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The Liverpool & Sefton Surface Water Flood Risk Area

Introduction to the Liverpool & Sefton Surface Water Flood Risk Area

map showing boundary of Liverpool & Sefton Surface Water Flood Risk Area



The Liverpool & Sefton Flood Risk Area (FRA) has been identified as the flood risk from surface water is considered nationally significant.

Liverpool City Council and Sefton Metropolitan Borough Council take the lead on the development and delivery of the FRMP for this FRA. It is identified as the Lead Local Flood Authorities responsible for managing flood risk from 'local' sources. These local sources of flooding are surface water, groundwater and ordinary watercourses.

The Environment Agency's remit covers flood risk from rivers and the sea.

United Utilities is the Water and Sewage Company that own, operate and maintain the sewerage network and waste water treatment infrastructure in the FRA.

The Liverpool & Sefton FRA covers many of the urban districts of Walton, Anfield, Wavertree, Waterloo and Bootle which includes residential, business and amenity areas. The FRA is surrounded by a green belt of mainly agricultural land to the north and the Mersey estuary to the south and west.

The Liverpool & Sefton FRA lies upon a sandstone aquifer, exploited in the past for various uses such as industry, mining and water supply. Since industry has declined, groundwater exploitation has reduced dramatically, causing the natural process of groundwater recharge and the raising of the water table. The superficial deposits in Liverpool are largely glacial till of clay, sand and gravel. The superficial deposits across Sefton from Crosby to Maghull are a patchwork of sand and a glacial till of clay, sand and gravel. There is also a strip of alluvial deposits along the course of the River Alt.

Part of the Mersey Estuary Special Protected Area (SPA), Site of Special Scientific Interest (SSSI), Ramsar site and Coastal Reserve is located within the FRA. Sefton Coast Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC) are found within the FRA. A number of Local Wildlife Sites (LWS) are found within the FRA. The LWS include Sefton Park, Loop Line and adjacent sites, Crosby Marine lake and park, Rimrose Valley and canal, plus others.

Two Ancient Woodland sites, Stocktons Wood and Fullwood Wood are located within the FRA. Liverpool Bay is a designated SPA and Croxteth Local Nature Reserve (LNR) and Brook Vale LNR, plus others, are located within the FRA. The FRA includes a Special Protected Area and Ramsar site, the Ribble and Alt estuaries.

Many listed buildings are housed within the FRA, in addition to several 'Heritage at Risk' sites. It includes areas in the Liverpool Conservation Area, Old Hall moated site and fishponds which is also a Scheduled Monument.

Historically Liverpool's story begins at the river, the 'pool' which was a tributary of the River Mersey which is now buried beneath Liverpool One shopping centre. This area was home to a small fishing village in the 13th Century. Growth occurred when its port boomed during the 17th and 18th century via the slave and cotton trades which helped the City to prosper and grow.

Liverpool was historically drained by a network of open channels, brooks and rivers. These discharged into the River Alt to the North and East, and the River Mersey to the South and West of the City. As Liverpool developed, the surface water system grew around the existing open channel network. The resultant drainage system comprised a series of small sub-catchments linked by ditches and watercourses.

Dense housing developed to the north of Liverpool to support the shipping trade this was serviced with piped drainage systems. Further north Crosby largely developed on coastal dunes. In the 1920s several properties were undermined as the River Alt was pushed against the coast due to sediment drifting south. This resulted in the Alt Training wall being built in the 1930s. Following this there was an ad-hoc approach to coastal protection that was consolidated in the late 1960s and early 1970s with the current seawall. The continual drift of sediment to the south has led to a build-up of beach levels at Waterloo, the development of dunes on the beach in front of the sea wall and inland of the seawall. These higher beach levels offer significant protection

to the existing sea wall. The northern end of the coast has seen lowering of beach levels due to wave driven sediment draw down.

Further inland, the Maghull developed on an area that was partly the historic flood plain of the River Alt giving way to higher ground to the north east. Numerous watercourses flow through the town to the River Alt to provide drainage. The Leeds and Liverpool canal started construction in 1770 and now bisects the town. Its path meanders through Bootle and on into Liverpool Docks.

Liverpool is now a predominantly urban area covering approximately 114km². It is particularly vulnerable to surface water flooding due to runoff from impermeable surfaces.

Over time, minor channels within the FRA were either culverted, laid with land drains and backfilled, or filled in, leading to a reduction in the efficiency of the original land drainage system. Potential collapses or blockages within culverts within the FRA pose a considerable risk of future flooding.

Many of Liverpool's culverted watercourses are incorporated into the sewer system. Each of Liverpool's culverted watercourses has inlet/outlet structures and debris screens. Without adequate maintenance to ensure free flow they could potentially increase flood risk to adjacent areas.

Sefton is susceptible to surface water flooding due the low-lying nature of the borough. The water needs to be pumped through it in order for it to drain out into the sea. The surface water system drains into numerous watercourse that flow through the north east of the FRA. Maghull in particular drains by gravity into the River Alt.

A number of sewage discharge outlets are present across the FRA.

The majority of the FRA is serviced by a combined (foul and surface water) sewerage system, particularly in the older parts of the FRA. As a result, some areas have experienced flooding from sewers which occurs when their capacity is overcome by the amount of water trying to enter the network. More modern parts of the town in Maghull and Aintree have separate foul and surface water systems.

Surface water in the Liverpool & Sefton FRA drains via ditches and watercourses to the Rivers Alt and Mersey. It drains directly or via the eight brooks that have been designated as main rivers by the Environment Agency. However, the high level of the ground water table during wet conditions can result in high water levels in these ditches and watercourses. It prevents the sub-catchments from discharging surface water effectively. High levels in the River Alt prevents many larger watercourses from discharging effectively and water backs up in the system leading to flooding.

High groundwater levels cause localised flooding in the FRA. Perched water tables are also present in Liverpool due to localised areas of less permeable material and most common in areas where the underlying geology is clay. It is estimated that the underlying clay strata is present across the vast majority of the City. In other areas, primarily in the City Centre the dense sandstone bedrock provides little infiltration.

Tidal flooding on the River Mersey occurs during high spring tides which causes a rapid increase in water levels together with strong winds. This flooding is most likely to occur within low lying areas or areas directly adjacent to the River Mersey estuary. Particularly when high astronomical tide levels combine with low atmospheric pressure conditions in combination with powerful onshore wind direction.

Sefton is at risk from flooding and erosion from the sea, with high storm surges affecting the coastline from High Town to Crosby. The coastal defences along the Crosby frontage can suffer damage during these events. Overtopping and flooding of coastal car parks is common at the northern end. Erosion of the made ground to the north also occurs.

The Leeds and Liverpool canal lies within the FRA, owned and maintained by the Canals and Rivers Trust.

Current flood risk

In July 2010, Liverpool experienced a high intensity rainfall event. It resulted in widespread flooding across the city, affecting properties and transport networks in three known flooding locations, Crawford Close, Churchdown Road and Leyfield Road.¹ In this event, approximately 257 properties flooded internally. In June and August 2020 parts of South Liverpool flooded including the Dovecot, Mossley Hill and Garston areas of the City. In December 2020, the West Derby and Deysbrook areas of the City suffered from internal property flooding. It caused severe disruption to the Highway Network. This incident triggered a Section 19 Flood Investigation.

In the early nineties the Leeds and Liverpool Canal burst its banks flooding over 200 properties. In July 2010, 50 properties were flooded in Seaforth and in September 2012, 40 properties in Maghull were flooded.² The winter of 2013/2014 saw a series of storm events that significantly impact the coastline with widespread damage, erosion and overtopping of defences in Sefton.

In December 2015, widespread flooding impacted roads and properties in Sefton. In Autumn 2019 the Dover's Brook overtopped its bank and properties narrowly avoided flooding due to preventative action by the residents and RMA.

In June 2020, widespread ponding on the highway network across Sefton. In August 2020, flooding was recorded in the Maghull, Thornton, Southport, Crossens and Formby areas of Sefton. Storm Christoph caused the Dovers Brook to overtop its banks resulting in standing water in properties in Maghull and Lydiate in January 2021. A more severe event was avoided due to the bank on the River Alt collapsing downstream on the Lunt Meadows Flood storage area. This event saw c1m cubic meters of water flood the site and surrounding fields.

The flood hazard and risk maps show that in the Liverpool Flood Risk area some 90,041 people are in areas at risk from flooding from surface water. It covers approximately 37,517 residential properties, of which 17.68% are considered to be in areas of high risk.

Also shown to be at risk of flooding from surface water are: -

- 4,557 non-residential properties, including golf courses, schools/colleges, hospitals, retail parks, industrial parks and public utilities
- 1 Airport
- 38.83km of roads
- 41.65km of railway
- 526.69ha of agricultural land, and

¹ https://liverpool.gov.uk/media/1356897/local-flood-risk-management-strategy_final.pdf

² <https://www.sefton.gov.uk/media/2728/fcerms-strategy-v14-final.pdf>

- Areas of environmental designated sites, parks and gardens, scheduled monuments, heritage sites, listed buildings and water abstraction points

The flood risk and hazard maps provide more detailed information on the likelihood and consequence of flooding for the Liverpool and Sefton FRA.

Based on this information it is concluded that further steps should be taken to reduce the likelihood of flooding and its impact. In particular, the impact it can have on people, the economy and the environment both for now and the future.

How the risk is currently managed

The management of surface water flood risk is led by Liverpool City Council & Sefton Metropolitan Borough in collaboration with other Risk Management Authorities (RMAs) and other stakeholders. For example, Mersey Rivers Trust, the Canal and Rivers Trust.

Under Section 13 of the Flood and Water Management Act 2010, RMAs are required to work in partnership and cooperate to help holistically manage flood and coastal erosion risks in their area. Operational, Tactical and Strategic level meetings (Chaired by a Local Councillor) between RMAs and stakeholders are held on a quarterly basis. The aim of the meetings is to help meet the agreed actions set out within the Partnership's annual Business Plan.

The Merseyside Flood Risk Partnership brings together the RMAs and other relevant stakeholders, to coordinate and maximise flood risk management across the area. For example, The Healthy Rivers Trust. A strategic partnership with elected members from each authority steers the direction of flood risk management and represents Merseyside at the North West Regional Flood and Coastal Committee (RFCC). A tactical partnership of lead officers supports the strategic group through the provision of technical advice and sharing of best practice. Sefton Council has an operational group where officers from the RMAs assess and seek to resolve local flood risk issues.

The EA monitors groundwater level at 8 sites within the Liverpool & Sefton FRA. The EA also monitors surface water levels at 3 sites in the FRA.

Reported flood incidences are recorded on the relevant RMAs data systems.

This information is used to inform activities related to 6 flood warning areas that cover the Liverpool & Sefton FRA. It enables people to receive a warning when flooding could occur. This data also informs the operational response during a flood incident.

Liverpool City Council, United Utilities and the Environment Agency have undertaken an integrated modelling study to provide Flood mapping for the Liverpool City Council area. The flood maps were reviewed and validated against United Utilities DG5 Register, flooding records from Liverpool City Council and local knowledge held by the various stakeholders. The United Utilities DG5 Register include record of reported sewer flooding to properties. The flood maps have been found to perform very well, showing good correlation to known flood risk areas across the city.

The modelling provided a previously unknown understanding of the performance of the culverted watercourse network within the City. It is now a vital tool which is regularly used for providing LLFA responses to planning applications, developing capital schemes and the identification of capacity issues.

Liverpool City Council & Sefton Borough Council LLFAs and United Utilities maintain assets that perform a flood risk management function on the drainage network that they have responsibility for. Liverpool City Council also maintain a number of other structures and defences on ordinary watercourses such as debris screens. There are many riparian owners with responsibility for maintenance of watercourses including private residences.

Sefton Council maintain the hard-coastal defences at Crosby.

The Environment Agency similarly maintains flood risk management assets on the main watercourses in the Liverpool & Sefton FRA. These include screens, outfalls, control gates and spillways, flood defence embankments and open channels. The Alt Pumping station is maintained by the Environment Agency.

The Canals and Rivers Trust maintains the Leeds and Liverpool Canal as a navigable waterway.

The impact of climate change and future flood risk

As rainfall intensity increases, it means that surface water flooding will become more frequent as higher rainfall totals will be seen more often.

Objectives and measures for the Liverpool & Sefton FRA

No additional specific FRMP objectives have been set for the Liverpool & Sefton FRA.

Measures have been developed which apply specifically to the Liverpool & Sefton FRA. These measures have been developed in addition to measures covering a wider geographic area but which also apply to the Liverpool & Sefton FRA. You can find information about all of the measures which apply to the Liverpool & Sefton FRA in the interactive mapping tool - flood plan explorer. This includes information on which national objectives each measure helps to achieve

South Sefton Flood Risk Area

- Between 2021 and 2027, the Environment Agency and Liverpool City Council and Sefton Council will undertake updates to the national flood risk maps in the Liverpool area to ensure that DEFRA is sharing the most up to date and validated information with regards to flood risk.
- By 2023, Sefton Council and Risk Management Authorities will take forward any recommendations from the Surface Water Management Plan level 2 study, on a priority basis, in the Liverpool area to aid in the long term management of surface water flooding.
- Between 2025 and 2027, the Environment Agency and Risk Management Authorities will work together to consider implications of revised climate change predictions and guidance and changes to other technical understandings in the Lower Alt Catchment to update the understanding of both fluvial and surface water systems with the intention to reduce the consequences of flood events and the risk of surface water flooding.

- By 2027, Sefton Council and Liverpool City Council will support the Liverpool Combined Authority to identify flood risk to the designated Key Route Network in the Liverpool area to support critical transport network suppliers such as the Highways Authority, Highways England and Network Rail to risk assess and manage flood risk to key transport routes.
- By 2025, the Environment Agency and Liverpool City Council and Sefton Council will review maintenance standards of main rivers and ordinary watercourses in the Liverpool area to better understand future maintenance needs taking into consideration the impact of climate change to reduce the likelihood of flooding to communities.
- By 2025, Sefton Council will seek partnership contributions for the Crosby Coastal Erosion and Flood Risk Management Scheme in the Crosby area to promote works that reduce coastal erosion and flood risk along that frontage of the coastline.
- By 2027, the Environment Agency will investigate the viability of a flood alleviation scheme in Whinney Brook, Maghull to reduce the risk of flooding from both fluvial and surface water causes.