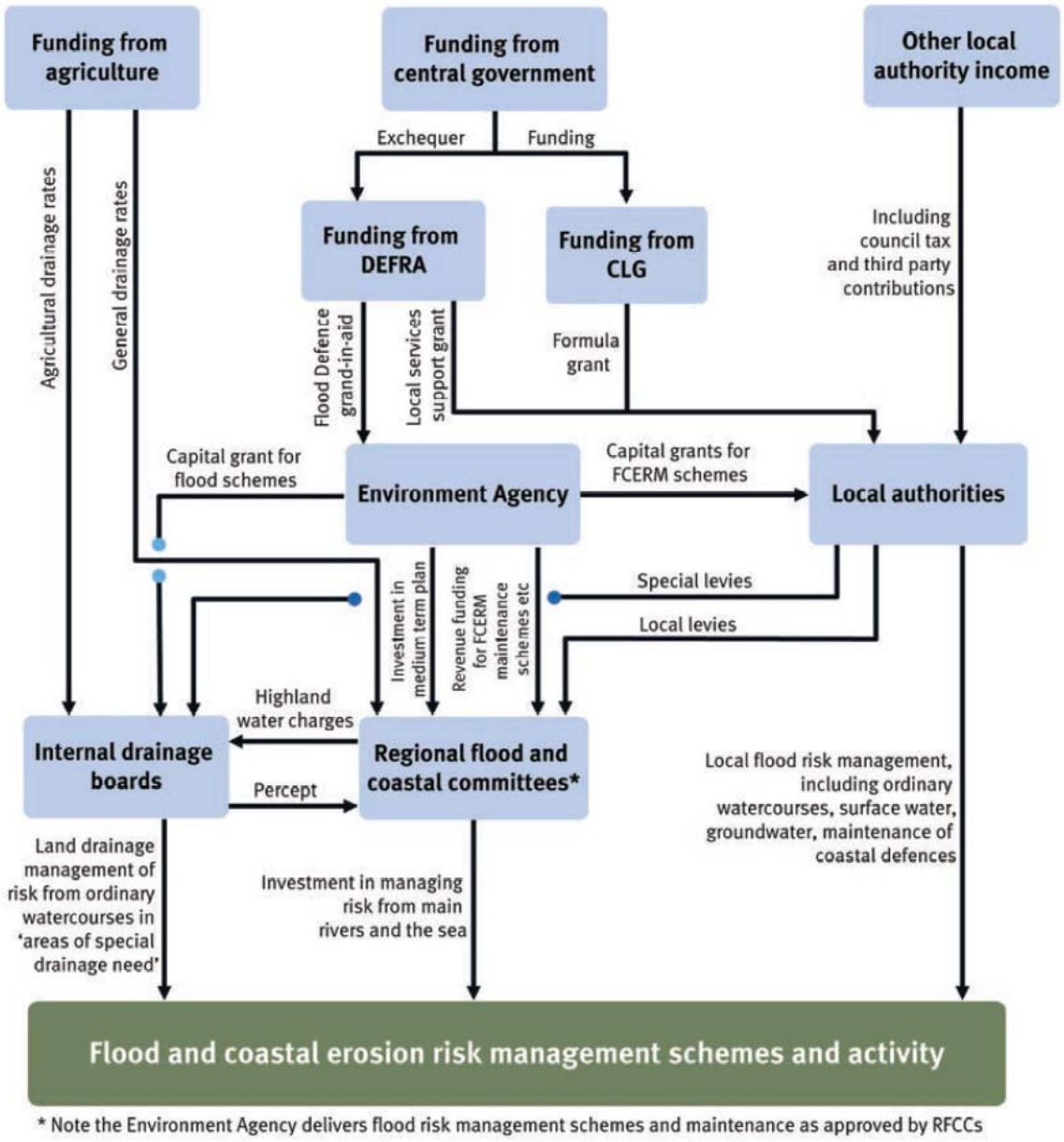
6.5.2 Funding

The effective practical implementation of flood risk management measures requires adequate resources both for the management and response activities of the LLFA as well as for capital projects. This section provides a summary of available forms of funding and seeks to help identify any further actions that will be needed to ensure that particular funding alternatives are feasible.

Figure 6-1 identifies the various streams of funding open to the RMAs which are discussed in turn in the following sections.

[57] Part 1, Article 2, Section 9 Sub-Section 4f

Figure 6-1: Funding Streams for Risk Management Authorities (Environment Agency, 2011)



6.5.3 Public Funding

6.5.3.1 Funding to LLFAs through Area Based Grants

The Government has committed funding annually to support LLFAs in their 'new' flood management roles up to 2015. The funding is provided through 'Area Based Grants', which have been allocated by Defra. The money is not ring fenced so individual LLFAs must decide how much of this grant to spend, subject to limits on overall budgets and the need for investment on other priorities.

The amount of money allocated to individual LLFAs varies based on the overall risk within the relevant area. This money has been made available to support Southend-on-Sea Borough Council with its on-going local flood risk management activities.

6.5.4 Funding for Flood Risk Management Studies and Schemes (Projects)

Flood risk management projects tend to be financed through a combination of the following funding streams:

- National funding – Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA);
- Regional funding – Local Levy; and
- Local / other funding contributions.

It should be noted that the mechanism for attracting the national (FCRM GiA) and regional (Local Levy) funding gives priority to the protection of residential properties.

6.5.4.1 Flood and Coastal Erosion Risk Management Grant in Aid (FCRM GiA)

Flood and Coastal Risk Management Grant in Aid (FCRM GiA) is the capital budget set aside by central government for flood defence projects across England. Following consultation during 2011, Defra introduced a new approach to the funding of flood risk management capital projects. This approach was termed the 'Flood and Coastal Resilience Partnership Funding' approach. The anticipated key benefits of the new approach are:

- Communities, through their Regional Flood and Coastal Committees (RFCCs), can take local decisions on which projects should progress, based on local willingness to contribute towards the benefits that would be delivered;
- A higher proportion of capital projects can be eligible for some government funding, subject to resources being available; and,
- The programme of capital works will be priorities based on the adjusted Partnership Funding score, which influenced by a series of Outcome Measures that the project will deliver:
    - Economic Benefits (OM1)
    - Household better protected against flood risk (OM2a-c)
    - Household better protected against coastal erosion (OM3a-c)
    - Water dependent habitat (OM4a)
    - Intertidal habitat (OM4b)
    - Protected rivers (OM4c)

6.5.4.2 Local Levy

This funding is raised by way of a levy on local authorities within the boundary of each RFCC. The Local Levy can be used to support, with the approval of the RFCC, flood risk management projects that have not achieved a great enough adjusted partnership funding score to attract full FCRM GiA funding and are deemed worthwhile causes by the RFCC local choices.

The Local Levy allows locally important projects to go ahead to reduce the risk of flooding within each committee's area. In addition to prioritising where Local Levy is to be spent, each RFCC annually sets the level of local levy funding that each local authority will contribute in the following year.

6.5.4.3 Funding through the Community Infrastructure Levy

The Community Infrastructure Levy (CIL) came into force in April 2010 and provides LLFAs with an alternative source of potential funding for flood defence schemes. It allows local authorities to raise funds from new development in their area in order to pay for the impact that the development has on local infrastructure. CIL is based on the concept that almost all development has some impact on infrastructure and services, so it is fair that development should contribute towards the cost of maintaining or upgrading local infrastructure.

It is estimated that the introduction of CIL has the potential to raise around £1billion a year of funding for local infrastructure by 2016. Local authorities are required to use this funding for infrastructure needed to support the development; it can be used to construct new infrastructure, increase the capacity of existing infrastructure or repair failing existing infrastructure. The Planning Act, 2008[58] includes a broad definition of the infrastructure that can be covered by this scheme including transport, flood defences, schools, hospitals and parks.

Southend-on-Sea Borough Council is presently establishing CIL within the Borough by June 2015. This is expected to raise approximately £100,000 per annum by 2017.

6.5.4.4 Funding through the European Union

European Union funding is available through the 'Interreg' scheme from the European Regional Development Fund (ERDF) where schemes are shown to deliver multiple benefits.

[58] Planning Act, 2008: http://www.legislation.gov.uk/ukpga/2008/29/pdfs/ukpga_20080029_en.pdf

6.5.4.5 Private funding - Section 106 Funding – Developer Contributions

Section 106 of the Town and Country Planning Act 1990[59] allows an LPA to enter into an agreement with a landowner or developer in association with the granting of planning permission. A Section 106 agreement is used to address issues that are necessary to make a development acceptable, such as supporting the provision of services and infrastructure.

One of the recommendations of 'Making Space for Water' was that LPAs should make more use of Section 106 agreements to ensure that there is a strong planning policy to manage flood risk. This means that any flood risk which is caused by, or increased by, new development should be resolved and funded by the developer.

6.5.4.6 Water Company Investment

Anglian Water are able to contribute to flood risk management projects through their AMP6 programme which is specifically available for partnership funding. For a proposed scheme, a costs benefit analysis will need to be undertaken. Where benefits of a proposed scheme are clearly demonstrated, funding may be available. Local Fundraising

In addition to contributions from developers, another important funding mechanism will come from local fundraising from the local communities and businesses that stand to benefit from the proposed flood defence schemes.

6.5.4.7 Other Sources of Funding

Defra is currently producing a good practice guide to support LPAs called 'Solutions for Joint Funding of Surface Water Schemes'. This project will explain the funding mechanisms and time cycles, approval processes of key partners and benefits of joint funding of local flood risk management.

Local partnership working and funding is essential to delivering holistic, sustainable flood and water management. Collaborative working can facilitate a 'sense of ownership' and define roles and responsibilities amongst stakeholders which has the potential to increase the likelihood of implementing successful initiatives. In addition to this, partnership working can improve access to interdisciplinary data and knowledge whilst enhancing community engagement and understanding. In turn, this approaches results in a number of beneficiaries ranging from local authorities and policy and/or decision makers to local communities.

6.5.5 Summary

In order to maximise the benefits of the new approach to funding flood risk management projects, Southend-on-Sea Borough Council should work closely with partnering organisations, stakeholders and private beneficiaries to generate alternative sources of funding. The likelihood of securing FCRM GiA funding is greatly increased when additional sources of funding are secured.

[59] Town and Country Planning Act 1990, http://www.legislation.gov.uk/ukpga/1990/8/section/106

7 Wider Environmental Objectives

7.1 Overview

The Act states that a LFRMS must specify how it will contribute to the achievement of wider environmental objectives. In order to facilitate this requirement, a Strategic Environmental Assessment[60] (SEA) of the LFRMS has been undertaken in accordance with Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (the 'SEA Directive')61. The SEA was developed alongside the LFRMS and has been used to inform sustainable decision making throughout.

7.2 Strategic Environmental Assessment

SEA is an iterative, systematic, publicly accountable framework with an overarching aim of integrating environmental considerations within policy development at the earliest opportunity whilst providing an 'audit trail' of option development and environmental mitigation.

Article 1 of the SEA Directive states that the preparation of an SEA will *"provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development"*. More simply an SEA is undertaken to identify the significant impacts that plans, programmes and strategies may have on the existing and future environment, and therefore heightens the consideration of environmental issues in decision making processes and planning.

SEA involves the identification and evaluation of potential environmental impacts resulting from the implementation of high-level decision-making (e.g. a plan, programme or strategy). By addressing strategic level issues, the SEA aids the selection of the preferred options, directs individual schemes towards the most environmentally appropriate solutions and locations and helps to ensure that resulting schemes comply with legislation and other environmental requirements. Impacts should not just be considered on a direct basis but should encompass temporary, permanent, positive, negative, secondary, cumulative and synergistic impacts over a range of timescales and probabilities.

The application of the SEA process to flood management plans and programmes is not legally required in every case, however adopting the SEA approach is strongly encouraged by Defra to enable a strategic approach to managing flood risk.

The SEA process ensures that environmental considerations inform the development of objectives and measures of the LFRMS, whilst mitigating against adverse environmental impacts and highlighting areas of environmental and socioeconomic opportunity. Additionally the SEA process identifies how the LFRMS can contribute to the achievement of wider environmental objectives, including Water Framework Directive (WFD) objectives.

7.3 Approach

The Communities and Local Government's Guidance on the development of an SEA62 identifies five key stages which are intended to be valid for all plans and programmes to which the Directive applies, irrespective of their geographical scope. Stage A Scoping and Baseline was conducted during the LFRMS/FRMP SEA Scoping stage whereas stage B Developing and Refining Alternatives and Assessing Effects is covered in the *Preparation of an SEA Environmental Report* (Stage C). Stage D relates to *Consultation* of both the Draft LFRMS and Environmental Report. Stage E *Implementation and Monitoring* will occur over the lifetime of the LFRMS in order to ensure continual improvement and the delivery of effective flood risk management alongside wider environmental objectives.

7.4 SEA Outcomes

The SEA determined that the LFRMS is likely to have beneficial impacts upon the environment in both the short and long term (i.e. beyond the life of the strategy). This is as a result of the proactive, holistic and sustainable approach of the LFRMS which aims to deliver effective flood risk management alongside multiple benefits. Each of the LFRMS objectives is predicted to fulfil environmental objectives identified within the SEA framework with a beneficial outcome.

[60] URS (2014) Draft Strategic Environmental Assessment
[61] SEA Directive (2001) http://ec.europa.eu/environment/eia/sea-legalcontext.htm
[62] CGL Guidance on SEA https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7657/practicalguidesea.pdf

The benefits of implementing the LFRMS are reinforced by the 'do nothing' alternative assessment undertaken as part of the SEA. This alternative assessment determines the impacts upon environmental receptors and SEA objectives through a failure to implement and deliver the LFRMS. In the short term, a failure to deliver the LFRMS may leave local communities and assets at an increased risk of flooding. It is likely that this risk would heighten over time as a result of climate change and associated impacts on flood frequency and magnitude.

The assessment of cumulative impacts acknowledges that there is a potential for adverse impacts to arise as a result of the cumulative effect of multiple plans and programmes. However, the SEA predicts that a number of beneficial, cumulative impacts are likely to arise from the implementation of the LFRMS alongside other plans and programmes.

As a result of these findings, the SEA puts no additional recommendations forward for the LFRMS. As the SEA did not determine any adverse impacts, mitigation measures have not been put forward at this stage. However, should an action arise from the LFRMS which has the potential to impact upon environmental receptors, further assessments should be undertaken and mitigation measures implemented where appropriate.

7.5 Habitats Regulations Assessment (HRA)

Article 6(3) of the EC Habitats Directive (1992)63 states that:

> *"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public".*

Similarly, Regulation 48 of the Conservation (Natural Habitats &c) Regulations (1994)64 states that:

> *"A competent authority, before deciding to undertake, or give any consent, permission or other authorization for, a plan or project which… is likely to have a* ***significant effect*** *on a European site in Great Britain.. shall make an appropriate assessment of the implications for the site in view of that site's conservation objectives".*

Southend-on-Sea Borough Council's administrative area comprises European sites such as the Benfleet and Southend Marshes. However, the LFRMS is a high level strategic document which does not contain any measures or actions which have the potential to cause significant effects upon such sites. Additionally, the SEA found that the LFRMS objectives are likely to have either neutral or minor, beneficial, indirect impacts upon biodiversity and therefore **significant effects** are very unlikely to materialise.

As such, it is has been determined that a HRA is not required to accompany the LFRMS and/or SEA. However, should actions which have the potential to cause significant effects be suggested, an appropriate assessment must be undertaken.

7.6 Water Framework Directive (WFD)

The LFRMS will complement work that is currently underway to comply with the requirements of the European WFD (2000/60/EC). Although a formal WFD assessment (WFDa) is not a statutory requirement of the LFRMS, WFD requirements have been considered as part of the SEA process, including where opportunities to improve WFD status exist.

The Environment Agency is responsible for preparing management plans for river basin districts in England and Wales in line with the requirements of the WFD. The plans outline the characteristics of the river basin district, identify the pressures that the local water environment faces, and specify the actions that will be taken to address any problems before 2015.

The Anglian River Basin Management Plan is concerned with the pressures faced by the water environment in the Anglian River Basin District and the actions that will address them. In recent years there has been considerable progress made in protecting the natural assets of the river basin district and in resolving the challenges imposed upon the water environment. However, a number of challenges remain and these include:

[63] Habitats Directive (1992) http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043
[64] The Conservation (Natural Habitats, &c.) Regulations (1994) http://www.legislation.gov.uk/uksi/1994/2716/regulation/48/made

- Point source and diffuse pollution from sewage treatment works and agriculture/other sources respectively;
- The physical modification of water bodies; and,
- Water abstraction.

Flood risk management activities are expected to have a significant impact on the ability of the UK to comply with the requirements of the WFD, as flood protection can involve substantial alteration to the natural morphology and function of waterbodies.

Table 7.1 demonstrates the current status of main rivers in the Southend-on-Sea Administrative Boundary which have undergone been classified under the WFD and been assigned a WFD Status.

Table 7.1: Southend-on-Sea's Main Rivers WFD Status

Water-body ID	Water-body Name	Hydro-morphological Designation	Current Status	Ecological Status	WFD elements less than Good	Status Objective
GB 105037028740	River Roach, Nobles Ditch and Eastwood Brook	Heavily Modified	Moderate	Moderate	Ammonia – Current (Poor), 2015 (Moderate). Phosphate – Current (Bad), 2015 (Bad). Specific Pollutants – Current (Poor), 2015 (Moderate).	Good Potential by 2027.
GB 105037028620	Roach and Canvey/ Mucking Hall Brook	Not Designated A/HMWB	Moderate	Moderate	-	Good Status by 2027.
GB 105037028730	Prittle Brook	Heavily Modified	Moderate	Moderate	Phosphate – Current (Poor), 2015 (Poor).	Good Potential by 2027.

The Environment Agency was consulted with regards to WFD priorities for watercourses within Southend-on-Sea. An action plan for the Crouch and Roach Operational Catchment has been developed by the Environment Agency which identifies actions required to improve the status of waterbodies within the catchment. For the Prittle Brook, action is required in relation to diffuse pollution (from urban and transport and industry, manufacturing and other business sources) and physical modification of the watercourse. Along the Eastwood Brook, action is required in relation to diffuse pollution, physical modification of the watercourse and the ability of fish to migrate along the watercourse.

A report developed by the Environment Agency: The Combined Essex Management Catchment – A summary of information about the water environment in the Combined Essex Management Catchment[65] outlines measures that could improve the water environment in the Crouch and Roach Operational Catchment:

Improve modified physical habitats:

- Removal or easement of barriers to fish migration;
- Improvement to condition of channel/bed and/or banks/shoreline;
- Vegetation management.

Managing pollution from wastewater:

[65] Environment Agency (2014) The Combined Essex Management Catchment – A summary of information about the water environment in the Combined Essex Management Catchment

- Reduce point source pollution pathways i.e. control entry to the water environment;
- Mitigate/remediate point source impacts on receptor.

Manage pollution from towns, cities and transport:

- Reduce diffuse pollution pathways (i.e. control entry to the water environment).

Manage invasive non-native specifies:

- Building awareness and understanding (to slow the spread).

Manage pollution from rural areas:

- Reduce diffuse pollution at source;
- Mitigate/remediate diffuse pollution impacts on the receptor.

It should be noted that some measures may benefit more than one waterbody within the catchment, whilst others may be more specific.

Once specific WFD objectives have been defined for the Crouch and Roach Catchment, the Action Plan for Southend-on-Sea (Appendix C) should be amended in order to demonstrate the multiple benefits of flood risk management measures.

The LFRMS seeks to reduce the incidence of local flooding through: encouraging future development to provide betterment to local flood risk; pursuing flood risk management measures using a risk based approach that provides multiple social, economic and environmental benefits and managing coastal flooding and erosion to hold the current line of defences and maintain the standard of protection.

Such maintenance has the potential to have adverse effects on biodiversity, for example restoration and maintenance of flood defences can cause disruption to ecosystems and lead to a reduction in overall biodiversity at the site. Water quality may also deteriorate if maintenance activities are not managed appropriately.

However, it is more likely that the LFRMS will facilitate opportunities for multi beneficial schemes which have positive effects on water quality and subsequently biodiversity from small-scale measures such as implementation of SuDS or changes in drainage. There may also be cumulative benefits to biodiversity and water quality through the strategic management of local flood risk, as enabling natural flood patterns to continue or extend in some areas can improve wetland habitats. The indirect, minor, yet beneficial impacts of the LFRMS upon biodiversity are described thoroughly within the Environmental Report.

In assessing this LFRMS for WFD compliance, the measures proposed are unlikely to have any significant environmental effects and will not cause deterioration to water bodies. However, as projects and schemes are developed these may require site specific environmental assessments to identify any potential environmental effects which may arise.

8 Monitor, Review and Maintain

8.1 Overview

The Act 2010 requires the LLFA to specify *'how and when the strategy will be reviewed'*[66] and where considered appropriate, update their identified objectives and measures for flood risk management on a regular basis.

8.2 Delivery

An Action Plan has been developed that details the measures and actions that will be taken to deliver the LFRMS (Appendix C). For each measure a number of actions have been identified and for each of these the proposed funding route, timescale for implementation, and delivery lead and partners have been identified. The Action Plan will be the key mechanism through which progress in meeting the Local Objectives will be monitored.

8.3 Monitoring

Southend-on-Sea Borough Council proposes to use the Action Plan as the basis to monitor the progress of the LFRMS annually.

The quarterly Local Flood Risk Management Partnership meetings will be used to report and monitor actions being completed.

The annual progress against the Action Plan will be reported to annually to Elected Members through an Annual Monitoring Report. A summary of the actions completed to date and priority actions for the next year will be made available to the public via the Councils website.

8.4 Review

This LFRMS will be reviewed and updated at least once every six years, to tie in with the requirement under the Regulations to revise the PFRA, flood risk and hazard maps and FRMP. There may also be additional circumstances which might trigger a review and/or an update of the action plan in the interim, for example:

- Occurrence of a significant and widespread surface water flood event;
- Additional data or modelling becoming available, which may alter the understanding of risk within the study area;
- If the outcome of investment decisions by partners is different to the preferred option, which may require a revision to the action plan;
- Additional (major) development or other changes in the catchment which may affect the surface water flood risk.

It should also be considered whether a procedure for informing the Anglian (Eastern) RFCC of changes to the LFRMS should be put in place. The RFCC is a committee established by the Environment Agency under the Act. It brings together members appointed by the LLFAs for three purposes:

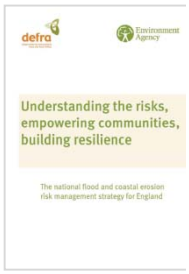
- To ensure there are coherent plans for identifying, communicating and managing flood and coastal erosion risks across catchments and shorelines;
- To promote efficient, targeted and risk based investment in flood and coastal erosion risk management that optimises value for money and benefits for local communities;
- To provide a link between the EA, LLFAs, other RMAs and other relevant bodies to engender mutual understanding of flood and coastal erosion risks in its area.

The Environment Agency will be reporting on the FRMP on an annual basis to inform Section 18 of the Act, in order to keep the RFCC update to date on the progress which has been made.

[66] Part 1, Article 2, Section 9 Sub-Section 4h

9 Further reading and information

The Environment Agency National Flood and Coastal Erosion Risk Management Strategy



Understanding the risks, empowering communities, building resilience - The national flood and coastal risk management strategy for England is provided by the Environment Agency. It describes what needs to be done by all the Risk Management Authorities to reduce the risk of flooding and coastal erosion, and to manage its consequences.

www.official-documents.gov.uk/document/other9780108510366/9780108510366.asp

Environment Agency Area Flood Risk Management Strategies

The Environment Agency website contains details of FCRM activities across the UK view FCRM activity in your area.

www.environment-agency.gov.uk/homeandleisure/floods/31736.aspx

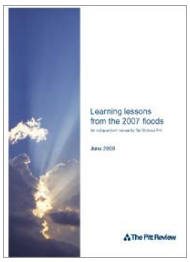
Future Funding of flood and Coastal Erosion Risk Management in England (Defra)

Visit Defra's website for more detailed information about the changes to funding.

www.defra.gov.uk/environment/flooding/funding-outcomes-insurance/

https://www.gov.uk/government/policies/reducing-the-threats-of-flooding-and-coastal-change

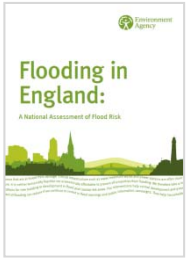
The Pitt Review



This review of the 2007 floods by Sir Michael Pitt identified the lessons learned, focusing on the needs of people living and working in areas at risk. The review made 92 recommendations, focusing on six key aspects of flood risk management and has also led to a greater focus on surface water flooding - a main cause of damage in the 2007 floods.

http://webarchive.nationalarchives.gov.uk/20100807034701/http:/archive.cabinetoffice.gov.uk/pittreview/thepittreview/final_report.html

Flooding in England



The Environment Agency's national assessment of flood risk for England sets out the current level of risk from rivers and the sea and what the Environment Agency is doing to manage it. Available to view or download from the Environment Agency website.

www.environment-agency.gov.uk/research/library/publications/108660.aspx

Investing for the future: Flood and Coastal Flood Risk Management in England

This report outlines the Environment Agency's long term investment strategy for flood and coastal risk management. The latest climate change predictions indicate that flooding and coastal erosion are likely to increase in the future. The long-term investment strategy sets out the scale of the investment needed to meet this challenge over the next 25 years. Available to view or download from the Environment Agency website.

www.environment-agency.gov.uk/research/library/publications/108673.aspx

The Foresight Future Flooding Report

Foresight projects are in-depth studies commissioned by the Department for Business, Innovation and Skills which look at major issues 20-80 years into the future. The Future Flooding Report was produced by the Flood and Coastal Defence project of the foresight programme. The report identifies the drivers of future flood risk and outlines how climate change will affect us in 30 to 100 years' time. The report is available to view or download from the Department for Business, Innovation and Skills website.

http://www.bis.gov.uk/foresight/our-work/projects/published-projects/flood-and-coastal-defence/project-outputs/volume-1

National Flood Forum

The National Flood Form is a national charity dedicated to supporting and representing communities and individuals at risk of flooding. They provide information to enable communities to prepare for and deal with issues they face when flooding occurs. It brings together individuals and communities with those responsible for managing flood risk. It also provides learning and training programmes to agencies, authorities and communities, and highlights flood risk issues to government.

www.floodforum.org.uk

Appendix A. Figures

A1 – Critical Drainage Area Overview

A2 – Surface Water Flooding Incidents

A3a – Risk of Flooding from Surface Water: High Risk Flood Depths (3.3% probability of occurrence)

A3b – Risk of Flooding from Surface Water: High Risk Flood Hazard (3.3% probability of occurrence)

A4a – Risk of Flooding from Surface Water: Medium Risk Flood Depths (1% probability of occurrence)

A4b – Risk of Flooding from Surface Water: Medium Risk Flood Hazard (1% probability of occurrence)

A5a – Risk of Flooding from Surface Water: Low Risk Flood Depths (0.1% probability of occurrence)

A5b – Risk of Flooding from Surface Water: Low Risk Flood Hazard (0.1% probability of occurrence)

A6 – Groundwater Flooding Incidents

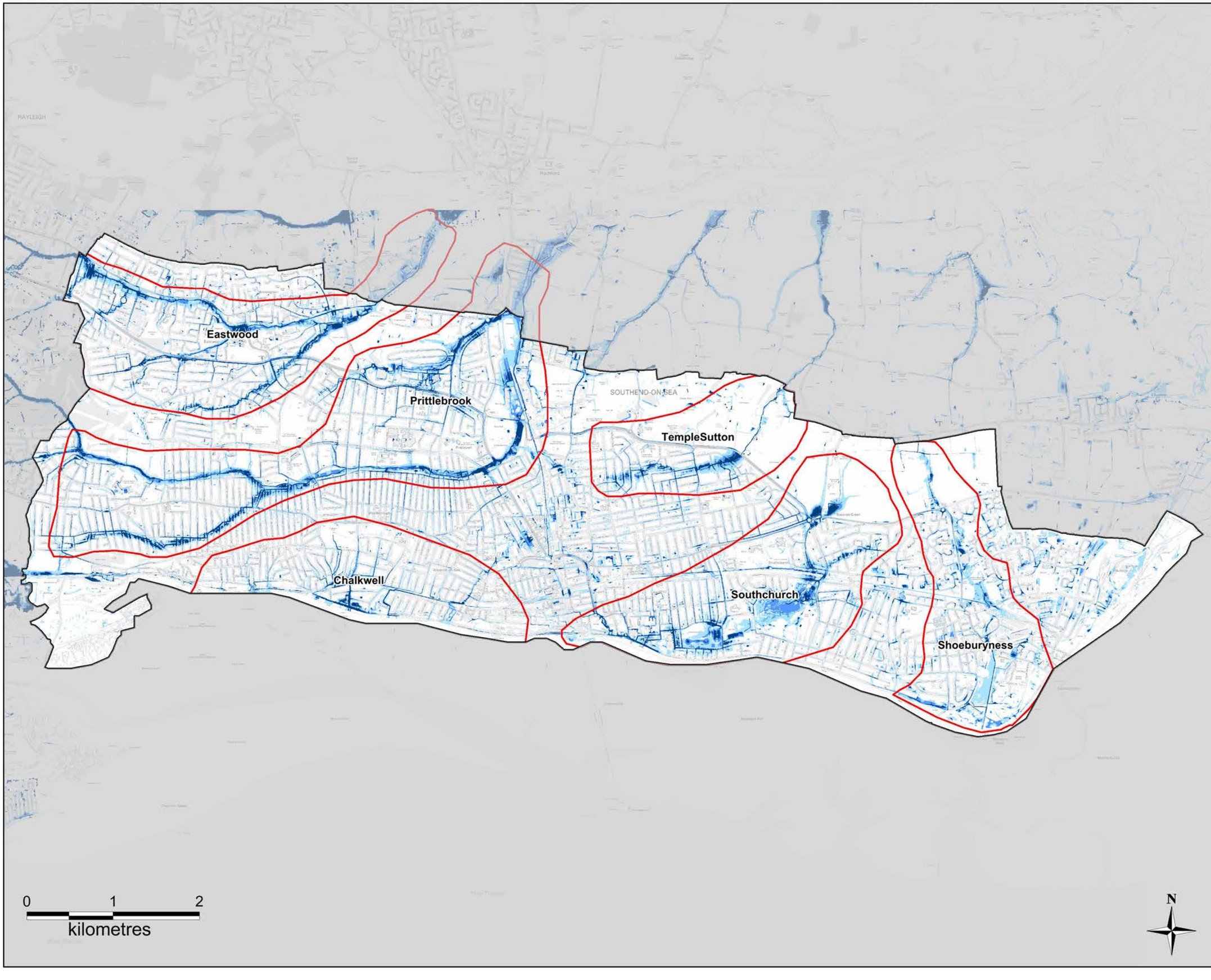
A7 – Susceptibility to Groundwater Flooding

A8 – Summary of Groundwater and Groundwater Flood Risk

A9 – Main Rivers and Ordinary Watercourses

A10 – Critical Infrastructure with Risk of Flooding from surface water

A11 – Environment and Heritage with Risk of Flooding from surface water



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

Legend

- Southend-on-Sea Administrative Area
- Critical Drainage Area/ Critical Drainage Catchme

Flood Risk from Surface Water

- High Risk (>3.3% AEP)
- Medium Risk (3.3% - 1% AEP)
- Low Risk (1% - 0.1% AEP)
- Very Low Risk (<0.1% AEP)

Limitations

1. This map shows the predicted likelihood of surface water flooding based on the updated Flood Map for Surface Water (uFMfSW) data, which may be subject to further analysis in the future. Further information on the mapping is provided on the Environment Agency website: www.gov.uk/government/organisations/environment-agency.

2. The potential impact of surface water flooding can vary according to the depth of the water, and its velocity (speed and direction that it is flowing in).

3. Surface water flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead. This type of flooding can be difficult to predict as it is hard to forecast exactly where or how much rain will fall in any storm.

Public Consultation comments / Update to Final URS to AECOM rebranding	DS / EG EB / EG	10/2015 06/2015	

Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: southend onsea BOROUGH COUNCIL

Project Title: SOUTHEND-ON-SEA LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title: FLOOD RISK FROM SURFACE WATER CRITICAL DRAINGE AREAS

Drawn	Checked	Approved	Date
DS	EG	EG	Oct 2015

AECOM Internal Project No.	Scale at A3
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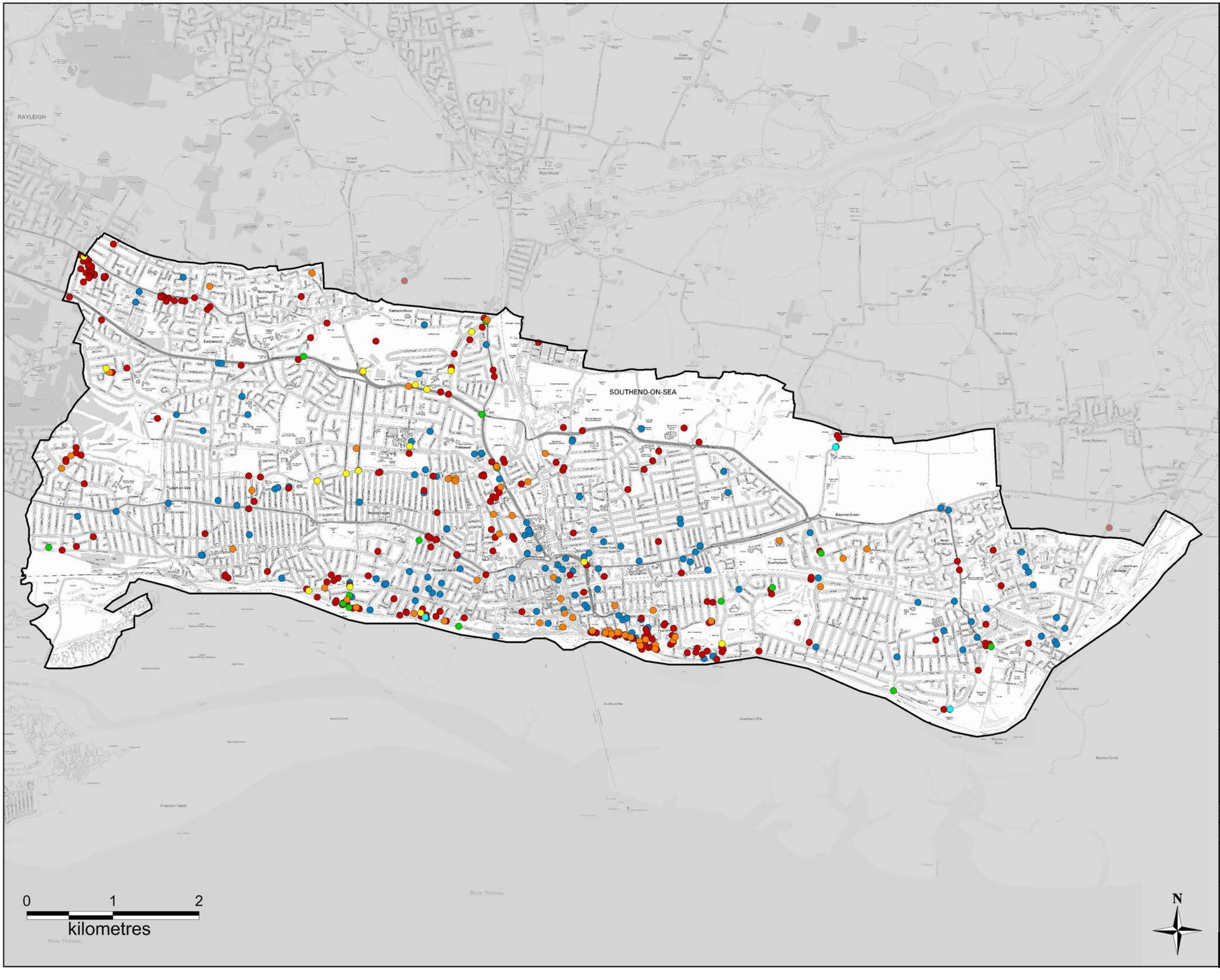
Drawing Number	Rev
Figure A1	3



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

Legend

- Southend-on-Sea Administrative Area
- Flooding 19th September 2((61 incidents recorded)
- Flooding 20th July 2014 (16 incidents recorded)
- Flooding 13th October 2013 (3 incidents recorded)
- Flooding 11th October 2013 (18 incidents recorded)
- Flooding 24th August 2013 (255 incidents recorded)
- Flooding pre 2010 (146 incidents recorded)

Revision Details	By / Check	Check Date	Suffix
Update to Final	EB / EG	10/2015	
URS to AECOM rebranding	EB / EG	06/2015	

Purpose of Issue: FINAL

Client: southend on sea

Project Title: SOUTHEND-ON-SEA LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title: HISTORIC FLOODING INCIDENTS

Drawn	Checked	Approved	Date
DS	EG	EG	Oct 2015

AECOM Internal Project No.	Scale at A3
47071307	1:40,000

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Drawing Number	Rev
Figure A2	3

Legend

Southend-on-Sea Borough Extent

Surface Water Flood Depths (3.3% AEP)

- High (>900mm)
- Medium (300-900mm)
- Low (<300m)

Update to Final	EB / EG	10/2015	
URS to AECOM rebranding	EB / EG	06/2015	

Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: southend on sea

Project Title: SOUTHEND-ON-SEA LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title: SURFACE WATER FLOOD DEPTHS (3.3% AEP)

Drawn	Checked	Approved	Date
DS	SK	EG	Oct 2015

AECOM Internal Project No.	Scale at A3
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Drawing Number	Rev
Figure A3a	3

0 1 2 kilometres

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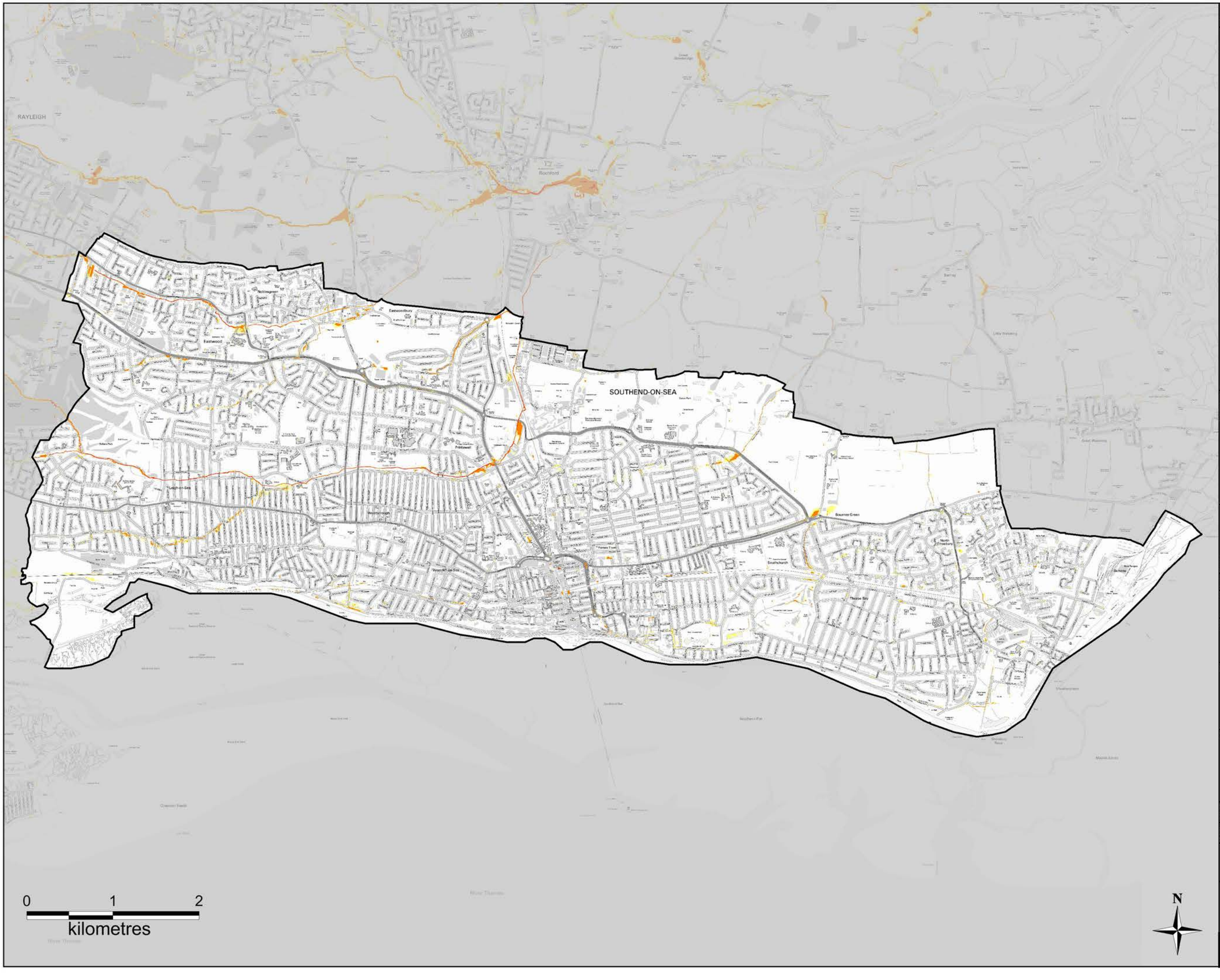

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Legend

- Southend-on-Sea Borough Extent

Surface Water Flood Hazard (3.3% AEP)

- Extreme (>2m)
- Significant (1.25-2m)
- Moderate (0.75-1.25m)
- Low (0.5-0.75m)

Revision Details	By / Check	Check Date	Suffix
Update to Final	EB / EG	10/2015	
URS to AECOM rebranding	EB / EG	06/2015	

Purpose of Issue: FINAL

Client: southend onsea

Project Title: SOUTHEND-ON-SEA LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title: SURFACE WATER FLOOD HAZARD (3.3% AEP)

Drawn	Checked	Approved	Date
DS	SK	EG	Oct 2015

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Drawing Number	Rev
Figure A3b	3

Legend

Southend-on-Sea Borough Extent

Surface Water Flood Depths (1% AEP)

- High (>900mm)
- Medium (300-900mm)
- Low (<300m)

Update to Final	EB / EG	10/2015	
URS to AECOM rebranding	EB / EG	06/2015	
Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: southend onsea

Project Title: SOUTHEND-ON-SEA LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title: SURFACE WATER FLOOD DEPTHS (1% AEP)

Drawn	Checked	Approved	Date
DS	SK	EG	Oct 2015

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Drawing Number	Rev
Figure A4a	3

0 1 2 kilometres

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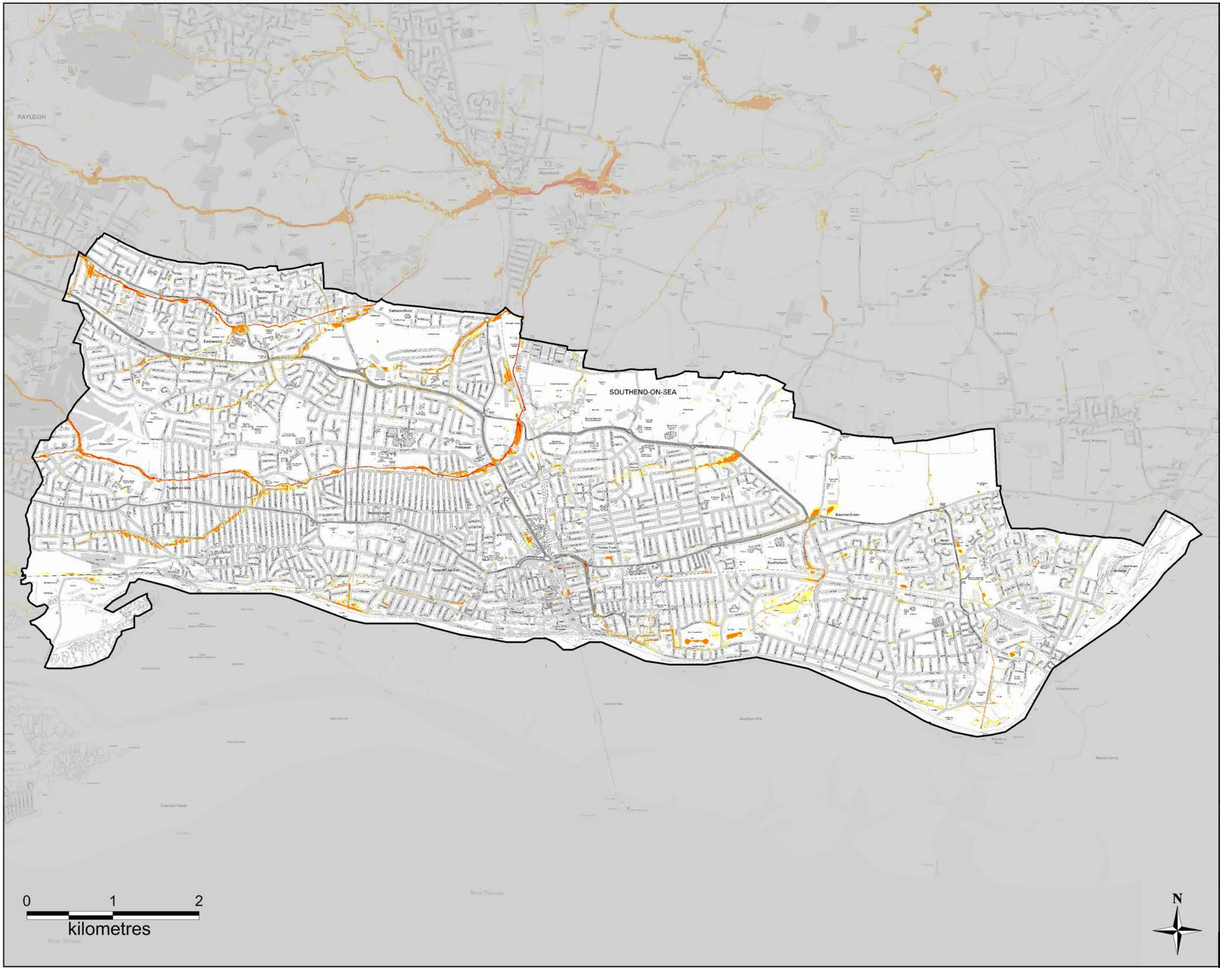

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Legend

- Southend-on-Sea Borough Extent

Surface Water Flood Hazard (1% AEP)

- Extreme (>2m)
- Significant (1.25-2m)
- Moderate (0.75-1.25m)
- Low (0.5-0.75m)

Revision Details	By / Check	Check Date	Suffix
Update to Final	EB / EG	10/2015	
URS to AECOM rebranding	EB / EG	06/2015	

Purpose of Issue: FINAL

Client: southend onsea

Project Title: SOUTHEND-ON-SEA LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title: SURFACE WATER FLOOD HAZARD (1% AEP)

Drawn	Checked	Approved	Date
DS	SK	EG	Oct 2015

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Drawing Number	Rev
Figure A4b	3

Legend

Southend-on-Sea Borough Extent

Surface Water Flood Depths (0.1% AEP)

- High (>900mm)
- Medium (300-900mm)
- Low (<300m)

Revision Details	By / Check	Check Date	Suffix
Update to Final	EB / EG	10/2015	
URS to AECOM rebranding	EB / EG	06/2015	

Purpose of Issue: FINAL

Client: southend onsea

Project Title: SOUTHEND-ON-SEA LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title: SURFACE WATER FLOOD DEPTHS (0.1% AEP)

Drawn	Checked	Approved	Date
DS	SK	EG	Oct 2015

AECOM Internal Project No.	Scale at A3
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0 1 2 kilometres

N

Legend

- Southend-on-Sea Borough Extent

Surface Water Flood Hazard (0.1% AEP)

- Extreme (>2m)
- Significant (1.25-2m)
- Moderate (0.75-1.25m)
- Low (0.5-0.75m)

Revision Details	By / Check	Check Date	Suffix
Update to Final	EB / EG	10/2015	
URS to AECOM rebranding	EB / EG	06/2015	

Purpose of Issue: FINAL

Client: southend on sea

Project Title: SOUTHEND-ON-SEA LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title: SURFACE WATER FLOOD HAZARD (0.1% AEP)

Drawn	Checked	Approved	Date
DS	SK	EG	Oct 2015

AECOM Internal Project No.	Scale at A3
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Drawing Number: **Figure A5b** Rev: 3

0 1 2 kilometres

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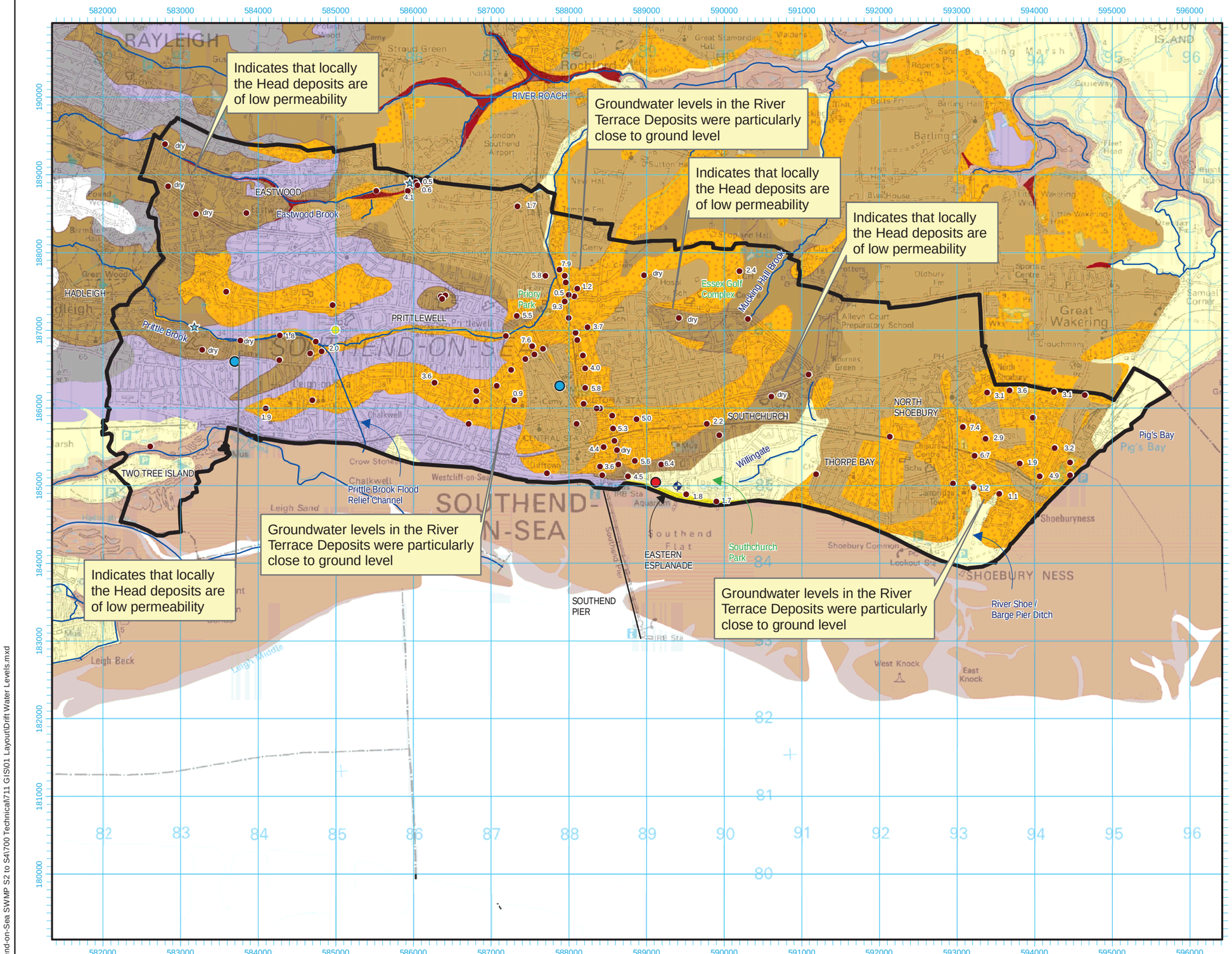

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Legend

- Southend-on-sea Borough Council Boundary
- BGS Borehole Logs - Superficial Deposits
- Council Groundwater Flooding Incident
- Fire Service Groundwater Flooding Incidents
- Environment Agency Observation Borehole

Environment Agency RBMP Monitoring

- Groundwater Monitoring
- Continuous Flow Monitoring

Superficial Geology

- Alluvium (Clay, Silt and Sand)
- Beach and Tidal Flat Deposits (Clay,Silt and Sand)
- Blown Sand
- Head (Clay, Silt and Sand)
- River Terrace Deposits (Sand and Gravel)
- River Terrace Deposits (Silt and Clay)
- Tidal Flat Deposits (Clay and Silt)

Bedrock Geology

- Claygate Member
- London Clay

6.7 Depth to groundwater (m)*

*Note: Rest water levels have been used where provided on the BGS borehole log. However, in some cases only a water strike is provided.

Drawing Status: **DRAFT**

Job Title: **Southend-on-Sea Surface Water Management Plan**

Drawing Title: **Drift Deposits BGS Log Water Level Information**

Scale at A3	1 : 50 000		
Drawn by	Date	Approved	Date
Bahar Vural	25/10/2010	Stephen Cox	25/10/2010

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FIGURE B7

Base Map Details
Projection: Transvers Mercator
Scale Factor: 0.999601
Origin: 2° West, 49° North
Coordinates: 400000,-100000
Units: metres
Datum: OSGB 1936

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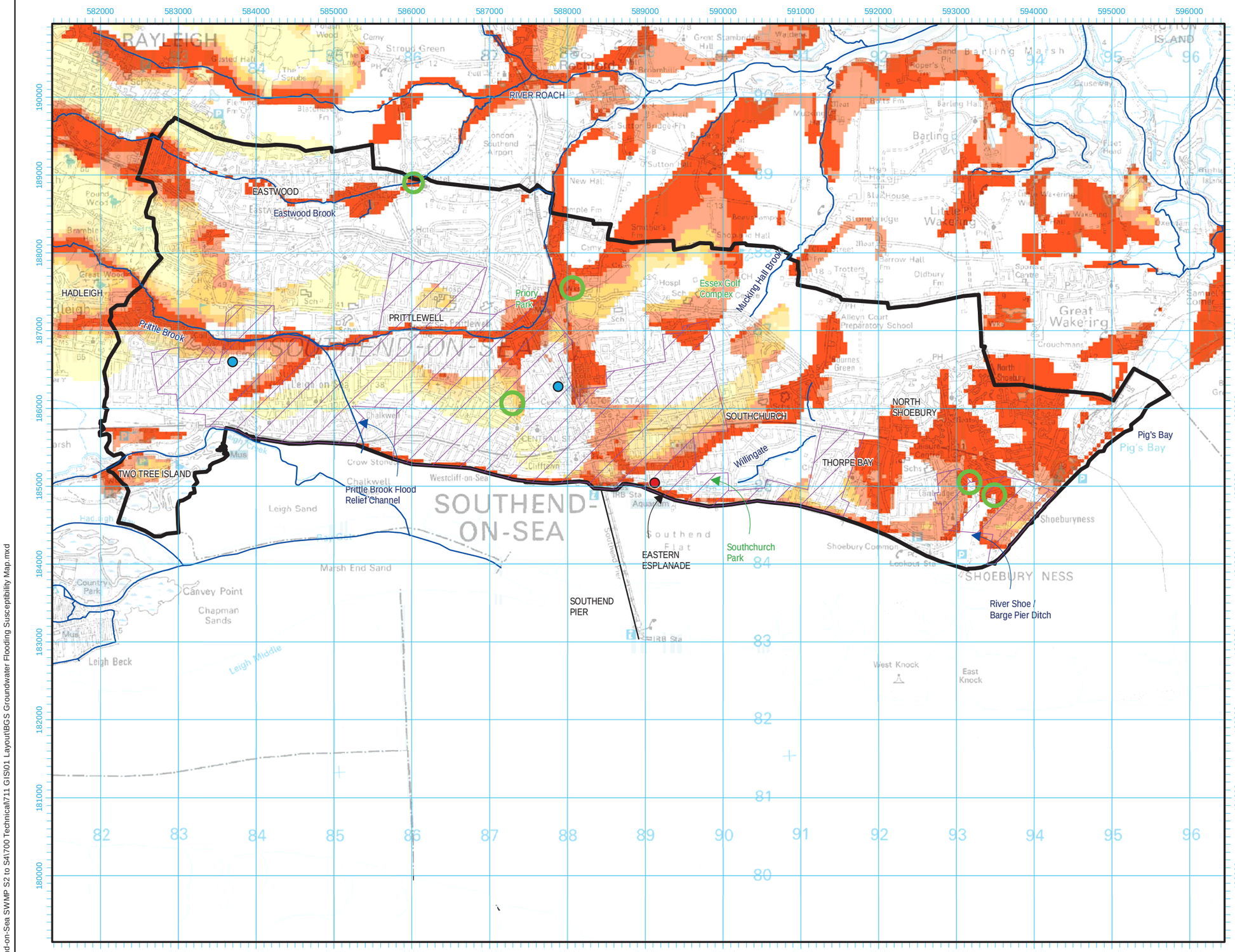

Legend

- Southend-on-sea Borough Council Boundary
- Council Groundwater Flooding Incident
- Fire Service Groundwater Flooding Incidents
- Area where Basements / Cellars are Likely

BGS Groundwater Flooding Susceptibility

- Very High
- High
- Moderate
- Low
- Very Low

Groundwater levels close to surface, based on BGS borehole log records.

Base Map Details
Projection: Transvers Mercator
Scale Factor: 0.999601
Origin: 2° West, 49° North
Coordinates: 400000,-100000
Units: metres
Datum: OSGB 1936

Drawing Status
DRAFT

Job Title
Southend-on-Sea Surface Water Management Plan

Drawing Title
BGS Groundwater Flooding Susceptibility Map

Scale at A3 1 : 50 000

Drawn by	Date	Approved	Date
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FIGURE B9

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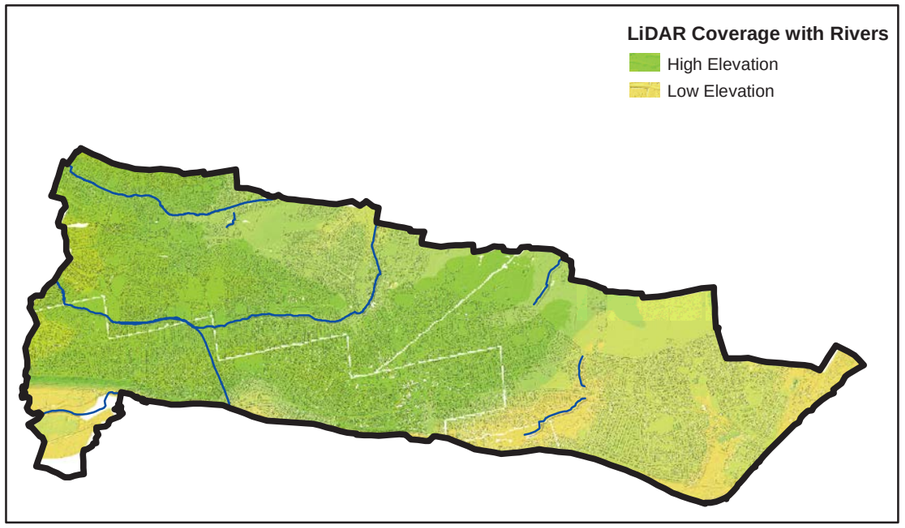

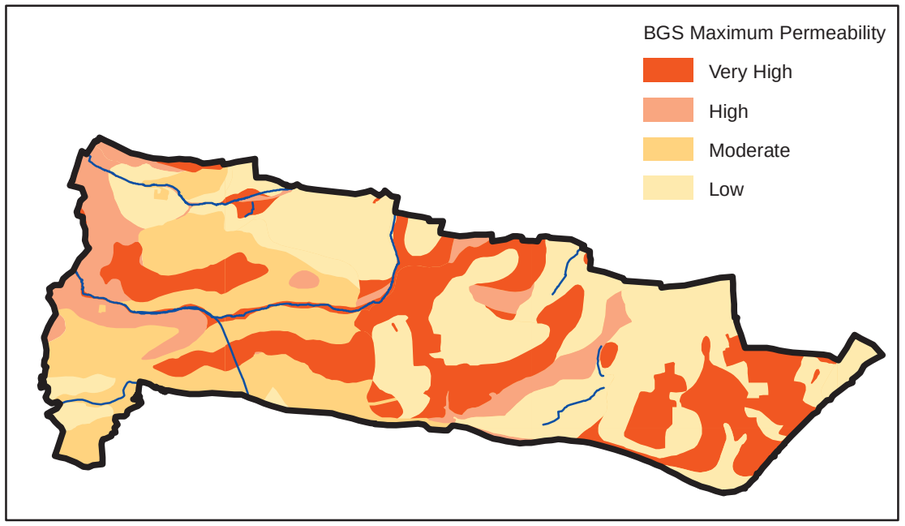

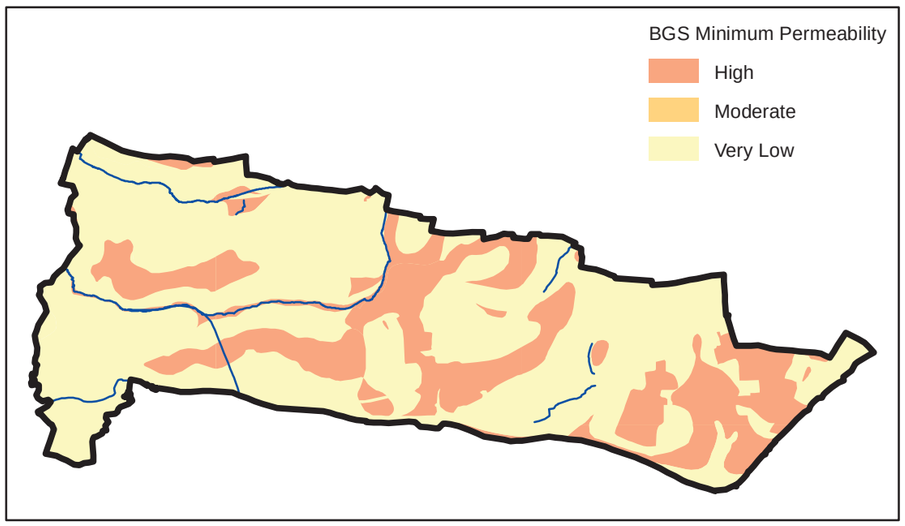

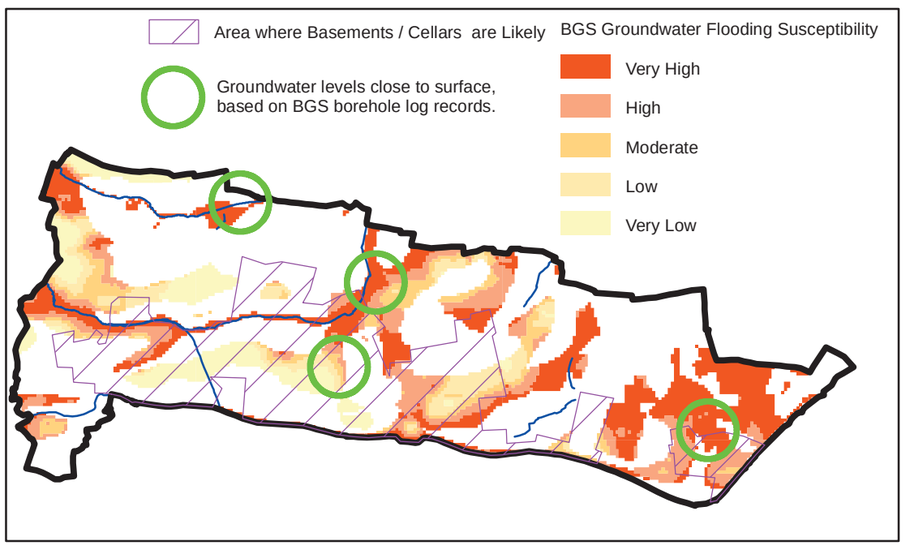

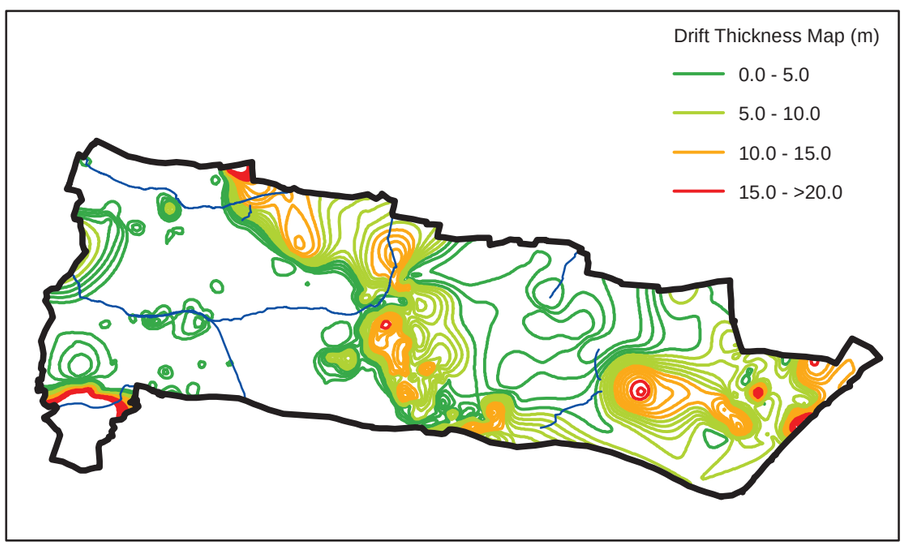

'Digital permeability, groundwater flooding susceptibility and drift thickness map reproduced from British Geological Survey (c) 2010'

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Legend

Southend-on-sea Borough Council Boundary

Drawing Status
DRAFT

Job Title
Southend-on-Sea Surface Water Management Plan

Drawing Title
Summary Map

Scale at A3 1 : 100 000

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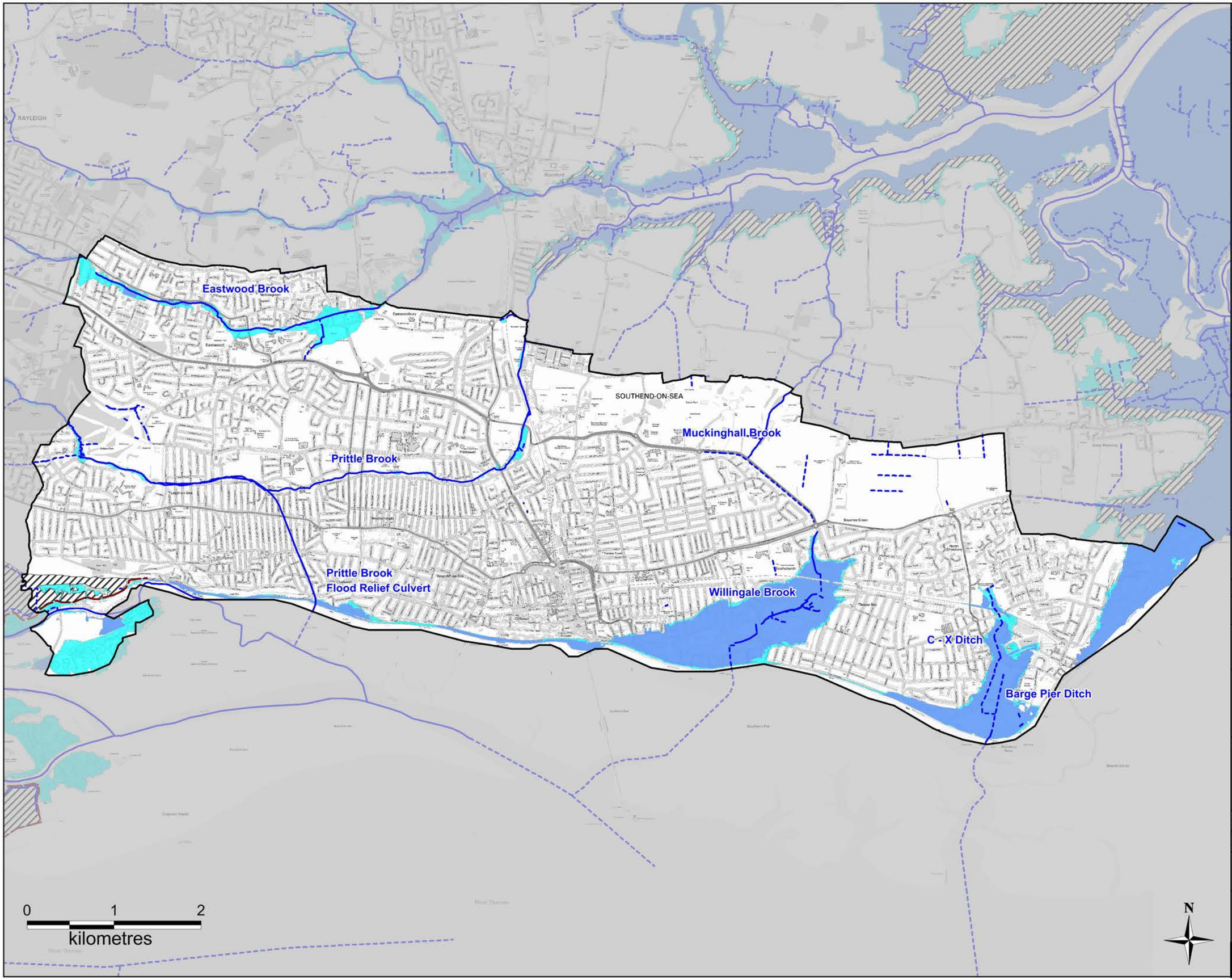
FIGURE B10



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Legend

- Southend-on-Sea Borough Extent
- Flood Zone 3
- Flood Zone 2
- Flood storage areas
- Areas benefiting from flood defences
- Defences

Watercourses

- Main River
- Ordinary Watercourse

Revision Details	By / Check	Check Date	Suffix
Updated Main Rivers dataset / Update to Final	DS / EG	10/2015	
URS to AECOM rebranding	EB / EG	06/2015	

Purpose of Issue: FINAL

Client: southend on sea

Project Title: SOUTHEND-ON-SEA LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title: MAIN RIVERS, ORDINARY WATERCOURSES AND FLOOD ZONES

Drawn	Checked	Approved	Date
DS	SK	JR	Oct 2015

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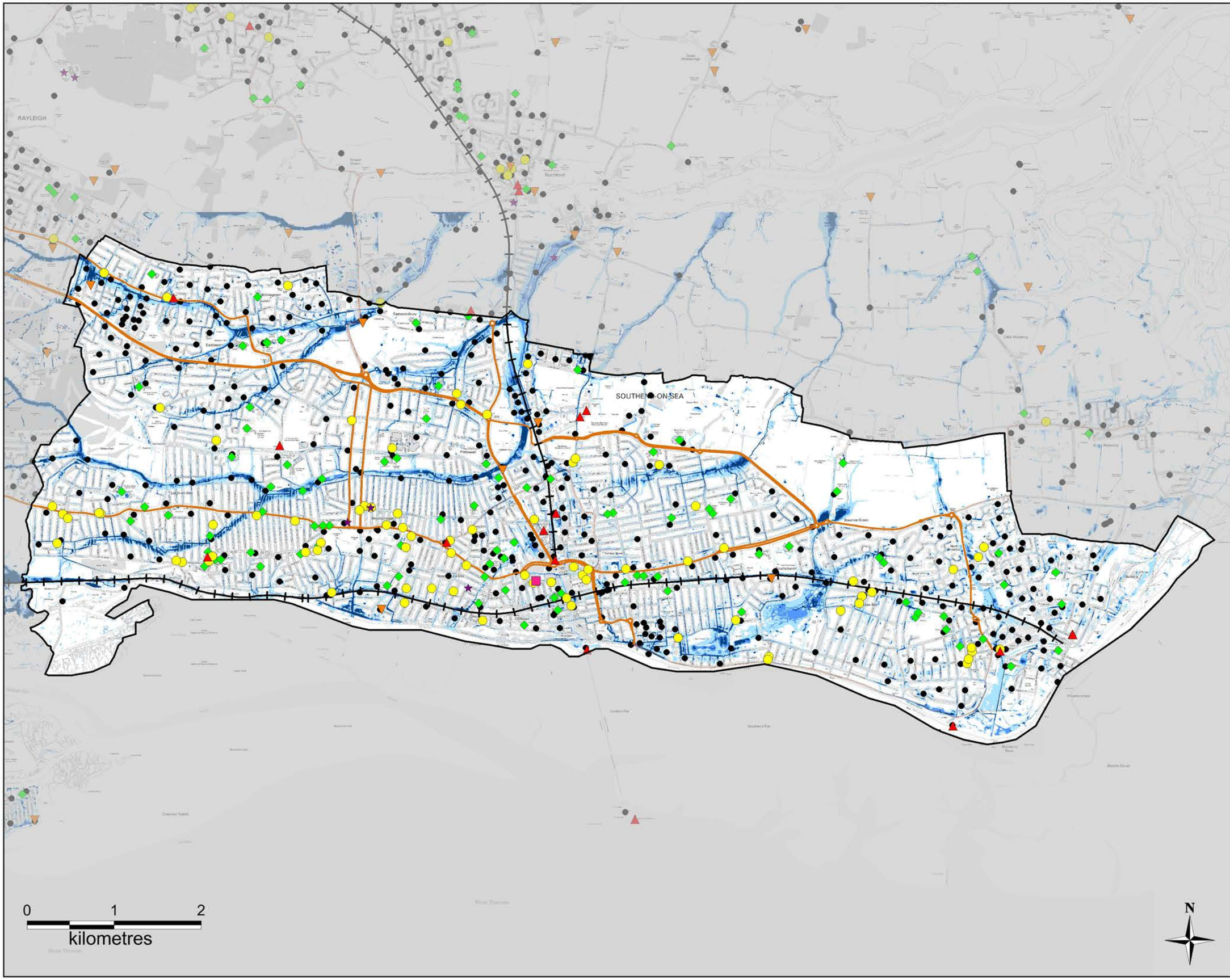
Figure A9	3



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Legend

Southend-on-Sea Administrative Area

Risk of Flooding from Surface Water

- Very Low (<0.1% AEP)
- Low (0.1% AEP)
- Medium (1% AEP)
- High (3.3% AEP)

Critical Infrastructure

- Hospital
- Emergency Services (Fire, Police and Ambulance Station)
- Nursing/Care Home
- Sewage Treatment
- School, Nursery, College or University
- Surgery or Health Care Centre
- Electricity Installation
- Railway Line

Major Road

- A Road
- B Road

Updated Main Rivers dataset / Update to Final	EB / EG	10/2015	
URS to AECOM rebranding	EB / EG	06/2015	

Revision Details	By / Check	Check Date	Suffix

Purpose of Issue: FINAL

Client: southend onsea

Project Title: SOUTHEND-ON-SEA LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title: CRITICAL INFRASTRUCTURE WITH RISK OF FLOODING FROM SURFACE WATER

Drawn	Checked	Approved	Date
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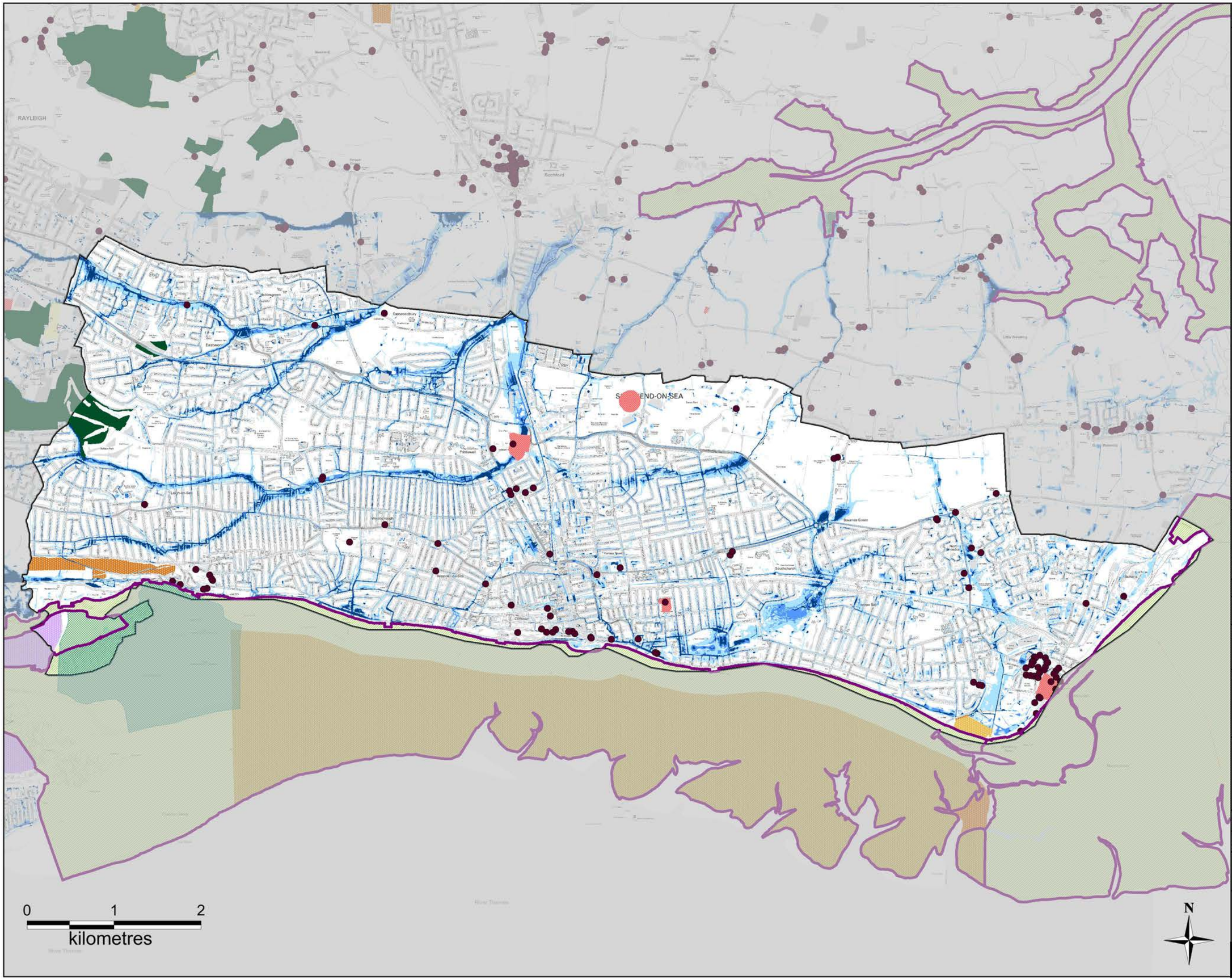
Figure A10	3



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Legend

- Southend-on-Sea Administrative Area

Risk of Flooding from Surface Water

- Very Low (<0.1% AEP)
- Low (0.1% AEP)
- Medium (1% AEP)
- High (3.3% AEP)

Receptors

- Ancient Woodland
- Ramsar
- Special Protected Areas
- Sites of Special Scientific Interest
- National Nature Reserve
- Local Nature Reserve
- Country Park
- Scheduled Ancient Monuments
- Listed Buildings

Revision Details	By / Check	Check Date	Suffix
Updated Main Rivers dataset / Update to Final	EB / EG	10/2015	
URS to AECOM rebranding	EB / EG	06/2015	

Purpose of Issue: FINAL

Client: southend onsea

Project Title: SOUTHEND-ON-SEA LOCAL FLOOD RISK MANAGEMENT STRATEGY

Drawing Title: ENVIRONMENT AND HERITAGE WITH RISK OF FLOODING FROM SURFACE WATER

Drawn	Checked	Approved	Date
PP	EG	JR	Oct 2015

AECOM Internal Project No.: 47071307

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Drawing Number: **Figure A11**

Rev: 3

Appendix B. Southend-on-Sea Stakeholder Engagement Plan

B.1 Purpose of the Stakeholder Engagement Plan

The purpose of this Stakeholder Engagement Plan (SEP) is to set out how Southend-on-Sea Borough Council will take the lead in local flood risk management and work with other risk management authorities (RMAs) as well as other organisational bodies, individuals and the public, to fulfil our duties and responsibilities under the FWMA and Flood Risk Regulations.

This plan defines who is involved in local flood risk management, what information will be shared, how frequently, and how it should be used.

This SEP is a live document that should be revised and updated as new stakeholders are engaged, as contact details change and as new procedures for the discharging of duties in relation to flood risk management are established. It is recommended that one individual is responsible for keeping the SEP up to date and circulating it amongst relevant contacts as necessary.

B.2 Stakeholders

The stakeholders relevant to flood risk management in the Southend-on-Sea Borough Council administrative area have been identified as:

Risk Management Authorities;

- Southend-on-Sea Borough Council (as the LLFA);
- Environment Agency;
- Southend-on-Sea as the Highways Authority; and,
- Anglian Water.

Other stakeholders include:

- The public;
- Residence Associations': Shoebury Residents Association, Garrison Residents Association;
- Friends of Shoebury Common;
- Essex County Council;
- Regional Flood and Coastal Committee (FRCC);
- Leigh-on-Sea Town Council;
- Network Rail;
- Essex County Fire and Rescue Services;
- Essex Police;
- Land owners and land managers;Riparian Owners;
- Essex and Suffolk Water; and,
- The media.

Southend-on-Sea Borough Council Internal departments:

- Flood and Coastal Management;
- Emergency Planning;
- Highways Department;

- Environmental Care;
- Parks;
- Strategic Planning;
- Development Control;
- Property;
- Communications; and
- Public Relations.

B.3 Risk Management Authority Roles and Responsibilities

When considering roles and responsibilities in relation to any project, the RACI model provides a useful tool. The acronym RACI stands for:

- **Responsible:** The person who does the work to achieve the task. They have responsibility for getting the work done or decision made. As a rule this is one person / organisation.
- **Accountable:** The person who is accountable for the correct and thorough completion of the task. This must be one person / organisation, and this is the role that the responsible individual is accountable to and who approves their work.
- **Consulted:** The people / organisations who provide information for the project and with whom there is two-way communication. This is usually several people, organisations or groups.
- **Informed:** The people / organisations who are kept informed about progress and with whom there is one-way communication. These are people who are affected by the outcome of the tasks so need to be kept up-to-date.

The following series of tables seek to set out the roles and responsibilities of each of the RMAs in accordance with the relevant legislation.

It is noted that as the procedure for local flood risk management in Southend-on-Sea becomes established, these tables should be updated to reflect changes in roles between RMAs, or where additional roles and responsibilities are taken on that have not already been identified.

It is recommended that these duties, roles and responsibilities are periodically reviewed at RMA meetings.

Table B-1 Roles and responsibilities of Southend-on-Sea Borough Council

Legislation	Flood Risk Management Functions
Flood and Water Management Act 2010	Southend-on-Sea Borough Council has a duty to lead on **local flood risk management**, including establishing effective partnerships within their local authority as well as with other risk management authorities such as the Environment Agency, Essex and Suffolk Water, Anglian Water, Highways Authority and neighbouring Local Authorities.
	Southend-on-Sea Borough Council have a duty to **investigate and record details of significant flood events** within their area. This duty includes identifying which authorities have flood risk management functions and what their have done or intend to do with respect to the incident, notifying risk management authorities where necessary and publishing the results of any investigations carried out. (FWMA Part 1 Section 19).
	Southend-on-Sea Borough Council has a duty to **develop, maintain, apply and monitor a strategy** for local flood risk management in their area. The LLFA must publish a summary of its Strategy (including guidance about the availability of relevant information). It may also issue guidance about the application of the Strategy in its area. The LLFA must consult other risk management authorities who may be affected by the Strategy and public on the LFRMS. (FMWA Part 1 Section 9).
	Southend-on-Sea Borough Council has a duty to **maintain a register of structures** or features which are likely to have a significant effect on flood risk in its area, including details on ownership and

Legislation	Flood Risk Management Functions
	condition as a minimum. The register must be available for inspection. (FWMA Part 1 Section 21).
	Southend-on-Sea Borough Council must aim to make a **contribution towards the achievement of sustainable development** when exercising a flood risk management function. (FWMA Part 1 Section 27).
	The UK government launched a consultation on 12th September 2014 proposing a new way to approach the implementation of SuDS responsibilities through the existing planning system effectively replacing the duty to form a separate SuDS Approving Body (SAB) as laid out in Schedule 3 of the Act. In the government response to the consultation on 18th December 2014, it was confirmed that this approach would be taken forward and take effect from 6th April 2015. Local planning authorities now require all major development applications to include proposals for SuDS. Southend-on-Sea Borough Council as the Local Planning Authority will now **consult on SuDS systems and drainage strategies** submitted as part of planning applications.
	Southend-on-Sea Borough Council has a **consenting and enforcement** responsibility for ordinary watercourse regulation.
	Southend-on-Sea Borough Council has powers to request a person to provide information in connection with the authority's flood and coastal erosion risk management functions. (FWMA Part 1 Section 14).
	Southend-on-Sea Borough Council has **powers to designate** structures and features that affect flooding in order to safeguard assets that are relied upon for flood risk management. Once a feature is designated, the owner must seek consent from the authority to alter, remove or replace it. (FWMA Schedule 1 Section 1).
	Southend-on-Sea Borough Council has **powers to undertake works** to manage flood risk from surface water or groundwater, consistent with the LFRMS for their area. (FWMA Schedule 2 Section 29).
Flood Risk regulations 2009	Southend-on-Sea Borough Council must revise the **Preliminary Flood Risk Assessment** (PFRA) at least every 6 years. The first review must be published by 22nd June 2017. (FRR Part 2 Section 10).
	Southend-on-Sea Borough Council must prepare **flood hazard and flood risk maps** of relevant flood risk areas by 22nd June 2013 and revise these at least every 6 years. (FRR Part 3 Section 19).
	Southend-on-Sea Borough Council must prepare a **flood risk management plan** for each flood risk area and revise these plans at least every 6 years. (FRR Part 4 Section 26).
	Southend-on-Sea Borough Council has a **duty to cooperate** with other authorities exercising their functions under the FRR. (FRR Part 6 Section 35).
	Southend-on-Sea Borough Council has **powers to require information** reasonably required in connection with their responsibilities as LLFA under the FRR from the authorities listed in Part 6 Section 36 Sub-section 3 of the FRR. (FRR Part 6 Section 36).
Civil Contingencies Act 2004	Southend-on-Sea Borough Council has a duty to: • assess the risk of an emergency occurring; • maintain plans for the purpose of ensuring that if an emergency occurs the person or body is able to continue to perform its functions; • arrange for the publication of all or part of assessments made and plans maintained for the purposes of preventing an emergency, reducing, controlling or mitigating the effects of an

Legislation	Flood Risk Management Functions
	emergency, or enabling other action to be taken in connection with an emergency; and, • maintain arrangements to warn the public, and to provide information and advice to the public, if an emergency is likely to occur or has occurred. (Civil Contingencies Act 2004 Part 1 Section 2).
National Planning Policy Framework 2012	Southend-on-Sea Borough Council, as LPA, 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. (NPPF Paragraph 94).
	Southend-on-Sea Borough Council's Local Plans should be supported by Strategic Flood Risk Assessment and should **develop policies to manage flood risk** from all sources, taking account of advice from the EA and other relevant flood risk management bodies. (NPPF Paragraph 100).

Table B-2 Roles and responsibilities of the Environment Agency

Legislation	Flood Risk Management Functions
Flood and Water Management Act 2010	The EA has a duty to **develop, maintain, apply and monitor a strategy** for flood and coastal erosion risk management in England. The EA must publish a summary of its Strategy. It may also issue guidance about the application of the Strategy within the Anglian River Basin area. The EA must consult risk management authorities and public on the National Strategy. (FMWA Part 1 Section 7).
	The EA must cooperate with other RMAs in the exercise of their flood risk management function and may share information with other RMAs for the purpose of discharging this duty. (FWMA Part 1 Section 13).
	The EA has **powers to request** a person to provide information in connection with the authority's flood and coastal erosion risk management functions. (FWMA Part 1 Section 14).
	The EA has **powers to designate** structures and features that affect flooding in order to safeguard assets that are relied upon for flood risk management. Once a feature is designated, the owner must seek consent from the authority to alter, remove or replace it. (FWMA Schedule 1 Section 1).
Flood Risk Regulations 2009	The EA has a duty to prepare **preliminary assessment maps and reports** in relation to each river basin district with respect to flooding from the sea, main rivers and reservoirs. (FRR Part 2 Section 9).
	The EA has a duty to determine in relation to each river basin district whether there is a **significant flood risk** from the sea, main rivers or reservoirs. (FRR Part 2 Section 13).
	The EA has a duty to prepare in relation to each flood risk area, **flood hazard and flood risk maps** relating to flooding from the sea, main rivers and reservoirs. (FRR Part 3 Section 19).
	The EA has a duty to prepare **flood risk management plans** in relation to each flood risk area identified under Section 13. (FRR Part 4 Section 25).
	The EA has a **duty to cooperate** with other authorities exercising their functions under the FRR. (FRR Part 6 Section 35).
	The EA must **comply with a request** of Southend-on-Sea Borough Council to provide information reasonably required in connection with their responsibilities as LLFA under the FRR. (FRR Part 6 Section 36).

Legislation	Flood Risk Management Functions
Civil Contingencies Act 2004	As a Category 1 Responder, the EA has a duty to: • assess the risk of an emergency occurring; • maintain plans for the purpose of ensuring that if an emergency occurs the affected person or body is able to continue to perform its functions; • arrange for the publication of all or part of assessments made and plans maintained for the purposes of preventing an emergency, reducing, controlling or mitigating the effects of an emergency, or enabling other action to be taken in connection with an emergency; and, • maintain arrangements to warn the public, and to provide information and advice to the public, if an emergency is likely to occur or has occurred. (Civil Contingencies Act 2004 Part 1 Section 2).
Water Resources Act 1991	Under the Water Resources Act, the EA has permissive powers for the management of flood risk arising from designated main rivers and the sea. In relation to flood risk, the EA have powers to carry out flood defence and drainage works, including maintenance of main rivers as well as the power to carry out works for purpose of providing flood warning system. The water resources act outlines the requirement for consents to be sought for any works to be completed over or under a main river. (Water Resources Act,1991[67])

Table B-3 Roles and responsibilities of Anglian Water

Legislation	Flood Risk Management Functions
Water Industry Act 1991	Anglian Water has a duty to **provide and maintain a system of public sewers** so that the areas for which they are responsible are effectually drained (Water Industry Act, 1991).
Water Management Act 2010	Anglian Water must **cooperate with other RMAs** in the exercise of their flood risk management function and may share information with other RMAs for the purpose of discharging this duty. (FWMA Part 1 Section 13).
Flood Risk regulations 2009	Anglian Water has a **duty to cooperate** with other authorities exercising their functions under the FRR. (FRR Part 6 Section 35).
	Anglian Water must **comply with a request** of Southend-on-Sea Borough Council to provide information reasonably required in connection with their responsibilities as LLFA under the FRR. (FRR Part 6 Section 36).

B.4 Regional Flood and Coastal Committee (RFCC)

The Anglian (Eastern) RFCC is a committee established by the EA under the FWMA and takes the place of the Anglian Regional Flood Defence Committee (RFDC). It brings together elected members appointed by Lead Local Flood Authorities (LLFAs) and independent members with relevant experience for three purposes:

1. To ensure there are coherent plans for identifying, communicating and managing flood and coastal erosion risks across catchments and shorelines;
2. To promote efficient, targeted and risk-based investment in flood and coastal erosion risk management that optimises value for money and benefits for local communities; and
3. To provide a link between the Environment Agency, LLFAs, other RMAs, and other relevant bodies to engender mutual understanding of flood and coastal erosion risks in its area.

[67] Water Resources Act (1991). Available online at: http://www.legislation.gov.uk/ukpga/1991/57/section/166/enacted

The Anglian (Eastern) RFCC consists of a chair appointed by the Government Minister, eight persons appointed by the EA, and members appointed by, or on behalf of, each Constituent Authority or Group of Constituent Authorities as set out in Table 3.3. All meetings are also open to the public.

Table B-4 RFCC Composition

Constituent Authority	Number of members of the Southern Anglian Eastern RFCC to be appointed by, or on behalf of, each Constituent Authority or Group of Constituent Authorities
Essex County Council	Four
Norfolk County Council	Two
Suffolk County Council	Two
Southend-on-Sea Borough Council	One
Thurrock Council	One

B.5 Local Flood Risk Management Partnership

The Local Flood Risk Partnership consists of the RMAs involved with Flood Risk Management within Southend-on-Sea.

Purpose

To provide a forum of the designated RMAs active in Southend and neighbouring RMA's to promote efficient and effective management of flood risk from rivers, surface water, groundwater and sewer and tidal sources.

Attendees

- Anglian Water Services Ltd
- Environment Agency
- Southend-on-Sea Borough Council (Lead Local Flood Authority)
    - Surface water management
    - Emergency Planning
    - Highways
    - Planning
- Neighbouring LAs as appropriate
    - Essex County Council
    - Castle Point Borough Council
    - Rochford District Council

Terms of Reference

The Partnership will meet quarterly and will work to:

- Ensure a long term sustainable approach to flood risk management in Southend, ensuring appropriate accountability and co-ordination between relevant parties
- Develop and own the Local Flood Risk Management Strategy for Southend Borough Council
- Provide leadership and accountability to ensure the effective delivery of the responsibilities set out in the Floods and Water Management Act 2010 within Southend

- Provide high level guidance to prioritise and co-ordinate local investment in flood management assets, maintenance and improvement works
- Be a central point for discussion of flooding issues by the appropriate agencies and the agreement and allocation of responsibility for any necessary resolution
- To share information, subject to the provisions of any Data Sharing Agreements, to mutually facilitate each other's actions in connection with the purpose of the Partnership
- To co-ordinate and mutually consult on the issuing of any public information relating to flooding or the work of members relevant to the objectives of the Partnership
- To collaborate, to the extent permissible by legislation and budgetary constraints, in joint projects which will seek innovative, cost effective solutions to flood risks, where added value can be provided by such collaboration
- Communicate together in an open and frank manner, while respecting Members' commercial or strategic interests, in the pursuit of improved flood risk management to the benefit of the residents of Southend.

Meeting Records

Previous meetings have been held on the following dates:

- 28th August 2013
- 23rd September 2013
- 9th October 2013
- 31st January 2014
- 15th September 2014
- 3rd October 2014
- 5th November 2014
- 20th April 2015
- 22nd July 2015

B.6 Data Sharing Protocol

Southend-on-Sea Borough Council have agreed with Anglian Water and the Environment Agency the mutual provision of data relating to flood risk management under the relevant data sharing agreements.

B.7 Stakeholder Engagement

As part of the development of the draft LFRMS, Southend-on-Sea Borough Council consulted with the Environment Agency and Anglian Water in March 2015.

Southend-on-Sea Borough Council have conduct public consultation through an online consultation of all of the LFRMS documents. The responding organisations included:

- The Environment Agency;
- Burges Estates Residents Association;
- Shoeburyness Residents Association;
- Mr Peter Lovett;
- Friends of Shoebury Common; and,
- Garrison Residents Associations.

Following the public consultation, comments have been included the final LFRMS reported to Southend-on-Sea cabinet. Any changes to the LFRMS will be reported to the Environment Agency for updating the Anglian River Basin District FRMP. The final LFRMS documents will be available to the public via the Southend-on-Sea Borough Council website.

Appendix C. Southend-on-Sea Action Plan

Southend-on-Sea Local Flood Risk Management Strategy: Action Plan

This Action Plan supports the Southend-on-Sea Local Flood Risk Management Strategy.
The reader should refer to the Main Strategy document for information relating to the local flood risk, objectives, measures and potential funding streams.

Measure / Scheme	Information relating to the measure or scheme for each action
Delivery	Proposed lead and partners for delivery of the action
Programme	Proposed start, finish and review timescales for the action, along with its current status
Funding	Estimated cost, source of funding and information on funding allocation
Location	Location of scheme to be focussed or implemented.
Priority	Identification of priority for actions
Category of Action	The category of which the action falls in
Comments	Any additional information relating to the action including links to case studies or articles where these have ben published.
Progress Review	To be used for furutre reviews of the action plan

Item		**Description**
Measure / Scheme	ID	The individual objective, measure and action ID.
	Objective	Objective, as defined in the Strategy.
	EU Measure Code	EU flood risk management measure codes which may be referred to in the River Basin District Flood Risk Management Plans[1, 2]
	Measure	Measure to deliver the objective, as identified in the Strategy.
	Action	Individual action to deliver the measure.
Delivery	Lead	Organisation who will lead the measure or scheme.
	Partners	Organisations who will be supporting or have a key role to play in delivering the measure or scheme.
Programme	Start	Start date (financial year) for the measure or scheme.
	Duration	Approximate length of project or scheme to run.
	Review	Review date for the measure or scheme. These are quarterly so stated at Month - Year.
	Status	Status of the measure or scheme: Not Started, In Progress, Planning, Community Engagement, Investigation, Feasibility, Design, Implementation or Completed.
Funding	Est. Cost (£)	Estimated cost of the measure or scheme.
	Source	Identified source of funding for delivering the measure or scheme. Short term, Medium term, Long term & Ongoing
	Status	Funding status of the scheme: Secured, Allocated, Requested, To be Confirmed or Unsuccessful.
Location		Location of scheme or measure: River, catchment, street, borough wide etc.
Priority		Priority assigned to the individual action. Low, Moderate or High.
Category of Action		The category of which the action falls in: Social, environmental, economic.
Comments		Any additional comments of information on the measure, action or scheme.
Progress Review	2015 - 2016	Status of actions during 2015 - 2016 at annual progress review

[1] European Commission (2013) Guidance for Reporting under the Floods Directive (2007/60/EC)
[2] Defra and the Environment Agency (2014) Flood Risk Management Plans – Measures and EU Reporting Codes

Revision	**Date**	**Comment**
v7	Nov-15	Action Plan amended to include comments of the public consultation.

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Measure / Scheme							Delivery		Programme				Funding						
ID	Objective	ID	Measure	EU Measure Code	ID	Action	Responsible Authority	Partners	Start	Duration	Review	Status	Est. Cost (£)	Source	Status	Location	Priority	Category of Action (social, economic or environmental)	Comments
1	Improve understanding of flood risk including likely effects of climate change.	1.a	Develop and maintain the existing information from internal and external stakeholders to understand the local flood risks to the Borough.	N/A	1.a.i	Establish Internal Flood group	SBC LLFA	SBC Departments	Pre-2013	Short term (1 - 2 years)	Dec-14	In Progress	<£10k	Area Based Grant	Secured	N/A	High	Social, economic, environmental	
				N/A	1.a.ii	Establish a Local Flood Risk Management Partnership with the RMAs and neighbouring boroughs.	SBC LLFA	EA, Other LLFA, Essex CC, AWS	Pre-2013	Short term (1 - 2 years)	Dec-14	In Progress	<£10k	Area Based Grant	Secured	N/A	Moderate	Social, economic, environmental	
				N/A	1.a.iii	Establish a process for communication across the Flood Working groups.	SBC LLFA	EA, AWS	Pre-2013	Short term (1 - 2 years)	Dec-14	In Progress	<£10k	Area Based Grant	Secured	N/A	Moderate	Social, economic, environmental	
				M43	1.a.iv	Develop and maintain a stakeholder engagement plan	SBC LLFA	Residents, Businesses, AW	Pre-2013	Short term (1 - 2 years)	Jun-15	Completed	<£10k	Area Based Grant	Secured	N/A	Moderate	Social, economic, environmental	
				M43	1.a.v	Improve external media communication	SBC LLFA	SBC Communications	2014-2015	Short term (1 - 2 years)	Jun-16	In Progress	£10k - £50k	Area Based Grant	Secured	N/A	Low	Social	
				M44	1.a.vi	Link engagement to the TE2100 Action Zone 8, Action 3 partnership arrangements.	SBC LLFA	EA,	2014-2015	Ongoing	Dec-16	In Progress	£10k - £50k	Area Based Grant	Secured	Seafront	High	Social, economic, environmental	
		1.b	Monitor flood risk and take account of the cumulative effect of new development, urban creep and climate change on the risk of flooding	M44	1.b.i	Maintain configured flood mapping	SBC LLFA - Emergency Planning	EA, AW	2013-2014	Ongoing	Mar-15	In Progress	<£10k	Area Based Grant	Secured	N/A	Moderate	Environmental	
				M44	1.b.ii	Develop a system for shared data storage and usage between the RMAs.	SBC LLFA - Emergency Planning	EA, AW	2014-2015	Short term (1 - 2 years)	Mar-16	In Progress	<£10k	Area Based Grant	Secured	N/A	Low	Social, economic, environmental	
				M44	1.b.iii	Develop network of rain gauges across the Borough.	SBC LLFA	EA, AW	2015-2016	Short term (1 - 2 years)	Dec-16	In Progress	£10k - £50k	Internal (Other)	To be confirmed	Borough Wide	High	Social, economic, environmental	
				M44	1.b.iv	Undertake groundwater monitoring	SBC LLFA	SBC Departments	2016-2017	Ongoing	Mar-17	Not yet commenced	£10k - £50k	To be confirmed	To be confirmed	Borough Wide	Moderate	Environmental	
				M44	1.b.v	Develop and publicise data collection system for historic and current flooding	SBC LLFA	EA, AW	2016-2017	Medium term (2-5 years)	Dec-17	Not yet commenced	<£10k	To be confirmed	To be confirmed	Borough Wide	Low	Social, environmental	
		1.c	Complete Flood Investigation Reports following flooding events deemed significant using the criteria outlined in the LFRMS and implement resulting actions.	M53	1.c.i.	Review all new incidents of flooding to determine the requirement for a Flood Investigation Report.	SBC LLFA	SBC Departments	2013-2014	Ongoing	Jun-15	In Progress	<£10k	Area Based Grant	Allocated	N/A	Very high	Social, economic, environmental	
				M53	1.c.ii	Utilise details of flooding mechanisms to identify remedial actions to alleviate flood risk.	SBC LLFA	EA, AW	2013-2014	Ongoing	Dec-15	In Progress	£10k - £50k	Area Based Grant	Allocated	Site Specific	High	Social, economic	
				M53	1.c.iii	Gather data from the RMAs relating to flood incidents recorded and responses to develop a comprehensive view of flood management across the borough.	SBC LLFA	EA, AW	2013-2014	Ongoing	Jun-15	In Progress	<£10k	Area Based Grant	Allocated	Borough Wide	High	Social, economic	
				M53	1.c.iv	Implement actions resulting from completed Flood Investigation Reports.	SBC LLFA	EA, AW, SBC Departments	2014-2015	Ongoing	Sep-16	In Progress	£50k - £100k	FCERM GiA	To be confirmed	Borough Wide	High	Social, economic, environmental	
		1.d	Develop a risk based modelling programme to understand the current and future flood risk from ordinary watercourses, surface water and groundwater.	M24	1.d.i	Review all historic incidents of flooding to determine and rank areas at greater risk of flooding.	SBC LLFA	EA, AW	2014-2015	Ongoing	Jun-16	In Progress	<£10k	Area Based Grant	Secured	Borough Wide	High	Social, economic, environmental	
				M24	1.d.ii	Review existing modelling, mapping and understanding of flooding mechanisms.	SBC LLFA	EA, AW	2014-2015	Ongoing	Jun-16	In Progress	£10k - £50k	Area Based Grant	Secured	Borough Wide	Moderate	Social, economic, environmental	
				M24	1.d.iii	Examine new modelling techniques and datasets available to determine viability of undertaking updated modelling.	SBC LLFA	EA, AW	2014-2015	Ongoing	Jun-16	In Progress	<£10k	Area Based Grant	Secured	Borough Wide	Moderate	Social, economic, environmental	
				M24	1.d.iv	Communicate with RMAs to develop integrated modelling where suitable.	SBC LLFA	EA, AW	2014-2015	Ongoing	Jun-16	In Progress	<£10k	Area Based Grant	Secured	Borough Wide	High	Social, economic, environmental	
				M24	1.d.v	Review and implement the SWMP Action Plan	SBC LLFA	EA, AW	2016-2017	Ongoing	Dec-16	In Progress	<£10k	Area Based Grant	Secured	Borough Wide	High	Social, economic, environmental	
2	Encourage future development to provide a betterment to flood risk.	2.a	Develop planning policy to be consistent with wider flood risk management policies presented at a national and regional level and provide clear and unambiguous advice on how to achieve those policies within Southend	M21	2.a.i	Develop standard advice notes for planning submissions	SBC LLFA	SBC Departments	2014-2015	Medium term (2-5 years)	Nov-16	In Progress	<£10k	Internal (Other)	To be confirmed	N/A	Moderate	Social, economic, environmental	
				M21, M34	2.a.ii	Develop advice for SuDS adoption within the Southend area and promote the use of SuDS through the Core Strategy and Local Development Framework policies.	SBC LLFA	SBC Departments including the Planning Department	2015-2016	Medium term (2-5 years)	Dec-16	In Progress	<£10k	Defra -SAB	Allocated	N/A	Moderate	Social, economic, environmental	
					2.a.iii	Develop planning policy to require site specific flood risk assessments and surface water drainage strategies for all developments within critical drainage areas.	SBC LLFA	SBC Departments	2016-2017	Short term (1 - 2 years)	Dec-16	Not yet commenced	<£10k	Internal (Other)	Allocated	N/A	High	Environmental	
				M21	2.a.iv	Develop local planning policy to encourage early consideration of flood risk in planning applications.	SBC LLFA	SBC Departments including the Planning Department	2015-2016	Medium term (2-5 years)	Dec-16	In Progress	<£10k	Internal (Other)	To be confirmed	N/A	Moderate	Social, economic, environmental	
				M21	2.a.v	Undertake an effective review of planning policy within the Core Strategy and update wording during the 2016 revision.	SBC LLFA	SBC Departments including the Planning Department	2015-2016	Short term (1 - 2 years)	Dec-15	In Progress	<£10k	Internal (Other)	To be confirmed	N/A	Moderate	Social, economic, environmental	
		2.b	Give consideration to development proposals that assist in addressing flood risk management across regeneration areas as well as individual development sites	M21	2.b.i	Develop a surface water drainage strategy for regeneration areas	SBC LLFA	SBC Departments, IDBs, Water Companies, Essex CC.	2016-2017	Medium term (2-5 years)	Mar-17	Not yet commenced	£10k - £50k	To be confirmed	To be confirmed	Regeneration Areas	Moderate	Social, economic, environmental	
				N/A	2.b.ii	Consider funding of measures through the use of Community Infrastructure Levy (CIL) Regulations	SBC LLFA	SBC Departments including the Planning Department	2015-2016	Medium term (2-5 years)	Mar-17	In Progress	<£10k	CIL	To be confirmed	N/A	Moderate	Economic	
		2.c	Develop a policy that requires all development to seek to provide a betterment to flood risk resulting to and from the proposed development, utilising SuDS.	M24	2.c.i	Develop standard advice notes for planning submissions	SBC LLFA	SBC Departments including the Planning Department	2014-2015	Medium term (2-5 years)	Dec-17	Not yet commenced	<£10k	Internal (Other)	To be confirmed	N/A	Moderate	Social, economic, environmental	
				M24	2.c.ii	Develop a standard set of adaptable planning conditions	SBC LLFA	SBC Departments including the Planning Department	2014-2015	Medium term (2-5 years)	Dec-17	Not yet commenced	<£10k	Internal (Other)	To be confirmed	N/A	Moderate	Social, economic, environmental	
				M24	2.c.iii	Develop planning policy to outline requirement for development to seek to provide a betterment to flood risk.	SBC LLFA	SBC Departments including the Planning Department	2014-2015	Medium term (2-5 years)	Dec-17	Not yet commenced	<£10k	Internal (Other)	To be confirmed	N/A	Moderate	Environmental, Social	

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Measure / Scheme							Delivery		Programme				Funding						
ID	Objective	ID	Measure	EU Measure Code	ID	Action	Responsible Authority	Partners	Start	Duration	Review	Status	Est. Cost (£)	Source	Status	Location	Priority	Category of Action (social, economic or environmental)	Comments
				M24	2.c.iv	Develop standard advice notes for installation of SuDS, outlining preferred measures.	SBC LLFA	SBC Departments including the Planning Department	2015-2016	Medium term (2-5 years)	Mar-16	Not yet commenced	<£10k	Internal (Other)	To be confirmed	N/A	High	Social, economic, environmental	
		2.d	Consider the designation of existing features believed to positively influence flood risk to safeguard their function in the event of future development.	M35	2.d.i	Review structures and assets recorded within the Asset Register to determine potential for designation.	SBC LLFA	SBC Highways department	2016-2017	Medium term (2-5 years)	Dec-16	Not yet commenced	<£10k	Area Based Grant	To be confirmed	Borough Wide	Low	Environmental, Social	
				M35	2.d.ii	Consider designating structures and assets in light of findings from completed Flood Investigation Reports.	SBC LLFA	SBC Legal department	2015-2016	Medium term (2-5 years)	Dec-16	Not yet commenced	£10k - £50k	To be confirmed	To be confirmed	Site Specific	Moderate	Social, economic, environmental	
3	Pursue flood risk management measures using a risk based approach that provide multiple social, economic and environmental benefits to the borough.	3.a	Prioritise flood risk management by implementing a risk-based approach to capital investment decisions, maintenance programmes and activities	M35	3.a.i	Assess flood management options outlined within existing flood management strategies and investigations to determine potential options for further investigation.	SBC LLFA	SBC Departments	2015-2016	Short term (1 - 2 years)	Dec-15	Not yet commenced	<£10k	To be confirmed	To be confirmed	N/A	Moderate	Environmental	
				M24	3.a.ii	Develop Project Proposal forms to take identified measures seeking FCERM GIA for consideration within the 6-year capital investment programme coordinated by the Environment Agency.	SBC LLFA	EA	2015-2016	Medium term (2-5 years)	Sep-16	Not yet commenced	£10k - £50k	FCERM GiA	To be confirmed	TBC	Moderate	Economic, Environmental	
				M35	3.a.iii	Develop a programme to update the asset register, including assessments of asset conditions and maintenance.	SBC LLFA	SBC Departments, EA, AW.	2017-2018	Medium term (2-5 years)	Dec-17	Not yet commenced	<£10k	To be confirmed	To be confirmed	N/A	High	Environmental	
				M24	3.a.iv	Review maintenance schedules for ordinary watercourses, drains, gullies and highways drains.	SBC LLFA, Highways	EA, AW	2015-2016	Short term (1 - 2 years)	Dec-15	In Progress	<£10k	Internal (Maintenance)	To be confirmed	Borough Wide - areas highlighted by FIRs include Chalkwell Esplanade, Clifton Drive, Rodbridge Drive, Campfield Road, Ness Road	High	Environmental	
				M35	3.a.v	Ensure the Council maintenance and infrastructure plan reflects flood risk management investment	SBC LLFA	Investors	2014-2015	Ongoing	Jun-15	In Progress	<£10k	Internal (Other)	To be confirmed	N/A	Very high	Economic, Environmental	
				M35	3.a.vi	Complete value/risk surveys for asset valuation and condition	SBC LLFA	SBC Departments, Essex CC, EA, AW	2015-2016	Ongoing	Jun-15	In Progress	<£10k	Internal (Other)	To be confirmed	Borough wide - areas highlighted by FIRs include Chalkwell Esplanade, Clifton Drive, Rodbridge Drive	High	Economic, Environmental	
		3.b	Give consideration to the economic, social and environmental benefits and limitations of flood risk management measures when making strategic investment decisions	M35	3.b.i	Develop a Cost-Benefit method as the basis of determining investment decisions in flood risk management	SBC LLFA	SBC Departments	2015-2016	Medium term (2-5 years)	Dec-15	Not yet commenced	<£10k	Internal (Other)	To be confirmed	N/A	Moderate	Economic, Environmental	
		3.c	Consider how future infrastructure improvements (such as highways, rail and public realm works) and/or changes could be used to deliver flood risk/ surface water management benefits	N/A	3.c.i	Develop internal communication between departments to ensure opportunities for collaborative measures are identified.	SBC LLFA	SBC Departments	2014-2015	Short term (1 - 2 years)	Sep-15	In Progress	<£10k	Area Based Grant	To be confirmed	N/A	Moderate	Social	
				N/A	3.c.ii	Develop a highways maintenance regime to consider frequency of maintenance within areas at high risk of flooding.	SBC LLFA, Highways	SBC Departments	2013-2014	Medium term (2-5 years)	Jun-15	In Progress	<£10k	Internal (Maintenance)	To be confirmed	N/A	Moderate	Social, Economic	
				M34	3.c.iii	Outsourced public realm and infrastructure contracts to include SuDS and flood risk management improvements	SBC LLFA	SBC Departments	2014-2015	Long term (5 - 10 years)	Mar-17	In Progress	£50k - £100k	Internal (Maintenance)	To be confirmed	Site Specific	Low	Social, economic, environmental	
				M31	3.c.iv	Assess the potential for the restructure of road and pavement levels to store flood waters and protect adjacent properties.	SBC LLFA	Highways, Essex CC	2016-2017	Medium term (2-5 years)	Mar-16	Not yet commenced	£50k - £100k	To be confirmed	To be confirmed	N/A	Low	Environmental, Economic	
		3.d	Consider measures that would provide a benefit to the environment including the protection/enhancement of biodiversity, habitats; water quality and hydromorphology of watercourses.	N/A	3.d.i	Assess the objectives and actions of RBMP and CFMP to implement measures to improve environmental quality of the Boroughs rivers.	SBC LLFA	EA	2015-2016	Short term (1 - 2 years)	Sep-16	Not yet commenced	<£10k	To be confirmed	To be confirmed	N/A	low	Environmental	
				M31	3.d.ii	Implementation of source control measures to attenuate surface water at the point of generation - would require cost-benefit assessment	SBC LLFA, Residents	SBC Departments, EA.	2015-2016	Medium term (2-5 years)	Jun-17	Not yet commenced	£500k - £1M	FCERM GiA & Community	To be confirmed	Borough Wide	Moderate	Environmental, Economic	
				M31	3.d.iii	Consider flood management measures in areas of designated nature conservation and designated heritage sites to minimise impact.	SBC LLFA	SBC Departments, Natural England, English Heritage.	2016-2017	Long term (5 - 10 years)	Dec-18	Not yet commenced	<£10k	To be confirmed	To be confirmed	Borough Wide	Low	Environmental	
				M31, M32, M33, M34	3.d.iv	Consider longer term measures to reduce flood risk such as flood defences, flood storage areas, increases to channel capacity and the increasing conveyance of flood waters via pumping stations etc.	SBC LLFA	EA	2015-2016	Long term (5 - 10 years)	Dec-16	Not yet commenced	£10k - £50k	Environment Agency	Allocated	Eastwood Brook	High	Environmental, Economic	
		4.a	Openly share information with respect to flood risk across Southend-on-Sea with all risk management authorities and the public	M43	4.a.i	Develop a media team strategy to communicate information to the public through regular communications.	SBC LLFA	EA, AW	2015-2016	Short term (1 - 2 years)	Dec-15	In Progress	£10k - £50k	Internal (Other)	To be confirmed	N/A	High	Social	
				M43	4.a.ii	Develop a communication strategy for public engagement through properly constituted community groups as per the Council's protocol.	SBC LLFA	SBC Departments	2016-2017	Short term (1 - 2 years)	Dec-16	In Progress	£10k - £50k	Internal (Other)	To be confirmed	Borough Wide	High	Social	
				M43	4.a.iii	Update the webpage on the Southend-on-Sea website to detail information on flooding and provide guidance to residents, businesses and developers.	SBC LLFA	SBC Departments	2015-2016	Short term (1 - 2 years)	Dec-15	In Progress	<£10k	Internal (Other)	To be confirmed	N/A	Very high	Social	

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Measure / Scheme							Delivery		Programme				Funding						
ID	Objective	ID	Measure	EU Measure Code	ID	Action	Responsible Authority	Partners	Start	Duration	Review	Status	Est. Cost (£)	Source	Status	Location	Priority	Category of Action (social, economic or environmental)	Comments
4	Raise awareness of flood risk and management measures to communities, residents and businesses.	4.b	Seek to increase public awareness (property owners, developers) with respect to flood risk and the responsibilities of the Risk Management Authorities	M43	4.b.i	Develop links to social networking sites in order to disseminate information.	SBC LLFA	Residents, Businesses.	2015-2016	Short term (1 - 2 years)	Sep-15	Not yet commenced	<£10k	Internal (Other)	To be confirmed	N/A	Low	Social	
				M43	4.b.ii	Provide staff training for flood awareness, advice for residents, and actions the Council will take.	SBC LLFA	SBC Departments	2015-2016	Medium term (2-5 years)	Dec-15	Not yet commenced	£10k - £50k	Internal (Other)	To be confirmed	N/A	moderate	Economic	
				N/A	4.b.iii	Investigate the potential for implementation of a water butt scheme for council properties	SBC LLFA	SBC Departments.	2017-2018	Medium term (2-5 years)	Mar-18	Not yet commenced	£10k - £50k	To be confirmed	To be confirmed	Borough Wide	Low	Environmental, social	
		4.c	Seek to increase public awareness of the public's responsibly with regards flood risk, namely riparian ownership, maintenance of drainage systems and management of flood risk.	M23, M43	4.c.i	Provide local homeowners and residents within information on flood resistance and resilience measures that they could implement.	Residents, SBC LLFA	EA, AW	2015-2016	Medium term (2-5 years)	Mar-17	Not yet commenced	<£10k	To be confirmed	To be confirmed	Borough Wide	Moderate	Environmental, social	
				M23, M43	4.c.ii	Work with local communities to develop community flood groups as part of developing local resilience.	SBC LLFA	EA, AW	2015-2016	Short term (1 - 2 years)	Sep-16	Not yet commenced	<£10k	To be confirmed	To be confirmed	Borough Wide	Moderate	Social, economic	
				M43	4.c.iii	Inform public of Anglian Waters "Keep it Clear" campaign.	AWS	SBC	2015-2016	Short term (1 - 2 years)	Mar-16	In Progress	<£10k	Anglian Water	To be confirmed	Borough Wide	Moderate	Social, economic	
				M43	4.c.iv	Advising residents of riparian responsibilities - enforcement under the Land Drainage Act where necessary	SBC LLFA	EA	2015-2016	Short term (1 - 2 years)	Sep-15	In Progress	<£10k	Internal (Other)	To be confirmed	Borough Wide	Moderate	Environmental, social	
				M43	4.c.v	Advise local residents of the risks of fly tipping	SBC LLFA, Residents	EA	2015-2017	Short term (1 - 2 years)	Sep-16	Not yet commenced	<£10k	To be confirmed	To be confirmed	Borough Wide	Moderate	Environmental, social	
				M43	4.c.vi	Communicate with riparian owners through group meetings, online resources and other materials.	SBC LLFA	EA, AW	2015-2016	Short term (1 - 2 years)	Sep-15	In Progress	<£10k	Internal (Other)	To be confirmed	Borough Wide	Moderate	Social	
		4.d	Encourage residents, businesses and stakeholders to report incidents of flooding to the council.	M53	4.d.i	Ensure a framework exists for the public to report blockages/poor conditions of assets which require maintenance.	SBC LLFA	EA, AW, Residents	2015-2016	Short term (1 - 2 years)	Sep-16	Not yet commenced	<£10k	To be confirmed	To be confirmed	N/A	High	Environmental, social	
				M53	4.d.ii	Improved flood incident record collection through implementation of a flood record form.	SBC LLFA - Emergency Planning	EA, AW, Essex CC, Fire & Rescue	2013-2014	Short term (1 - 2 years)	Jun-15	In Progress	<£10k	Area Based Grant	Secured	N/A	Moderate	Social, economic, environmental	
				M53	4.d.iii	Encourage residents and business to report incidents of flooding with as much detail as possible in order to develop a comprehensive database of flooding incidents.	SBC LLFA	EA, AW, Essex CC, Fire & Rescue	2013-2014	Short term (1 - 2 years)	Jun-15	Not yet commenced	<£10k	Area Based Grant	Secured	Borough Wide	High	Social, economic, environmental	
5	Use knowledge of flooding to inform the emergency response.	5.a	Use information on flood risk as a tool for flood prediction and warning	M43	5.a.i	Communicate information on flooding, outlining ways to report flooding to relevant Risk Management Authorities.	SBC LLFA	SBC Communications, EA, AWS, ECC	2014-2015	Short term (1 - 2 years)	Sep-15	In Progress	<£10k	Internal (Other)	To be confirmed	N/A	High	Social, environmental	
				M43	5.a.ii	Set up communication channels for reports to be made, such as through the website.	SBC LLFA	SBC Communications	2015-2016	Short term (1 - 2 years)	Mar-16	Not yet commenced	<£10k	To be confirmed	To be confirmed	N/A	Moderate	Social, economic	
				M42, M44	5.a.iii	Review historic flooding incidents and the councils flood risk from surface water mapping to prioritise flood risk response across the Borough.	SBC LLFA	SBC Departments, EA, AW.	2013-2014	Ongoing	Dec-15	In Progress	<£10k	Internal (Other)	To be confirmed	N/A	Very high	Social, economic	
				M41	5.a.iv	Use Environment Agency flood warning and Met Office weather warning information to update external communications such as website and networking sites.	SBC LLFA	SBC Departments, EA, Met Office	2013-2014	Short term (1 - 2 years)	Jun-15	In Progress	<£10k	Internal (Other)	To be confirmed	N/A	Moderate	Social, economic	
				M42	5.a.v	Review requirements of Action 2 of TE2100 for Actions Zones 6 and 8 and link these to Emergency Planning activities.	SBC Emergency Planning	SBC Departments, EA	2015-2016	Short term (1 - 2 years)	Sep-16	In Progress	<£10k	Area Based Grant	Secured	Seafront	High	Social, economic, environmental	
		5.b	Use information on flood risk to identify property / people / groups at risk, in order to inform emergency planning and emergency response priorities	M24	5.b.i	Maintain configured flood mapping	SBC LLFA	SBC Departments, EA, AW.	2015-2016	Ongoing	Mar-16	In Progress	<£10k	Area Based Grant	To be confirmed	N/A	Moderate	Environmental	
				M42, M44	5.b.ii	Use model outputs to simulate and visualise flood scenarios using available software to inform emergency planning.	SBC LLFA Emergency Planning	SBC Departments.	2014-2015	Medium term (2-5 years)	Sep-15	In Progress	£10k - £50k	Area Based Grant	To be confirmed	N/A	High	Environmental	
				M42, M44	5.b.iii	Update Multi Agency Flood Plan	SBC LLFA Emergency Planning	EA, EEC	2014-2015	Short term (1 - 2 years)	Sep-15	Not yet commenced	<£10k	To be confirmed	To be confirmed	N/A	Moderate	Environmental, social	
				M42, M44	5.b.iv	Plan for road closures and diversions for flood prone areas	SBC LLFA, Highways	Essex Police	2014-2015	Short term (1 - 2 years)	Dec-15	In Progress	<£10k	Internal (Other)	To be confirmed	Borough Wide	High	Environmental, social	
				M42, M44	5.b.v	Identify vulnerable receptors to target emergency response	SBC LLFA Emergency Planning	SBC Departments, EA	2014-2015	Short term (1 - 2 years)	Dec-15	Not yet commenced	<£10k	Internal (Other)	To be confirmed	Borough Wide	Very high	Social	EA may be able to help with this action through the Emergency Planning Maps produced for Gold Control (EA Lead - Guy Cooper)
				M42, M43, M44	5.b.vi	Set up contact with community groups to be used in the event of flooding to assist with coordinated responses within communities.	SBC LLFA Emergency Planning	Essex Police	2014-2015	Short term (1 - 2 years)	Sep-15	Not yet commenced	<£10k	Internal (Other)	To be confirmed	Borough Wide	High	Social	
		6.a	Manage flood risk from local flood sources owned and maintained by Southend-on-Sea Borough Council	N/A	6.a.i	Review ownership of assets across the borough.	SBC LLFA	SBC Departments, EA, AW.	2013-2014	Short term (1 - 2 years)	Dec-15	Completed	<£10k	Area Based Grant	Secured	Borough Wide	High	Economic	
				M24	6.a.ii	Maintain ordinary watercourses and drainage ditches where SBC is the riparian owner.	SBC LLFA	SBC Departments and Subcontractors	2014-2015	Ongoing	Mar-17	In Progress	<£10k	Internal (Maintenance)	To be confirmed	Borough Wide	High	Environmental, Economic	
				M24	6.a.iii	Undertake regular inspections of drainage ditches and ordinary watercourses, where necessary serving notice for maintenance requirements.	SBC LLFA	SBC Departments and Subcontractors	2015-2016	Ongoing	Mar-17	Not yet commenced	£10k - £50k	Internal (Maintenance)	To be confirmed	Borough Wide	Moderate	Environmental, Economic	

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Measure / Scheme							Delivery		Programme				Funding						
ID	Objective	ID	Measure	EU Measure Code	ID	Action	Responsible Authority	Partners	Start	Duration	Review	Status	Est. Cost (£)	Source	Status	Location	Priority	Category of Action (social, economic or environmental)	Comments
6	Continue to manage local flood risk and coastal flooding & erosion.	6.b	Updating the Southend-on-Sea Shoreline Strategy to consider the requirements of local flood risk and environmental benefits.	N/A	6.b.ii	Determine how actions required to meet the overarching objective of the SMP to maintain the current standard of protection, can serve multiple benefits by considering schemes to manage local flood risk.	SBC LLFA	SBC Departments.	2015-2016	Medium term (2-5 years)	Sep-17	Not yet commenced	<£10k	To be confirmed	To be confirmed	N/A	Moderate	Social, economic, environmental	
		6.c	Identify where schemes can be developed that provide coastal as well as local flood risk and environmental benefits , considering TE2100 recommendations for Action Zone 6 and 8.	N/A	6.c.i	Review the LFRMS objectives and consider how these can be incorporated into the SBC Shoreline Management Strategy	SBC LLFA	SBC Departments.	2015-2016	Short term (1 - 2 years)	Jun-16	Not yet commenced	<£10k	To be confirmed	To be confirmed	N/A	Moderate	Social, economic, environmental	
				N/A	6.c.ii	Consider the environmental implications of shoreline management including potential impacts on tourism, fisheries and recreation as outlined in the Southend-on-Sea Shoreline Strategy	SBC LLFA	SBC Departments, EA, Essex CC.	2016-2017	Short term (1 - 2 years)	Mar-17	Not yet commenced	<£10k	To be confirmed	To be confirmed	N/A	Moderate	Social, economic, environmental	
				N/A	6.c.iii	Assess coastal management schemes against the various flood studies including the strategic flood risk assessment, catchment flood management plan, surface water management plan and TE2100.	SBC LLFA	SBC Departments, EA, Essex CC.	2016-2017	Medium term (2-5 years)	Jun-16	Not yet commenced	<£10k	To be confirmed	To be confirmed	N/A	Moderate	Social, economic, environmental	

Appendix D. Southend-on-Sea Flood Incident Recording and Investigating

D.1 Overview

Section 19 (1) of the FWMA places a duty on LLFAs to investigate flood incidents from surface water, groundwater and ordinary watercourses, where it considers it 'necessary and appropriate'. As part of these investigations, Southend-on-Sea Borough Council must determine which RMAs have relevant flood risk management functions and whether each of those RMAs have exercised or are proposing to exercise those functions in response to a flood. The result of any investigation must then be published, in accordance with Section 19 (2) of the FWMA.

D.2 When should a flood be investigated?

In order to determine when it is 'necessary and appropriate' to undertake an investigation into a flood event, a working definition of areas at 'significant risk' has been developed by Southend-on-Sea Borough Council as follows:

Is there, or have there been:

- the interior of a residential dwelling flooded more than four times,
- any reports of the interior of critical infrastructure flooding,
- flooding of a transport link such that it has been made impassable for a significant amount of time,
- more than 14 reports of flooding within 50m of a receptor within the past three years,
- potential for accidents or health implications, or
- effects on vulnerable people through service or amenity impacts.

Where the answer to any of the below is 'yes', the need for a Flood Investigation will be considered based on a risk based approach:

- Has there been more than one report of the interior of a commercial property flooding?
- And has this had an economic impact?
- Has the natural environment been affected?
- And is there a threat to a local ecosystem?
- Is the localised flooding known to occur according to historic records?
- Has a request for investigation been received?
- Is a single source of flooding evident?
- Are other Risk Management Authorities investigating?

The criteria are not limiting and the significance of each flood event will be assessed on a case-by-case basis.

This process is illustrated within Figure D-1.

D.3 What should be recorded?

In order to be able to investigate incidents of flooding (where necessary and appropriate) across their administrative area, Southend-on-Sea Borough Council first need to establish a robust and consistent method for capturing sufficient relevant information from the public and relevant departments within the Council regarding specific flood events. The following details will need to be captured in order to consistently determine when a flood incident should be investigated (based upon the criteria established in Section 6.2).

- Description of flood location;
- Date and time flooding started (and at what point the flood start has been recorded from);
- Date and time the flooding began to recede;
- At what point was the flood end reported from;

- Total flood duration;
- Description of flood source and pathway;
- Description of Maximum flood extent;
- Recorded maximum heights/ depths;
- Location of flooding in relation to existing infrastructure and properties;
- Sketch of flood extent and flow paths; and,
- Photographs of flood event.

D.4 How should the findings of the report be published?

A draft Flood Investigation Report will be issued to the relevant RMAs for comment. Following receipt of comments, a final report will be submitted for internal review and scrutiny.

Should the report pass the scrutiny process, the report will be presented to the Southend-on-Sea Borough Council cabinet.

Following the completion of Flood Investigation Report and cabinet sign off, the report will be published on the Southend-on-Sea website.

Figure D-1 Southend-on-Sea Flood Investigation Process Diagram