

SURFACE WATER MANAGEMENT PLAN

Non-Technical Summary



Sefton Metropolitan Borough Council
August 2011



1.1 Introduction

- 1.1.1 Sefton Metropolitan Borough Council (Sefton MBC), with support from key partners, United Utilities (UU) and the Environment Agency (EA), has developed a Surface Water Management Plan (SWMP) to understand the causes and effects of surface water flooding in Sefton and to address the gaps in understanding of these local flood sources. In this context, surface water flooding describes flooding from sewers, drains, groundwater, and runoff from land, small water courses and ditches that occurs as a result of heavy rainfall.
- 1.1.2 A Surface Water Management Plan (SWMP) is the document that outlines the preferred surface water management strategy in a given location. It establishes a long-term action plan to manage surface water and will influence future capital investment, maintenance, public engagement, land-use planning, emergency planning and future developments. The Sefton SWMP covers the whole of the borough but focuses on key urban areas in which the risks are more acute and which have a greater vulnerability to flooding.
- 1.1.3 The SWMP provides a tool for spatial planners to incorporate surface water flood risk into planning policy and development control. Sefton's Civil Contingencies, Highways and Estates departments will also use the information provided to review emergency response plans and to assist in the planning and delivery of adaptation measures for the effects of climate change on flood risk. The Council will also be able to use the information generated to assist and support its Partners and other stakeholders to increase the resilience of critical infrastructure to flood risk.

1.2 Plan Area

- 1.2.1 The SWMP covers the area within the administrative boundary of Sefton MBC (See Figure 1). It covers an area of 155 square kilometres within which there is a diverse mixture of industrial, commercial and urban development coupled with rural green belt divides. There are 36 kilometres of coastline and extensive areas of sand dunes and coastal salt marsh. Sefton has a major port and extensive commuter travel into Liverpool from the key urban areas of Southport, Formby, Crosby, Litherland, Maghull and Bootle.
- 1.2.2 Sefton is typically flat and low lying, however, this generalisation hides a complexity that heavily influences surface water drainage.
- 1.2.3 A coastal ridge between Formby and Southport causes most watercourses within this area to flow inland, away from the coast, where they are discharged to the sea via Crossens Pumping Station at Banks or via

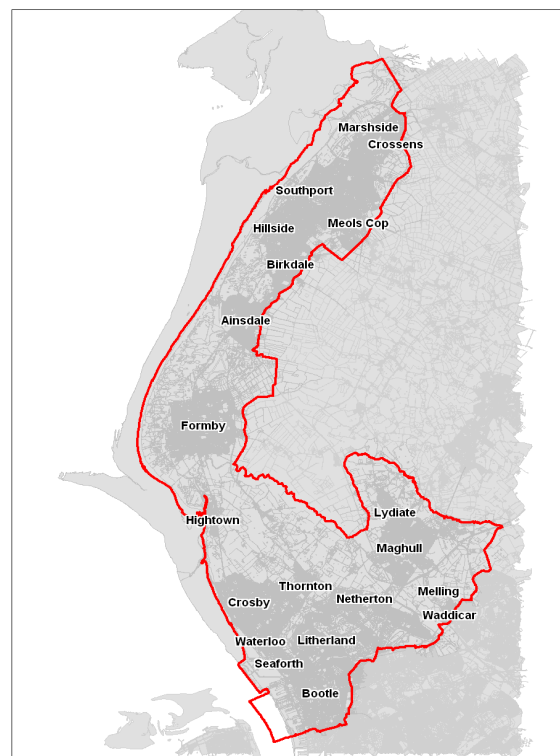


Figure 1: Sefton SWMP study area

Altmouth Pumping Station near Hightown.

- 1.2.4 Those areas in the south of Sefton that don't drain towards the River Alt, typically drain towards the coastline and docks. Drainage is heavily influenced by the path of Rimrose Brook and by the Leeds and Liverpool Canal, which zigzags across Sefton.
- 1.2.5 The northern half of Sefton is narrow and contains a mix of urban areas, e.g. Formby, Ainsdale and Southport, which are bordered by coastal dunes to the west and arable and grazing fields to the east. South of Formby the land is rural and arable until the edge of Crosby and Netherton, south of which is heavily urbanised. To the east, the area is dominated by Maghull and Lydiate, which are also bordered by arable land. There is significant road and rail infrastructure linking these settlements together and with Liverpool, Ormskirk and Manchester. There are also numerous environmental and heritage designations of national, regional and local importance.

1.3 Current surface water flood risks and management responsibilities

- 1.3.1 The sewerage infrastructure of most of Sefton is largely based on Victorian sewers. Based on the available outputs of United Utilities' sewer models, the capacity of the sewer system across the borough is highly variable. Approximately 57% of the sewer network has a capacity that is at or above the flow anticipated from a storm with a 1 in 30 (3.3%) chance of occurring in any given year, indicating that 43% of the network would not provide the design capacity associated with a new build system. This is an understandable capacity issue affecting older sewerage systems.
- 1.3.2 As a result of these capacity issues there is a risk of localised flooding associated with the existing public sewerage and land drainage system. Approximately 2,600 homes, businesses and infrastructure could be impacted during a 1 in 30 (3.3%) chance event and more severe events like the 1 in 100 (1%) chance event could impact approximately 40,100 homes, businesses and infrastructure.
- 1.3.3 Flooding mechanisms vary. There are many areas of low relief, such as parts of central and southern Southport and some areas of Crosby and Litherland, in which the flood risk comes primarily from surface water runoff ponding in wide topographical depressions that would affect large areas. These tend to be areas that were built on what were once sand dunes and as such there is typically no watercourse system to drain excess water away and the rate of ponding exceeds the capacity of sewers during severe storms.
- 1.3.4 Elsewhere, for example along the eastern edge of Southport, Ainsdale and Formby, similar flooding mechanisms occur however low gradients assist in the removal of flood water. United Utilities (UU) is generally responsible for the sewer systems that drain these areas, however, UU is only responsible for flooding from its sewers and not responsible for flooding caused by water being unable to enter its drainage system, which is the responsibility of the land owner or Sefton MBC if it relates to the highway or ditches or watercourses. In Formby and in isolated areas elsewhere, United Utilities surface water sewer system discharges to ditches that are the responsibility of Sefton MBC. In places these then re-enter piped systems, which remain the responsibility of Sefton MBC.
- 1.3.5 In areas of greater relief, for example those areas around Rimrose Valley, areas of Netherton, Aintree, Maghull and Lydiate, Litherland and Bootle, the flooding mechanism is linked to the presence of historical watercourses or flow paths which have now been replaced by sewers or which are now piped watercourses. In these areas, when water cannot enter the sewer system it will follow flow paths along the line of the former

watercourse. In many places these flow paths are intercepted by features such as raised road embankments, railway lines and the Leeds and Liverpool Canal, resulting in wider areas of flooding. As elsewhere, UU is responsible for flooding from sewer systems and piped watercourses are the responsibility of Sefton MBC. This includes sections of the drainage system in Thornton, Aintree and Maghull.

- 1.3.6 Many areas within Sefton are also at risk from fluvial and tidal flooding, however, for the large part these are managed by the presence of defences and the operation and maintenance of complex pumped drainage systems in both the Alt and Crossens catchments. In a few areas there is a risk from fluvial flooding that is not managed by defences and these areas can coincide with areas of surface water flooding, though these areas tend to be located in areas of arable or grazing land and are therefore not significant influences on flood risk. High water levels within the main drainage system can, however, have a significant influence on areas that lie outside of the flood plain, particularly within Formby, in which there is a history of high water levels effecting levels within Dobb's Gutter and other watercourses.
- 1.3.7 There are also areas within Sefton that are at risk from groundwater. This tends to be associated with main rivers such as the River Alt and Fine Jane's Brook however it can contribute to surface water flooding in lower lying areas such as parts of Maghull, Aintree, Netherton and along the eastern edge of Ainsdale, Birkdale and Southport.
- 1.3.8 The risk of flooding from other sources is limited. The River Alt could act as a pathway for reservoir flooding originating in Knowsley or St. Helens and the Leeds and Liverpool has been and remains a potential source of flooding in Sefton.

1.4 Future challenges

- 1.4.1 Key challenges with respect to the management of surface water within Sefton relate to climate change, development/growth and land use management.
- 1.4.2 The key challenge in future is climate change, which is expected to increase the number of homes, businesses and infrastructure impacted by 45%, i.e. up to 58,300 properties may be impacted. Climate change is also set to increase the risk of flooding from rivers and the sea, which will have an impact on the risk from surface water sources. The capacity of sewers is already lower than those of a new build system in approximately 43% of the borough, as a result sewer flooding will increase as climate change affects rainfall intensity.
- 1.4.3 Future growth will also present a significant challenge. The location of significant new development is set out in the Sefton Unitary Development Plan (2006), however, recent consultation on the Core Strategy indicated that there were three options for how Sefton may develop, largely based on how many people will live in Sefton in the future. The evidence base for the Core Strategy Options Paper indicates that only 55% of housing needs could be provided within the existing urban area and that all land currently needed for employment needs to be retained as such to meet the needs of the local economy. Growth will therefore require expansion of the urban area into the Green Belt which will increase pressure on infrastructure, including flood risk management and drainage infrastructure.
- 1.4.4 Within existing urban areas, increases in impervious areas not linked to growth or infrastructure development, i.e. urban creep, poses a challenge with the potential for borough-wide increases in impervious areas of approximately 3.8ha per year. Without proper management and control of such increases, which can occur through permitted

development, the impacts on flood could compound the potential effect of climate change and planned growth, resulting in wider and more frequent surface water flooding problems.

1.5 Opportunities and Constraints

1.5.1 This study has identified both opportunities and constraints related to the implementation of flood risk management actions and measures.

Opportunities

1.5.2 This study has identified the following opportunities for local flood risk management measures to contribute to wider objectives and targets:

- There may be opportunities to incorporate or enhance flood risk management function within new or redeveloped urban green spaces, e.g. detention basins and soakaways;
- There may be opportunities to incorporate, restore or enhance wildlife habitats when developing measures to reduce flood risk, particularly by storing water in ponds or wetlands;
- Recommendations to increase the utilisation of SuDS and in particular source control measures could contribute to an improvement in water quality, contributing to the wider objectives of the Water Framework Directive, as well as reducing runoff rates and volumes; and
- Changes to the criteria for Defra's Flood Defence Grant-in-Aid (FDGiA) funding of Flood and Coastal Erosion Risk Management (FCERM) schemes, could provide opportunities for previously marginal schemes with higher whole-life and environmental benefits to receive sufficient funding to proceed.

Constraints

1.5.3 There are also potential constraints to the effective management of flood risk.

- Existing infrastructure capacity is below current design standards in many areas and this may, in places, limit the flood risk management options available;
- Environmental designations may limit the suitability of some flood risk management measures, especially if there may be an increase or a decrease in water level as a result;
- Land ownership could restrict potential actions; and
- Changes to the criteria for Defra's Flood Defence Grant-in-Aid (FDGiA) funding of Flood and Coastal Erosion Risk Management (FCERM) schemes, could restrict opportunities for marginal schemes with lower whole-life and environmental benefits to receive sufficient funding to proceed.

1.6 Objectives

1.6.1 The agreed objectives of the SWMP are:

1. To determine and map current and potential surface water flood risk areas across the Sefton MBC area, irrespective of source.
2. To determine the consequences of surface water flooding on people, property, infrastructure and the environment, now and in the future.

3. To identify an effective, affordable and achievable strategy with sustainable and cost-beneficial measures to mitigate surface water flood risk, which achieve multiple benefits where possible, and which make the most of opportunities for economic, social and environmental enhancement.
4. To improve co-operation and co-ordination for better working relationships between Key Partners to the Surface Water Management Plan (SWMP) comprising Sefton Council, the Environment Agency, United Utilities and other stakeholders influencing surface water management, including establishment of a standing liaison requirement for subsequent delivery of the SWMP measures and any review of the SWMP.
5. To assess potential flood risk management measures to Critical and Vulnerable Infrastructure within Sefton.
6. To inform and advise spatial planning so that new development is directed away from areas at greatest risk of actual and potential surface water and other flooding so that appropriate surface water mitigation measures are promoted.
7. To assess the likely impact of potential flood risk management measures including their contribution to eco-hydrological benefit (i.e. WFD compliance) and to specific locations identified for potential development and thereby seek to inform future spatial planning policy and site guidance briefs.
8. To contribute to meeting the requirements of the Flood Risk Management Regulations, 2009 and the Flood and Water Management Act, 2010, and inform emergency planning decisions.
9. To develop an Action Plan for the delivery of SWMP measures showing how partners and stakeholders will work together to finance and implement the preferred measures.
10. To periodically review the appropriateness of SWMP datasets and modelling, the delivery of the Action Plan, the means of implementation and to monitor the effectiveness of the enacted SWMP measures, and to update the SWMP where resources allow.
11. To develop and implement an effective communications strategy involving all Partners that engages the affected communities and all stakeholders and helps their understanding of surface water flooding issues in Sefton.

1.7 Local Flood Risk Zones and Critical Drainage Areas

- 1.7.1 The SWMP has identified through modelling of surface water and sewer flooding a number of Local Flood Risk Zones (LFRZs). LFRZs are those areas of flooding of 5m² or greater that affect houses, business or infrastructure to a depth of 80mm. LFRZs can represent both pathways and receptors of surface water flooding and facilitate the targeting of local measures and options to manage flood risk.
- 1.7.2 A second stage was undertaken to identify those LFRZs in which 8 or more properties are impacted, defined as key LFRZs. Approximately 300 key LFRZs have been identified, and they represent areas in which the consequences of flooding in these areas are considered to be locally significant.
- 1.7.3 From these key LFRZs, 22 Critical Drainage Areas (CDAs) have been identified. CDAs define areas where multiple and interlinked sources of flood risk cause flooding in one or more Local Flood Risk Zone during severe weather, thereby affecting people, property and local infrastructure. Land within a CDA either contributes to flooding within a LFRZ or acts as a pathway for the water that contributes to that flooding. At the outlet of the CDA, the land also may be within a LFRZ and may therefore also be a receptor. CDAs enable strategic level policies and actions to be identified and applied in a targeted manner to address flood risk issues that cover wider areas. CDAs are presented in Figure 2.

1.8 Action Plan

- 1.8.1 The assessments completed as part of the surface water management plan have to date identified a range of potential measures that should be investigated further with the aim of alleviating flood risk in critical drainage areas and across the borough in general. This should include further assessment of their feasibility, effectiveness, costs and benefits as well as the potential for providing wider benefits to features such as habitats and water quality. Remaining options can then be developed further into a prioritised list for future implementation.
- 1.8.2 An Action Plan has been developed that outlines recommendations, actions and measures that should be implemented to ensure that Sefton MBC meet the requirements placed upon them by the FWMA and FRR and which could be implemented in order to reduce the chance and consequences of flooding, to improve the emergency response to flooding and to improve the integration of flood risk management activities across the borough.
- 1.8.3 Recommendations and actions identified in the plan relate to the following main areas:
1. **Flood and Water Management Act / Flood Risk Regulations** (FWMA / FRR) - Duties and actions as required by the FRR and FWMA;
 2. **Policy Action** (Policy) - Spatial planning or development control recommendations;
 3. **Communication / Partnerships** (C + M) - Actions to communicate risk internally or externally or create / improve flood risk related partnerships;
 4. **Financial / Resourcing** (F + R) - Actions to secure funding internally / externally to support works or additional resources to deliver actions;
 5. **Investigation / Feasibility / Design** (I / F / D) - Further investigation / feasibility study / design of mitigation; and
 6. **Flooding Mitigation Action** (FMA) - Maintenance or capital works undertaken to mitigate flood risk.
- 1.8.4 The Action Plan is summarised in Table 1-1, below, indicating the action type, where it applies, what the action is, a potential funding source, lead organization and general benefits of the action.
- 1.8.5 No firm implementation programme is presented for actions other than those in which the driver is compliance with EU timescales, and in particular those within the EU Floods Directive, via implementation of the Flood Risk Regulations. Timescales for the implementation of other actions and recommendations are dependent upon the outcome of further investigation and the availability of funding.
- 1.8.6 Sefton MBC, as LLFA, will review the actions presented within the Action Plan and will work with partner organisations to monitor implementation and progress, review opportunities for operational efficiency and to review any legislative changes. The SWMP Action Plan should be reviewed and updated once every six years as a minimum, but there may be circumstances which might trigger a review and/or an update of the action plan in the interim, such as a significant surface water flood event, new data becoming available or changes to funding and investment.

Table 1-1: Summary of Sefton SWMP Action Plan

Action Type	Where?	What?	Potential Funding Source	Lead Organisation	Benefit
C + M	All CDAs	Developed a programme of education and awareness for land owners and tenants that lie within CDAs and in particularly in some of the key LFRZs	SC	SC	Community resilience to flooding
	Borough-wide	Determine whether businesses and industry are resilient to surface water flooding	LO	LO	Community resilience to flooding
		Determine whether education facilities are resilient to surface water flooding	LO	LO	Community resilience to flooding
		Determine whether environmentally sensitive and heritage sites are resilient to surface water flooding	LO	LO	Community resilience to flooding
		Determine whether healthcare facilities are resilient to surface water flooding	LO	LO	Community resilience to flooding
		Determine whether potentially polluting sites and other sources of pollution are resilient to surface water flooding	LO	EA	Community resilience to flooding
		Determine whether services (e.g. power, telecommunications) are resilient to surface water flooding	LO	LO	Community resilience to flooding
		Improve data collection, data sharing and validation	SC	SC	Meeting obligations under the Floods and Water Management Act. Improved understanding of local flood risk issues.
		Promote commercial business flood resilience	LO	SC	Community resilience to flooding
		Take forward existing and future local actions in the SWMP	SC	SC	Co-ordinated delivery of local flood risk management within the borough
Sub-regional	Take forward strategic existing and future actions in the SWMP that involve local boroughs or other flood risk management authorities	SC	SC	Co-ordinated delivery of local flood risk management across the region	
F + R	Borough-wide	Maximise multi-functional open space that includes an element of flood risk management/reduction	SC	SC	Project synergy and overall cost savings by undertaking flood risk reduction work at the same time as other park projects
FMA	Borough-wide	Consider retrofitting flood resilience and resistance measures to basement properties where there is a history (and likely future risk) of groundwater ingress.	Defra, SC	SC	Reduction in the probability of flooding
	Relevant CDAs	Enforce maintenance of ditches where the responsibility is the riparian land owner and where public access cannot be provided in order to improve the efficiency of the surface water drainage network.	LO	LO	Reduction in the consequences of flooding

Action Type	Where?	What?	Potential Funding Source	Lead Organisation	Benefit
		Installation of additional road gullies to reduce standing water depth and duration in local flood risk zones	SC	SC	Reduction in the probability of flooding
		Investigate potential to relieve ponding in key locations	UU, SC	SC	Reduction in the consequences of flooding
	Refer to Table 4-1 of the SWMP	Undertake more detailed studies to identify whether attenuation could be provided on upstream watercourses and within overland flow paths	EA, LO	SC	Reduction in the consequences of flooding
	Refer to Table E-1 Appendix E	Consider flood resistance and resilience measures	Defra	SC	Reduction in the consequences of flooding
	Formby	Investigate the potential for flood defences to the north of Formby to protect against flooding from Wham Dyke, Acre Lane Brook and Eight Acre Lane	EA, LO	EA	Reduction in the consequences of flooding
	Melling	Consider feasibility of diversion of flow in Melling towards Brooklea	EA, LO	SC	Reduction in the consequences of flooding
	Formby	Consider feasibility of connecting Dobb's Gutter into Bull Cop	UU, SC	SC	Reduction in the consequences of flooding
FWMA / FRR	Borough-wide	Co-operation - Authorities must co-operate with each other in exercising functions under both the Act and the Regulations.	SC	SC	Meeting obligations under the Floods and Water Management Act
		Develop, maintain, apply and monitor a Strategy for local flood risk management of the area.	SC	SC	Meeting obligations under the Floods and Water Management Act
		Duty to Maintain a Register	SC	SC	Meeting obligations under the Floods and Water Management Act. Improved understanding of local flood risk mechanisms and asset importance
		Flood Incident Investigations	SC	SC	Meeting obligations under the Floods and Water Management Act. Improved understanding of local flood risk issues.
		Prepare flood hazard maps and flood risk maps	SC	SC	Meeting obligations under the Flood Risk Regulations
		Prepare flood risk management plans	SC	SC	Meeting obligations under the Flood Risk Regulations
		Sustainable Development contributes towards achievement of sustainable development.	SC	SC	Meeting obligations under the Floods and Water Management Act. Long term implementation of sustainable flood risk management.
		Sustainable Drainage - LLFAs must establish a SuDS Approval Body (SAB)	SC	SC	Meeting obligations under the Floods and Water Management Act. Long term implementation of sustainable flood risk

Action Type	Where?	What?	Potential Funding Source	Lead Organisation	Benefit
					management.
		Update the PFRA in relation to flooding in the LLFA's area.	SC	SC	Meeting obligations under the Flood Risk Regulations
I / F / D	All CDAs	Assess the accuracy of the UU drainage capacity assumptions to enable further local prioritisation of flood management options	SC	SC	Refine understanding in CDAs
	All LFRZs	Ensure drainage systems are operating at capacity in Local Flood Risk Zones	SC	SC	Flooding isn't exacerbated
		Investigate whether flooding incidents have occurred in Local Flood Risk Zones	SC	SC	Validate model outputs, resident 'buy in', Adds to understanding of local flood risk
	Traffic sensitive routes, underpasses	Determine standard of protection offered by pumps/drainage serving critical transport infrastructure underpasses	MR, NR, SC	SC, HA	Refine understanding in CDAs, reduction in the probability of flooding on sensitive routes
	Borough-wide	Identify if any maintenance is required on watercourses not currently maintained	SC	SC	Reduction in the consequences of flooding
		Determine whether current emergency response to borough-wide surface water flooding is appropriate	SC	SC	Emergency response based on best available information
		Green roof/SUDS retrofitting feasibility on council owned property and large new developments	SC, LO	SC	Understanding of existing performance and determine feasibility of measures
		Look for opportunities to reduce flood risk to critical infrastructure whilst upgrading the existing drainage network	UU	UU	Refine understanding of risk to critical infrastructure. Prioritise localised drainage improvements
		Monitor implementation of flood resilience and resistance measures into new and existing properties and plan for future delivery.	SC	SC	Track delivery of improved flood resilience and facilitate the targeting of new funding when it becomes available
		Review of the recorded incidents of basement flooding in the borough as well as groundwater borehole and geological conditions and develop a strategy to manage the problem.	SC	SC	Refine understanding of this borough wide problem and identify solutions and funding
	Relevant CDAs	Work with British Waterways to understand the influence that the Leeds and Liverpool Canal has on flood risk.	SC, BW	SC	Refine understanding in the CDA
	Refer to Figure C-6 Appendix C	The SWMP models do not include detailed information for a number of culverted watercourses. The model may therefore over or under convey water in these locations, which means the current prediction of risk could be an underestimate or overestimate.	SC	SC	Refine understanding of flood risk
	Southport, Formby, Crosby and Bootle	Develop a more detailed understanding of the potential interaction with and relative contribution of fluvial and surface water flooding risk to the railway in Sefton	NR, MR	MR	Refine understanding in the CDA

Action Type	Where?	What?	Potential Funding Source	Lead Organisation	Benefit
	Stations and Railway lines	Determine capacity of existing drain system serving railway lines and the accuracy of the SWMP drainage capacity assumptions.	NR, MR	NR, MR	Refine understanding of risk to critical infrastructure. Prioritise localised drainage improvements
Policy	All CDAs	Seek to limit the effect of urban creep on surface water flood risk	LO	SC	Mid-long term reduce in flood risk and improvement in water quality
		Seek to further reduce runoff rates and volumes from new Brownfield development in Critical Drainage Areas	LO	SC	Mid-long term reduction in the consequences of flooding
	Borough-wide	Seek net improvement in water quality through promotion of SuDS in new development	LO	SC	Mid-long term reduction in the probability of flooding
		Seek to reduce runoff rates and volumes from new Greenfield development across the borough	LO	SC	Mid-long term reduction in the probability of flooding
		Seek to reduce runoff rates and volumes from new Brownfield development across the borough	LO	SC	Mid-long term reduction in the probability of flooding
		Ensure any major regeneration in Sefton targets a reduction of runoff to predevelopment Greenfield runoff rates.	LO	SC	Long term reduction in flood risk in the CDA
	Relevant CDAs	Work with adjacent borough councils to develop joint land use planning and development control policies	SC, WLC, KC, SHC, LC	SC	Mid-long term reduction in the probability of flooding
<p>NB. Actions from the SWMP will be carried into medium term plans and carried out on a priority basis, subject to funding and approval. SC = Sefton MBC, LO = Land Owner, EA = Environment Agency, UU = United Utilities, MR = Merseyrail, NR = Network Rail, HA = Highways Agency, BW = British Waterways, WLC = West Lancs Council, KC = Knowsley MBC, SHC = St. Helens MBC, LC = Liverpool City Council</p>					

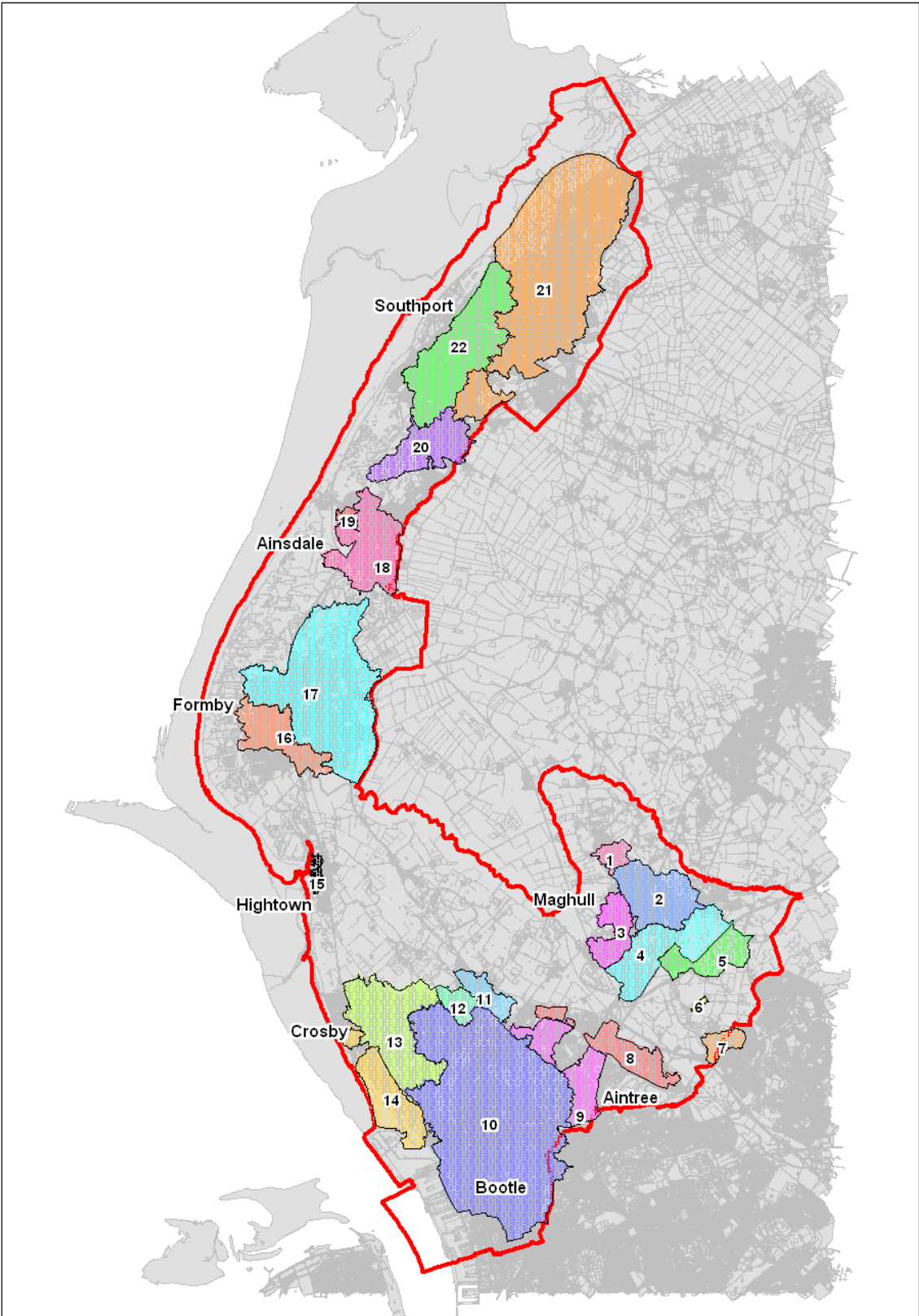


Figure 2: Sefton SWMP Critical Drainage Areas