# Southend-on-Sea Local Flood Risk Management Strategy

## Non- Technical Summary

November 2015

AECOM

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## 1. Introduction

In 2008, Sir Michael Pitt published a report entitled 'Learning Lessons from the 2007 Floods'. 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 ('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).

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.

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.

**Figure 1: Flooding within Southend (August 2013)**

# 2. Management of Flood Risk within Southend-on-Sea

Within Southend-on-Sea, in addition to the Council, the Environment Agency and Anglian Water are considered to be Risk Management Authorities (RMAs). Each of the RMAs are responsible for management of flood risk sources, however it is important that they work together, as in many instances there are interactions between the different sources of flooding. The following section will provide a summary of the roles and responsibilities of the RMAs.

- **Southend-on-Sea Borough Council** are responsible for the managing of flood risk from surface water, groundwater and ordinary watercourses through their role as:
    - LLFA,
    - Highways Authority,
    - Local Planning Authority,
    - Emergency Responder,
    - Riparian Owner; and
    - Regulator of Ordinary Watercourses.
- **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.
- **Anglian Water** is responsible for managing the risks of flooding from adopted sewers where the sewer flooding is wholly or partly caused by an increase in the volume of rainwater. 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.

In addition to the RMAs, the public, businesses, developers and riparian owners all have a role in implementing and using the LFRMS.

- **Businesses and the public:** 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. The National Flood Forum1 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 website2.
- **Developers:** 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.
- **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. The Environment Agency have published a document entitled 'Living on the Edge'3 which provides a useful guide to the rights and responsibilities of those who own land adjacent to main rivers and ordinary watercourses.

# 3. Flood Risk in Southend-on-Sea

Flood risk is not just the likelihood of flooding occurring, but a function of likelihood combined with the potential damage a flood could cause.

[1] National Flood Forum: http://www.nationalfloodforum.org.uk/
[2] Environment Agency website - 'Prepare your property for flooding' https://www.gov.uk/prepare-for-a-flood
[3] Environment Agency (2012) 'Living on the edge', Environment Agency: Bristol. Available online at: https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities

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.

## Flooding from Surface Water

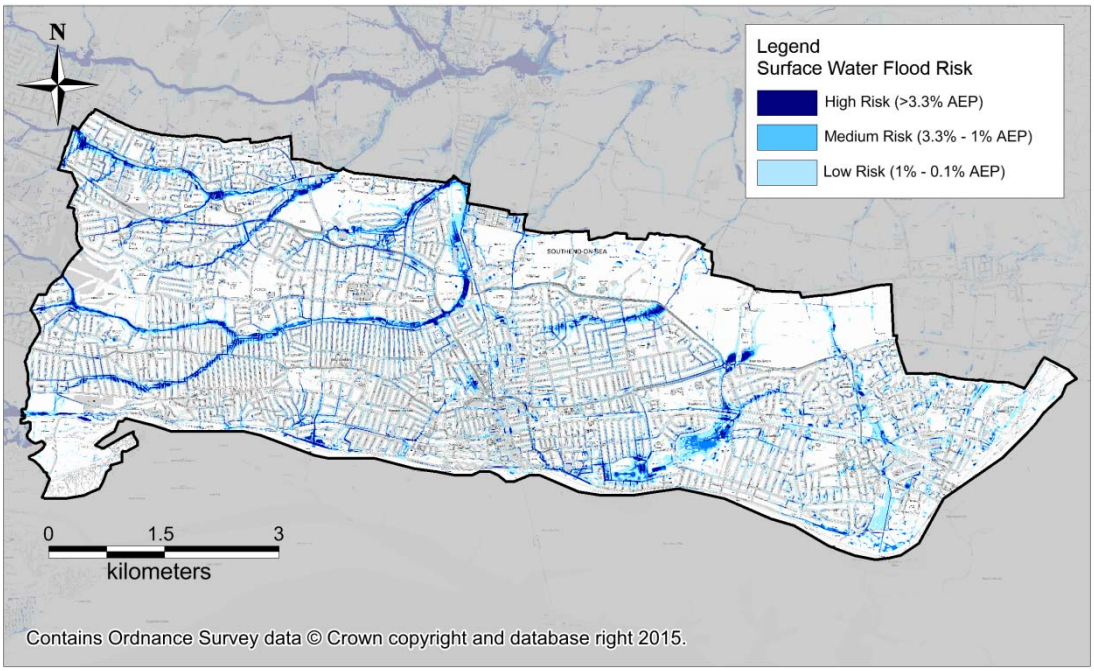
Surface water flooding, also known as pluvial flooding, occurs when high intensity rainfall generates runoff which flows over the surface of the ground and accumulates in low lying areas. The presence of impermeable surfaces, saturated soils and insufficient capacity within the drainage network can further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

The current understanding of surface water flood risk is based on historical events and hydraulic modelling. Further details of surface water flood risk can be found in the Surface Water Management Plan (SWMP)[4]. Based on the hydraulic modelling, across the borough there are estimated to be 1062 properties (residential and commercial) at a high risk of surface water flooding and 8518 properties at a low risk of surface water flooding.

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);
- 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.

**Figure 2: Surface Water Flood Risk**




[4] AECOM (2015) 'Southend-on-Sea Borough Council Surface Water Management Plan', AECOM: Basingstoke

## 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.

The British Geological Survey (BGS) has produced a dataset showing areas susceptible to groundwater flooding on the basis of geological and hydrogeological conditions. The map indicates that susceptibility to groundwater flooding is high to very high along Prittle Brook, Eastwood Brook, Shoeburyness and around Southchurch.

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.

## Flooding from Ordinary Watercourses

Ordinary watercourse 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

In total there is approximately 5.3 km of ordinary watercourse in Southend-on-Sea, most of which are tributaries of main rivers. 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.

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.

## Other sources of flood risk

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.

- **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. Within Southend-on-Sea, the main rivers that contribute to flood risk as the Prittle Brook, Eastwood Brook and Willingale Brook.
- **Flooding from 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.
- **Flooding from sewers:** Sewer flooding typically occurs when the rainfall exceeds the capacity of the sewer network, when sewers become blocked with debris, sediment or waste products, and when high river or sea levels restrict discharge causing the sewers to surcharge.

## Flooding from combined sources

Within Southend-on-Sea there are numerous interactions between the different sources of flooding. These need to be considered when looking at managing flood risk.

- **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.

- **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.

## 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[5]. Consequently, the number of properties, business and critical infrastructure at risk will increase.

**Figure 3: Combined sources of flooding within Southend**

# 4. LFRMS Objectives

The Act requires the LFRMS to specify objectives for managing local flood risk. Southend-on-Sea Borough Council have developed the following 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.

[5] United Kingdom Climate Projections 2009 http://ukclimateprojections.defra.gov.uk//

# 5. Delivery of the LFRMS

An Action Plan has been developed to accompany the LFRMS that outlines how the Council will meet the objects through a series of measures and actions. 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 is a 'live' document that will be frequently updated. It is intended that annual reports are made to Cabinet to summarise actions completed to date and priority actions for the forthcoming year.

## Communication and Engagement

A Stakeholder Engagement Plan 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.

## Monitor Review and Maintain

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.

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.