



WARRINGTON

Borough Council

Local Flood Risk Management Strategy 2017 - 2023



December 2017





FINAL 02

**Warrington Borough Council
New Town House
Buttermarket Street
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Revision Schedule:

Document Title:	Local Flood Risk Management Strategy
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Revision	Name	Signature	Position	Date	Stage
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	Jim Turton		Public Realm Manager	14/04/2014	Checked and Reviewed
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Revision	Name	Signature	Position	Date	Stage
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Information & Review/Monitoring

This document has been produced for the purpose of setting out how Warrington Borough Council will endeavour to manage flood risk across its administrative area in accordance with the requirements of the Flood and Water Management Act 2010. It is an ongoing review process and will be fully revised at three year intervals.

Warrington Borough Council will monitor its progress in effectively managing flood risk against the actions set out in Appendix C.

The actions set out in Appendix C are subject to change on a yearly basis as priorities are identified and reassessed.

Appendix C will be reported on an annual basis and available on the Council website.

Document Purpose:

- Developed from the Statutory Duty set down by the Flood and Water Management Act 2010

Foreword

This is the second Local Strategy for Flood Risk Management produced by Warrington Borough Council. This Local Strategy will help to ensure that the Council, Environment Agency, United Utilities, Neighbouring Authorities, and other partners, work collectively to help protect local communities and business and other infrastructure from the risk of flooding.

Since the first publication of the Local Strategy in 2014, Warrington Borough Council has strengthened its management of flood risk in line with current legislation, from improved planning procedures to mitigate flood risk through to ensuring emergency responders have the correct information to prioritise where flood risk is greatest.

It is vital that organisations work better, not just with each other but crucially with the public. This Local Strategy details the roles and responsibilities of all major stakeholders, including households and community groups so that there is increased clarity and understanding about when different stakeholders should be involved. This strategy focuses on 'Local Flood Risk', that is flooding caused by surface runoff, groundwater and ordinary watercourses (streams, ditches etc.). However it's not the source of flooding but the effects of flooding that matter. Warrington Borough Council is keen to ensure that all forms of flooding are managed together and tackled according to level of risk as well as considering appropriate solutions.

Measures already taken to reduce flood risk are identified in this Local Strategy, as well as projects that Warrington Borough Council is planning to undertake in the future. Warrington Borough Council cannot prevent all areas from flooding but can take practical measures to reduce both the likelihood and impact of any flooding that does occur. As more development takes place, it is essential that it is managed so that the effects on flood risk are minimised.

This Local Strategy is our statement of intent as to how Warrington Borough Council will manage flood risk. I hope it will help you become more informed of everyone's responsibilities, how to find out your flood risk and what Warrington Borough Council can do to help you become safer.

**Councillor Hans Mundry
Portfolio Holder for Highways,
Transportation & Public Realm**



Contents

1	Introduction	1
1.1.	What is a Local Flood Risk Management Strategy?	1
1.2.	Who is the strategy aimed at?	2
1.3.	Objectives of the Warrington Local Flood Risk Management Strategy	3
2	Objective 1: Risk Management Authorities and Responsibilities.....	5
2.1.	National Policy Context.....	6
2.1.1.	The Pitt Review.....	6
2.1.2.	The Flood and Water Management Act (2010)	6
2.1.3.	Flood Risk Regulations 2009.....	8
2.1.4.	National Flood and Coastal Risk Management Strategy for England 2011.....	8
2.1.5.	National Planning Policy Framework (2012) and Planning Practice Guidance: Flood Risk and Coastal Change (2014)	9
2.1.6.	Preliminary Flood Risk Assessment.....	9
2.1.7.	UK Exit from European Union	9
2.2.	Local Policy Context.....	10
2.2.1.	Mersey Estuary Catchment Flood Management Plan.....	10
2.2.2.	Cheshire Resilience Forum	10
2.3.	Warrington Borough Council Policy Context.....	10
2.3.1.	Adopted Local Plan Core Strategy.....	10
2.3.2.	Strategic Flood Risk Assessment (SFRA) Volume II Technical Report 2011	11
2.3.3.	Mid Mersey Water Cycle Study 2011	11
2.3.4.	Surface Water Management Plan (SWMP) - Environment & Regeneration Surface Water Flooding Evidence Base 2012	11
2.3.5.	Warrington Supplementary Planning Documents	12
2.3.6.	Warrington Sustainable Drainage Systems (SuDS) Guidance	12
2.4.	Other Relevant Legislation	13
2.5.	Roles and Responsibilities	13
2.5.1.	Risk Management Authorities (RMAs)	13
2.5.2.	Flood Type and Responsibility.....	16
2.6.	Governance Arrangements	18
2.6.1.	Coordination of Flood Risk Management	18
2.6.2.	Governance of Flood Risk Management within Warrington Borough Council	22
3	Objective 2: Assessment of Flood Risk in Warrington.....	23
3.1.	Overview of Warrington Borough.....	23
3.2.	Data Availability.....	25
3.2.1.	Data Collection	25
3.2.2.	Data Limitations	28
3.3.	Historic Flood Risk – Assessment of Past Flooding	29
3.3.1.	Surface Water Flooding (Overland Flow)	29
3.3.2.	Ordinary Watercourse.....	30
3.3.3.	Interaction with Main Rivers.....	32
3.3.4.	Sewer Flooding.....	32
3.3.5.	Groundwater Flooding	34
3.3.6.	Canals	35
3.4.	Future Flood Risk.....	35
3.4.1.	Surface Water Flooding.....	36

3.4.2.	Sewer Flooding	37
3.4.3.	Groundwater Flooding	38
3.4.4.	Ordinary Watercourses	41
3.4.5.	Interaction with Main Rivers	43
3.4.6.	Canals	46
3.5.	Climate Change and Long Term Development.....	46
3.5.1.	Initial Review	46
3.5.2.	The Impacts of Climate Change – Future Flood Risk.....	51
3.5.3.	Improving Risk Understanding	52
4	Objective 3: Managing Local Flood Risk	53
4.1.	Community Focus, Partnership Working and Encouraging Community Resilience.....	53
4.1.1.	Responsibilities.....	53
4.1.2.	Partnering.....	53
4.1.3.	Communities	54
4.1.4.	Householders	54
4.1.5.	Publicity	54
4.1.6.	Localism Act 2011.....	55
4.2.	Spatial Planning	55
4.2.1.	Planning Policy	55
4.2.2.	Surface Water Mapping and Land Use Considerations.....	57
4.3.	Sustainable Drainage Systems (SuDS)	59
4.4.	Watercourse Regulation: Enforcement and Consenting Powers.....	60
4.4.1.	Procedure	61
4.4.2.	Local Byelaws	62
4.5.	Power to Carry Out Works	62
4.5.1.	Powers to acquire land and Compulsory Purchase.....	62
4.6.	Asset Management	63
4.6.1.	Asset Register – Ordinary Watercourses and Surface Water Flooding.....	63
4.6.2.	Asset Register – Main Rivers	65
4.6.3.	Asset Management Responsibilities	65
4.7.	Reservoirs.....	66
4.8.	Designation of Features	67
4.9.	Investigations and Flood Reporting	69
4.9.1.	Threshold for Investigation	69
4.9.2.	Disclosure of Information.....	69
4.9.3.	Reporting of Flooding Investigations	70
4.9.4.	Publications of Flood Investigation Reports.....	70
4.10.	Communications and Public Engagement.....	71
4.10.1.	Consultation Stakeholder Identification	71
4.11.	Preparedness and Emergency Response	72
4.11.1.	Preparedness.....	72
4.11.2.	Responding.....	74
4.11.3.	Communications.....	75
4.11.4.	Sandbag Policy.....	76
4.11.5.	Continuous Improvement	77
5	Objective 4: Funding and Actions & Interventions to Reduce Flood Risk	78
5.1.	Overview	78
5.2.	Works to mitigate or reduce flood risk	79
5.3.	Maintenance	79

5.4.	Community Information Provision.....	80
5.5.	Funding.....	80
5.5.1.	Flood and Coastal Risk Management Grant in Aid (FCRM GiA)	80
5.5.2.	Local Levy	83
6	Objective 5: Environment and Sustainability	84
6.1.	National Strategy.....	84
6.2.	How does the Local Strategy contribute to Sustainability?	85
6.3.	How does the Local Strategy contribute to the Environment?.....	85
6.3.1.	Ordinary Watercourses: Enforcement and Consenting	86
6.3.2.	Designation of Third Party Assets	86
6.3.3.	SuDS.....	86
6.3.4.	Capital Works	87
6.3.5.	Maintenance Works	87
	Appendices	88
	Appendix A – Mapping.....	89
	Appendix B – Environment Agency Flood Warning Areas	91
	Appendix C – Cheshire Mid-Mersey FWMA Programme 2017 - 18	98
	Appendix D – Objectives, Measures and Schemes.....	103
	Appendix E – Abbreviations and Definitions	109
	Appendix F – Principle Contact Details	114
	Appendix G - Sandbag Policy.....	116
	Appendix H – Options Suitable for Warrington Borough Council	120
	Appendix I – References	123

1 Introduction

What this section will cover:

- What is a Local Flood Risk Management Strategy and target audience?
- Area of Warrington.
- Aims, Objectives and Measures of the strategy.

1.1. What is a Local Flood Risk Management Strategy?

Warrington Borough Council has a legal duty under the Flood and Water Management Act 2010 (FWMA 2010) to produce a Local Flood Risk Management Strategy (hereafter referred to as 'the strategy'). The FWMA 2010 defines a lead role for local authorities and designated Warrington Borough Council a Lead Local Flood Authority (LLFA)

Flood and Water Management Act 2010:

Section 9. Effect of national and local strategies: England

(1) 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 FWMA 2010 Act gives County and Unitary Local Authorities a local leadership role and the Environment Agency a national overview role in relation to Flood and Coastal Erosion Risk Management (FCERM).

The strategy is a document that explains how the Council as an LLFA will coordinate services across the Borough with the primary aim to understand and where appropriate manage flood risk from:

- **Groundwater** - Water that flows out from the ground due to high water tables locally or regionally;
- **Ordinary Watercourses** - Out of channel flows from small watercourses such as streams, brooks and drainage ditches that are not regarded to be main river by the Environment Agency;
- **Surface runoff** - Water that flows over land following a heavy rainfall event, before it enters a natural watercourse or an artificial drainage network.

Warrington Borough Council must have a Local Strategy that is available to the general public. The FWMA 2010 Act states this document is to be reviewed at least every 6 years. This document was first published in April 2014. Warrington Borough Council seeks to be proactive in the area of flood risk and strives to regularly monitor and review to ensure that the objectives are being delivered and that they are still relevant.

1.2. Who is the strategy aimed at?

This strategy is aimed at the main flood Risk Management Authorities (RMAs) operating in the Borough and will clearly set out the Borough’s links with them. The role of these authorities is identified in the FWMA 2010 Act.

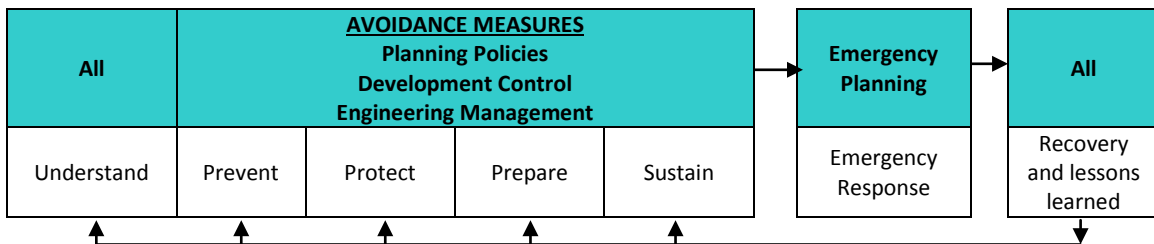
The strategy will also be of interest, but not limited, to:

- Organisations that manage land, property, cultural heritage and the natural environment in England such as landowners, farmers, Natural England, Crown Estates, navigation authorities and the Forestry Commission;
- Important service and infrastructure providers such as water companies and other utility companies, highways authorities and Network Rail;
- Non-government organisations such as the Royal Society for the Protection of Birds, Country Land and Business Association, National Farmers Union, the National Trust, Wildlife and Rivers Trusts, National Flood Forum, Association of British Insurers, and the Association of Drainage Authorities.

It will also be relevant to individuals, communities and businesses at risk of flooding and coastal erosion and the general public.

Figure 1.1 outlines the principle steps that are required to manage flood risk in relation to the target audience. Flood risk management is a continuous process and measures need to be adapted as circumstances change.

Figure 1.1: Steps to understand Flood Risk



Sections 2 and 3 of this document provide information as to how this strategy is aligned with policies at both the national and local levels.

1.3. Objectives of the Warrington Local Flood Risk Management Strategy

Table 1.1 provides a summary of the Aims, Objectives and Measures within the Warrington Local Flood Risk Management Strategy. The numbers associated with each of the measures reflect the section number where the measure is described in the strategy.

Table 1.1: Aims, Objectives and Measures the Warrington Local Flood Risk Management Strategy

Aim	Objectives	Report Section	Measure	
To produce a coherent plan to demonstrate how the Council will work with individuals, the community, and organisations to holistically manage flood risk in a sustainable manner.	To clearly set out the different types of flooding, who is responsible and Governance arrangements.	2.1	National Policy Context	
		2.2	Local Policy Context	
		2.3	Warrington Borough Council Policy Context	
		2.4	Other Relevant Legislation	
		2.5	Roles and Responsibilities	
		2.6	Governance Arrangements	
	To assess the total risk of flooding from all sources in Warrington.	3.1	Overview of Warrington Borough	
		3.2	Data availability	
		3.3	Historic Flood Risk – Assessment of Past Flooding	
		3.4	Future Flood Risk	
		3.5	Climate Change and Long Term Development	
	To manage flood risk and where appropriate reduce the risk and consequences of flooding through a range of activities and by effective management.	4.1	Community Focus, Partnership Working and Encouraging Community Resilience	
			4.2	Spatial Planning
			4.3	Sustainable Drainage Systems (SuDS)
			4.4	Watercourse Regulation: Enforcement and Consenting Powers
			4.5	Power to Carry Out Works
			4.6	Asset Management
			4.7	Reservoirs
			4.8	Designation of Features
4.9			Investigations and Flood Reporting	
4.10			Communications and Public Engagement	
4.11			Preparedness and Emergency Response	
To develop actions and interventions to reduce flood risk where appropriate.	5.2	Works to Mitigate or Reduce Flood Risk		
	5.3	Maintenance		
	5.4	Community Information Provision		
	5.5	Funding		

Aim		Objectives	Report Section	Measure
	5	To undertake flood risk management in a sustainable manner.	6.1	National Strategy
			6.2	How does the Local Strategy contribute to Sustainability?
			6.3	How does the Local Strategy contribute to the Environment?

2 Objective 1: Risk Management Authorities and Responsibilities

What this section will cover:

- National and local legislation.
- Roles and Responsibilities.
- Governance arrangements.

Flood and Water Management Act 2010:

Section 11. Effect of National and Local Strategies: England

(1) In exercising its flood and coastal erosion risk management functions, an English risk management authority must-

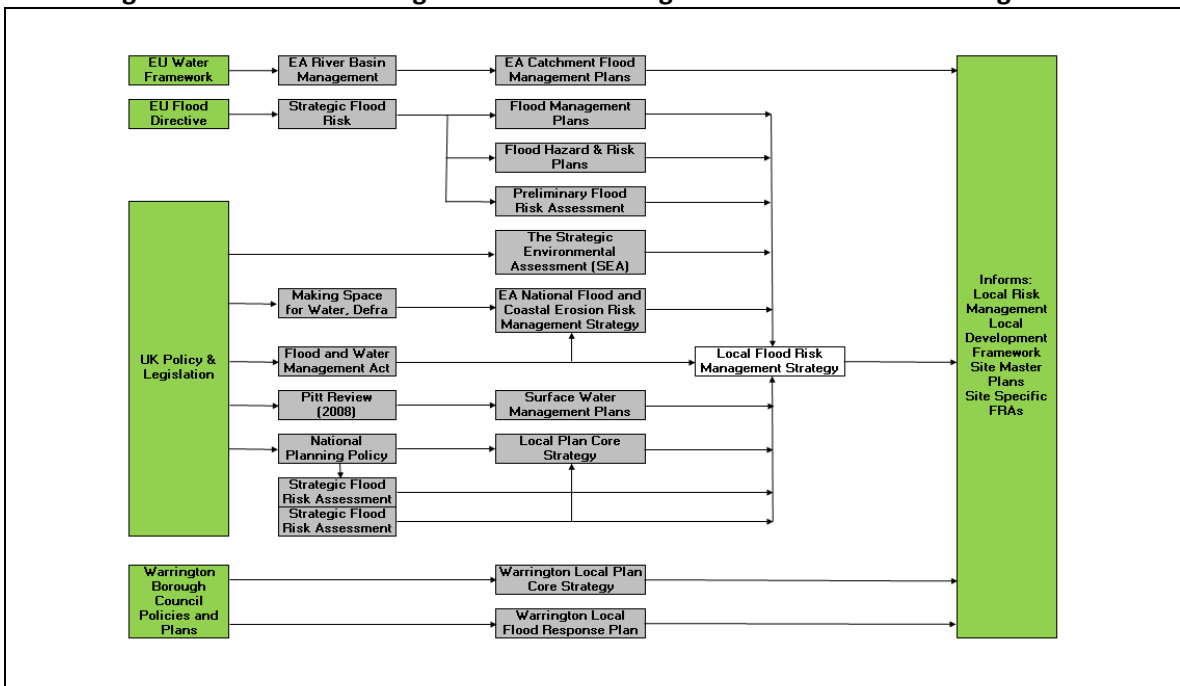
(a) act in a manner which is consistent with the national strategy and guidance, and;

(b) except in the case of a water company, act in a manner which is consistent with the local strategies and guidance.

Sections 2.1 to 2.3 provide information to how this strategy is connected to national and local legislation.

Figure 2.1 provides an overview of legislation contributing to current flood risk management

Figure 2.1: Overview of legislation contributing to current flood risk management



2.1. National Policy Context

2.1.1. The Pitt Review

Following extensive flooding across the United Kingdom in 2007, Sir Michael Pitt on behalf of the UK Government undertook a comprehensive review of the lessons to be learned from the floods and made a series of recommendations. The Pitt Review (2008) was the catalyst for Local Authorities and partner agencies to become more responsible for flood risk with many of the recommendations incorporated into the Flood and Water Management Act 2010 (FWMA 2010).

WAY MARKER 2.1

The Pitt Review: Lessons learned from the 2007 floods

<http://webarchive.nationalarchives.gov.uk/20100702214846/http://archive.cabinetoffice.gov.uk/pittreview/thepittreview.html>

2.1.2. The Flood and Water Management Act (2010)

The FWMA 2010 identified a number of responsibilities, powers and duties to be executed in phases to help manage flood risk and coastal erosion in a more holistic way. These are through either amending existing Acts, such as the Land Drainage Act 1991, or through the FWMA 2010 itself.

The FWMA 2010 defines a lead role for local authorities and designated Warrington Borough Council a Lead Local Flood Authority (LLFA) responsible for the management of local sources of flooding such as surface water. The Environment Agency has operational responsibility for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea, as well as being a coastal erosion risk management authority.

WAY MARKER 2.2

Flood and Water Management Act 2010

<http://www.legislation.gov.uk/ukpga/2010/29/contents>

Land Drainage Act 1991

www.legislation.gov.uk/ukpga/1991/59/contents

The key powers and duties of FWMA 2010 are summarised in Table 2.1, with Section 3 setting out how Warrington Borough Council will develop these duties to manage flood risk.

Table 2.1: Key Powers and Duties of the Flood and Water Management Act 2010

Responsibility		Details
Preparation of an Asset Register.	Section 21	The Council has a duty to maintain a register of structures or features, which are considered to have a significant effect on flood risk including details on ownership and condition as a minimum.
Power to designate flood risk management structures.	Schedule 1 Section 30	The Council as well as other flood management authorities have powers to designate structures and features that affect flooding or coastal erosion in order to safeguard assets that are relied upon for flood or coastal erosion risk management.
Investigation of flood incidents.	Section 19	The Council has a duty to co-ordinate the investigation and recording of significant flood events within their area. This duty includes identifying which authorities have flood risk management functions and what they have done or intend to do with respect to the incident, notifying risk management authorities where necessary and publishing the results of any investigation carried out.
Prepare a Local Strategy for Flood Risk Management.	Section 9	The Council is required to develop, maintain, apply and monitor a Local Strategy for flood risk management in its area. The Local Strategy will build upon information such as the national risk assessment and will use consistent risk based approaches across different local authority areas and catchments.
SuDS Approval Body (SAB)	Schedule 3	<p>Under Schedule 3 of the FWMA 2010, LLFAs were required to establish SAB which would have required Warrington Borough Council to approve and adopt SuDS for new developments.</p> <p>In December 2014, the Government announced changes to the planning system that would require developers to give priority use to Sustainable Drainage Systems (SuDS) and those LLFAs would become statutory consultees for major development proposals from April 2015. These changes are set out in Paragraph 103 of the National Planning Policy Framework 2012 (NPPF) and are supported by Defra's Non-Statutory Technical Standards for SuDS.</p> <p>Refer to section 4.3 for further information</p>
Works powers and enforcement.	Amendment to Land Drainage Act 1991, S.14	The Council now has permissive powers to undertake works to manage flood risk from surface run-off and groundwater, consistent with the local flood risk management strategy for that area.
Consenting changes to Ordinary Watercourses	Amendment to Land Drainage Act 1991, S.21	If riparian owners wish to build a culvert/structure or make any alteration likely to affect the flow of an ordinary watercourse, land drainage consent is required from Warrington Borough Council as an LLFA.
Powers to create Byelaws	Amendment to Land Drainage Act 1991, S.66	The Council may make such byelaws as they consider necessary for securing the efficient working of the drainage system within its administrative area.

2.1.3. Flood Risk Regulations 2009

Alongside FWMA 2010, the EC Floods Directive (Directive 2007/60/EC) on the assessment and management of flood risk was transposed into domestic law in England and Wales under the European Communities Act 1972 via the Flood Risk Regulations 2009 (FRR 2009). The purpose of the EC Floods Directive is to establish a framework for assessing and managing flood risk across the European Community.

WAY MARKER 2.3

The Flood Risk Regulations 2009

www.legislation.gov.uk/ukxi/2009/3042/contents

2.1.4. National Flood and Coastal Risk Management Strategy for England 2011

The National Flood and Coastal Risk Management Strategy for England 2011 sets out a framework for implementing the FWMA 2010 (Section 11), aiming to assist local authorities and communities with their responsibilities through taking a risk based approach to flood and coastal risk management and ensure a full range of options is managed in a co-ordinated manner.

WAY MARKER 2.4

National Flood and Coastal Risk Management Strategy for England 2011

<https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england>

"Understanding the risks, empowering communities, building resilience"

The National Strategy sets out what needs to be done to manage these risks by improving understanding where feasible reducing the likelihood of incidents happening, as well as managing the potential consequences to people, business, infrastructure and services. The National Strategy addresses these aims and shares them with the local level to:

- Improve response to flood incidents and recovery;
- Encourage local innovations and solutions;
- Assist households, businesses and communities to improve understanding and management of flood risk;
- Manage the risk of flooding to residents and their property and where appropriate, to improve standards of protection;
- Invest in actions that benefit public who face the greatest risk, but who are least able to afford to help themselves;
- Prioritise sustainability; work with nature to benefit the environment, people and economy, and;
- Shift focus from national government-funded activities towards an approach that gives more power to local people at individual, community or local authority level.

2.1.5. National Planning Policy Framework (2012) and Planning Practice Guidance: Flood Risk and Coastal Change (2014)

The National Planning Policy Framework 2012 (NPPF) provides the planning policy and guidance for England which informs local plans and decisions. There is a focus on the role of sustainable development which should underpin planning and decision making, particularly with regards to reducing the causes and impacts of flooding.

It states that SuDS provide numerous opportunities in addition to reducing the causes and impacts of flooding. It advises on the need to plan for maintenance of SuDS to ensure effective drainage for properties and notes that local authorities and Developers should work together to implement SuDS.

WAY MARKER 2.5

National Planning Policy Framework (NPPF) 2012

<https://www.gov.uk/government/publications/national-planning-policy-framework--2>

Planning Practice Guidance: Flood Risk and Coastal Change 2014

<https://www.gov.uk/guidance/flood-risk-and-coastal-change>

The Planning Practice Guidance relating to SuDS was revised 23rd March 2015 and highlights the considerations which should be made about the types of SuDS, operation and maintenance in relation to the Defra Non-Statutory Technical Standards for SuDS.

Planning Practice Guidance: Flood Risk and Coastal Change (2014) advises how to take account of and address the risks associated with flooding and coastal change in the planning process.

2.1.6. Preliminary Flood Risk Assessment

Warrington Borough Council as an LLFA has a duty to prepare a Preliminary Flood Risk Assessment (PFRA) in accordance with Part 2 of the FRR 2009 which sets out the requirements. The PFRA is a high level screening exercise to identify areas in which the risk of local flooding is significant and warrants further examination through the production of maps and management plans. The first PFRA was completed in 2011 and updated in 2017. The latest review of the PFRA identified that Warrington had no flooding issues that were nationally significant.

WAY MARKER 2.6

Preliminary Flood Risk Assessment 2017

https://www.warrington.gov.uk/downloads/download/717/preliminary_flood_risk_assessment

2.1.7. UK Exit from European Union

Depending on the approach taken to European Union exit, there may be potential to make changes to the FRR and other associated legislation in the coming years. At present European Exit does not alter the requirement for LLFAs to adhere to current legislation and document review unless confirmed by Central Government.

2.2. Local Policy Context

2.2.1. Mersey Estuary Catchment Flood Management Plan

The Mersey Estuary Catchment Flood Management Plan examines 10 sub areas in the Mersey catchment. It notes that Warrington (Area 5) is an area of moderate to high flood risk where further action can be taken to reduce flood risk.

The Manchester Ship Canal conveys approximately 70% of the flows which by-pass Warrington from the River Mersey, reducing the flood risk to 9,800 properties in the area.

The vision for the area includes: "to review existing urban drainage issues and develop an integrated urban drainage strategy, taking into account the effects of climate change and development" through the provision of SuDS.

WAY MARKER 2.7

Mersey Estuary Catchment Flood Management Plan (CFMP) 2009

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/293769/Mersey_Estuary_Catchment_Flood_Management_Plan.pdf

2.2.2. Cheshire Resilience Forum

The Cheshire Resilience Forum Multi – Agency Emergency Response Manual sets out the co-ordinated response of agencies across Cheshire. It offers a framework to allow those involved in responding to an emergency to work together as efficiently and effectively as possible.

WAY MARKER 2.8

Cheshire Resilience Forum Multi – Agency Emergency Response Manual

<http://cheshireresilience.org.uk/recovery-issues/>

Warrington Borough Council is well placed to co-ordinate flood risk management through its other statutory functions including Local Highway Authority, Local Planning Authority and Civil Contingencies Act Category 1 Responder. Warrington Borough Council has a well-developed network of partners by virtue of our historical operational and strategic practices.

2.3. Warrington Borough Council Policy Context

2.3.1. Adopted Local Plan Core Strategy

The strategy sets out a series of policies for addressing the vision for 2027 and objectives to achieve this vision. The spatial policy reflects the need for sustainable development in the National Planning Policy Framework 2012.

Warrington Borough Council is currently in the process of reviewing the Local Plan to replace the adopted Local Core Strategy (2014). As part of this process, but not exclusively, the vision and objectives and Policy QE 4 will be assessed to ensure they meet the needs of the Borough and conform to National Planning Policy Framework 2012. Until then the Local Core Strategy (2014) remains valid.

WAY MARKER 2.9

Warrington Borough Council Local Plan Core Strategy 2014

https://www.warrington.gov.uk/info/200564/planning_policy/1903/local_plan

Vision for 2027: "Warrington is one of the best places to live and work in the UK, where everyone enjoys an outstanding quality of life".

2.3.2. Strategic Flood Risk Assessment (SFRA) Volume II Technical Report 2011

Volume II provides detailed flood risk information collected and produced as part of the Level 1 and Level 2 assessment. It focuses on the main sources of risk in the Borough including fluvial and tidal flooding along the River Mersey, its five key tributaries (Sankey, Padgate, Spittle, Penketh and Whittle Brooks), surface water flooding, sewer flooding and residual risks associated with Bridgewater Canal, St. Helens Canal and Manchester Ship Canal.

It makes recommendations of a surface water management plan and water cycle strategy to aid decision making process on allocating sustainable development sites. It is recommended that within critical drainage areas a reduction of 50% in surface water discharge rates from new development on brownfield sites and a reduction to greenfield rates on all other development sites is achieved.

WAY MARKER 2.10

Warrington Borough Council Strategic Flood Risk Assessment 2011

https://www.warrington.gov.uk/info/200564/planning_policy/1905/evidence_base/8

2.3.3. Mid Mersey Water Cycle Study 2011

The study makes specific recommendations in relation to both planning and sustainable drainage and provides an Environment Agency checklist to encourage SuDS to be considered at the earliest opportunity. It also examines where infiltration SuDS would be applicable in Warrington.

WAY MARKER 2.11

Mid Mersey Water Cycle Study

https://www.warrington.gov.uk/info/200564/planning_policy/1905/evidence_base/8

2.3.4. Surface Water Management Plan (SWMP) - Environment & Regeneration Surface Water Flooding Evidence Base 2012

The SWMP builds upon the information of surface water risk identified in the SFRA and sets a framework for addressing the risk in the present and future. This builds upon Planning Policy Statement 25 (PPS25) - Development and Flood Risk Practice Guide. This has been superseded by the National Planning and Policy Framework (NPPF) - Planning Practice Guide 2014.

The preliminary flood risk assessment identifies surface water flooding in Warrington to have two main characteristics:

- Large-scale, shallow ponding affected by widespread flooding, with the potential to affect hundreds of properties during and after very high intensity rainfall events, and;
- Small-scale localised flooding issues, likely to affect few properties, but potentially occurring with much greater frequency.

WAY MARKER 2.12

Surface Water Management Plan 2012

https://www.warrington.gov.uk/info/200564/planning_policy/1905/evidence_base/8

Planning Practice Guide

<http://planningguidance.communities.gov.uk/>

2.3.5. Warrington Supplementary Planning Documents

In Warrington's local planning framework there are a key number of supplementary planning guidance documents, including the two listed in Way Marker 2.13.

These planning documents detail the aspirations and aims of a number of areas to be developed.

WAY MARKER 2.13

Warrington Town Centre Master Plan Vision 2030 (2012)

http://sys.warrington.gov.uk/content_documents/documents/warringtonandco/Images/Vision%202030%20Presentation%20AF%20LR_tcm37-57105.pdf

Warrington Town Centre South Masterplan Framework (2008)

https://www.warrington.gov.uk/download/downloads/id/1917/bridge_street_quarter_final_report_-_introduction.pdf

Warrington Means Business (2017)

<http://warringtonandco.com/wp-content/uploads/2017/01/Warrington-Means-Business-December-2016.pdf>

2.3.6. Warrington Sustainable Drainage Systems (SuDS) Guidance

This guidance is primarily aimed at Developers, to identify the information that they need to provide to enable the assessment of SuDS proposals by Warrington Borough Council as the LLFA and other Statutory Consultees. This guidance is intended to provide a standardised approach to the selection of appropriate SuDS and identify the information that the Developer is required to provide to enable the Local

WAY MARKER 2.14

2.3.6. Warrington Sustainable Drainage Systems (SuDS) Guidance

https://www.warrington.gov.uk/info/201080/streets_and_transport/2037/flooding

Authority and Statutory Consultees to effectively review planning applications.

2.4. Other Relevant Legislation

There is a wide range of other relevant legislation, policy and guidance contributing to Flood Risk Management including:

- The Climate Change Act (2008);
- The Conservation of Habitats and Species Regulations (2010);
- The Civil Contingencies Act (2004);
- The Strategic Environmental Assessment (SEA) Directive (2001);
- The Land Drainage Act (1991 and 1998);
- The Water Framework Directive (2003);
- Wildlife and Countryside Act (1981);
- Countryside and Rights of Way Act (2000);
- Public Health Act (1936);
- Highways Act (1980);
- Reservoirs Act (1975);
- Environment Agency - Water Cycle Study Guidance - January 2009;
- Defra: National flood and coastal erosion risk management strategy for England (2011);
- Defra: Co-operation and requesting information in flood and coastal erosion risk Management (2011);
- Defra: Making Space for Water (2004);
- Defra: Understanding the risks, empowering communities, building resistance (2011);
- Local Government Association: Framework to assist the development of the Local Strategy for Flood Risk Management (2014).

Note: this list is indicative only and not meant to be definitive.

Further information to these can be obtained from the following website: www.gov.uk

2.5. Roles and Responsibilities

2.5.1. Risk Management Authorities (RMAs)

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What is Risk Management?

Anything done for the purpose of:

1. analysing a risk;
2. assessing a risk;
3. reducing a risk;
4. reducing a component in the assessment of a risk;
5. altering the balance of factors combined in assessing a risk, or
6. otherwise taking action in respect of a risk or a factor relevant to the assessment of a risk (including action for the purpose of flood defence).

Table 2.2 summarises the roles and responsibilities of organisations associated with flood risk management within Warrington.

Under the provisions of the FWMA 2010, the following duties are common to all RMAs:

- A duty to cooperate with other risk management authorities;
- A duty to act consistently in accordance with the national and local strategies;
- Powers to take on flood risk functions from another risk management authority, and;
- A duty to contribute towards the achievement of sustainable development.

Table 2.2: Risk Management Authorities and Responsibilities

Authority	Responsible For	Activity
Government (Defra)	Defra develops FCERM policy and is the lead Government department for flood risk management in England.	New or revised policies are prepared with other parts of government such as the Treasury, the Cabinet Office (for emergency response planning) and the Department for Communities and Local Government (land-use and planning policy). These national policies form the basis of the Environment Agency’s work.
Environment Agency (RMA)	<p>As national co-coordinator, the Environment Agency has a strategic overview of all sources of flooding (as defined in the Flood and Water Management Act 2010).</p> <p>It is also responsible for regulating reservoir safety, and working in partnership with the Met Office to provide flood forecasts and warnings.</p> <ul style="list-style-type: none"> • Main rivers • Reservoirs over 10,000m³ 	<p>Developing long-term approaches to FCERM. This includes working with others to prepare and carry out sustainable Catchment Flood Management Plans (CFMP’s) to address flood risk in each river catchment.</p> <p>Shoreline Management Plans (SMPs) assess the risks of coastal flooding and erosion and propose ways to manage them. The Environment Agency also collates and reviews assessments, maps and plans for local flood risk management (normally undertaken by Lead Local Flood Authorities).</p> <p>Providing evidence and advice to support others, including local authorities on planning and development issues. This includes national flood risk information, data and tools to help other risk management authorities and inform government policy.</p> <p>Working with others to share knowledge and the best ways of working. This includes work to develop FCERM skills and resources. Monitoring and reporting on flood and coastal erosion risk management and assessing the impact the national FCERM strategy is having across the country.</p> <p>The Environment Agency brings together local authorities and communities to share combined knowledge, and develop a sustainable framework so that the right action is decided for each community.</p>

Authority	Responsible For	Activity
<p>Warrington Borough Council (LLFA, RMA)</p>	<p>As local coordinators, the Flood and Water Management Act directs responsibility for the following types of flooding to LLFA's to:</p> <ul style="list-style-type: none"> • Surface Water; • Highway Drainage* • Groundwater; and • Ordinary Watercourses. <p>*Providing and managing highway drainage and roadside ditches under the Highways Act 1980.</p>	<p>Prepare and maintain a strategy for local flood risk management in our area, coordinating views and activity with other local bodies and communities through public consultation and scrutiny, and planning. Maintain a register of assets – these are physical features that have a significant effect on flooding in their area. Issue consents for altering, removing or replacing certain structures or features on ordinary watercourses.</p> <p>Play a lead role in emergency planning and recovery after a flood event. Set land use policy and manage development in relation to policy.</p> <p>The owners of land adjoining a highway also have a common-law duty to maintain ditches to prevent them causing a nuisance to road users. To manage these risks as set out in the national strategy, authorities will need to work effectively with the Environment Agency.</p> <p>Coastal erosion risk management authority functions include planning shoreline management activities with input from the Environment Agency and the delivery of coastal erosion risk management activities.</p>
<p>United Utilities (RMA)</p>	<p>Work with flood authorities to co-ordinate the management of water supply and sewage systems.</p>	<p>Make sure their systems have the appropriate level of resilience to flooding, and maintain essential services during emergencies. Maintain and manage their water supply and sewage systems to manage the impact of flooding and pollution to the environment.</p> <p>Provide advice to LLFA's on how water and sewage company assets influences local flood risk. Work with developers, landowners and LLFA's to understand and manage risks.</p>
<p>Peel Ports Group (Not a RMA)</p>	<p>The Bridgewater Canal is owned and operated by The Bridgewater Canal Company Limited, part of The Peel Group, in conjunction with the Bridgewater Canal Trust.</p> <p>The Manchester Ship Canal Company is owned and operated by Peel Ports Group, which has two shareholders - The Peel Group and Deutsche Asset Management. The Manchester Ship Canal Company is the statutory body responsible for navigation and maintenance of the Manchester Ship Canal governed by Acts of Parliament.</p> <p>The Woolston New Cut Canal is owned by the Manchester Ship Canal Company.</p>	<p>Subsidiary companies of Peel Ports Group are the statutory navigation authorities for the canals and as such are responsible for managing the shipping movements along the entire length of the canals.</p> <p>The companies are also responsible for managing flood risk directly from the canal and can do this by managing water levels through the operation of key assets and undertaking dredging where necessary.</p>

Authority	Responsible For	Activity
Cheshire Police/Fire and Rescue (RMA)	Police and Fire and Rescue Service can identify locations at which they have been involved in flood incident management. Work with flood authorities to co-ordinate flood response or in emergency situations take the lead in the overall management.	
Private Sewer Ownership	Property owners no longer responsible for private sewer, lateral drains or private pumping stations that connect their properties to public sewers	Legislation transferred responsibility of private sewers and lateral drains, to United Utilities 1 st October 2011. Private pumping stations were transferred to United Utilities on 1 st October 2016.
Residents, Businesses and Land Owners	Riparian Land Owners are responsible for the maintenance and upkeep of the watercourses on their land. Householders and businesses are responsible for the protection of their own properties.	

2.5.2. Flood Type and Responsibility

This Strategy sets out a framework for managing flood risk in a holistic way and will guide Warrington Borough Council as the LLFA in respect of managing local flood risks.

“**Significant harmful consequences**” are considered to be impacts of flooding that may have negative consequences for human health, the social and economic welfare of individuals and communities, infrastructure, and the environment (including cultural heritage). The definition of “significant” has been defined by Warrington Borough Council in Table 2.3.

Table 2.3: Historically Significant Harmful Consequences

Impact of flooding on:	Category	Consequence
Human Health	Number of individuals	≥ 200
Economic Activity	Number of critical services	≥ 2
	Number of residential properties	≥83
	Number of non-residential properties	≥ 20
Environment	-	-
Cultural Heritage	-	-

Irrespective of “significance”, Warrington Borough Council considers that all flood events that affect property or people justify consideration. Therefore, where known, information on all flood events has been gathered.

Following a flooding event Warrington Borough Council will undertake the necessary activities as required by FWMA 2010 in order to comply with its responsibilities as a RMA. Everyone has the responsibility to take steps to protect their own property from flooding. However the steps an individual takes to protect their property from flooding must be carried out with due care. A property owner must ensure that they do not cause harm to their neighbours or their property through their actions to reduce their own flood risk. Depending on the severity/frequency of flooding events, the LLFA may use permissive powers under the relevant legislation to intervene where it deems necessary in order to manage and reduce flood risk.

Table 2.4 indicates which organisations are responsible for management of the different types of flooding. Although these organisations may be responsible, this does not mean that they are

liable for damage caused by flooding. Property owners who own land bounding a river, lake, or other watercourse are defined as ‘Riparian Owners’ and they have the responsibility of protecting their property and for maintaining the section of adjacent watercourse.

Table 2.4: Risk Management Authority for each Type of Flooding

	Flooding Type	Details	Risk Management Authority	Responsibility for flood protection
Natural	River flooding (Fluvial)	Flooding from any type of watercourse, also known as fluvial flooding, occurs when intensive or prolonged rainfall causes a watercourse to exceed hydraulic capacity. The additional inflow causes the water to rise above its banks or retaining structures and subsequently flows onto the land.	Ordinary Watercourse - Warrington Borough Council Main River – Environment Agency	Riparian land Owner
	Surface water flooding (Pluvial)	Surface water flooding, also known as pluvial flooding, results from overland flow before the runoff enters a watercourse or drainage system. It is usually the result of high intensity rainfall exceeding the hydraulic capacity of the receiving system. However it can also occur with lower intensity rainfall when the land has a low permeability and/or is already saturated, frozen or developed.	Warrington Borough Council	Land Owner
	Ground Water Flooding	This occurs when levels of water in the ground rise above the surface. It is most likely to happen in areas where the ground contains aquifers following periods of persistent rainfall. These are permeable rocks that water can soak into or pass through.	Warrington Borough Council	Land Owner
	Tidal Flooding	This occurs due to a combination of low pressure weather systems and peak high tides which results in high water levels which can breach banks and flood defences. The River Mersey which flows through Warrington is tidally influenced up to Howley Weir.	Environment Agency	Riparian Land Owner
Joined	Highway Flooding	Flooding is caused by heavy rainfall or water overflowing from blocked drains and gullies causing water to pond within the highway network.	Warrington Borough Council as Highway Authority	Warrington Borough Council
Unnatural	Public Sewer Flooding	Sewer flooding is often caused by drainage systems exceeding hydraulic capacity during periods of intensive, or prolonged, rainfall. Flooding may also occur due to operational issues such as blockages or asset failure. Land and property can be flooded with water contaminated with raw sewage as a result. Sewers which contain an overflow can also pollute receiving watercourses.	United Utilities	United Utilities
	Water Supply Flooding	When flooding occurs as a result of manmade water supply, for example a burst water mains.	United Utilities or asset owner if in private ownership	United Utilities or asset owner if in private ownership

Flooding Type	Details	Risk Management Authority	Responsibility for flood protection
Reservoir flooding	Reservoirs hold large volumes of water above ground level, contained by walls or dams. Although the safety record for reservoirs in England is excellent, it is still possible that a dam could fail.	Rivers and Canals Trust / Environment Agency/ United Utilities/ Local Authorities	Reservoir Owner
Canal	These engineered systems are heavily controlled and are unlikely to respond in the same manner during periods of rainfall as natural watercourses. The probability of flooding is more associated with residual risks, such as overtopping of canal banks, breaching of embanked reaches or asset (e.g. gate) failure. Each canal also has significant interaction with other sources of flood risk, such as the main rivers and the minor watercourses that feed them, or drains that cross beneath them	Rivers and Canals Trust / Canal Owner/Navigation Authority/ Local Authorities	Canal Owner

2.6. Governance Arrangements

Flood and Water Management Act 2010: Section 13 Co-operation and Arrangements

(1) A relevant authority must co-operate with other relevant authorities in the exercise of their flood risk management functions.

(2) A relevant authority may share information with another relevant authority for the purpose of discharging its duty under subsection

(4) A risk management authority may arrange for a flood risk management function to be exercised on its behalf by –

(a) another risk management authority, or

(b) a navigation authority (within the meaning given by Section 219 of the Water Industry Act 1991).

2.6.1. Coordination of Flood Risk Management

Local knowledge and technical expertise necessary for Warrington Borough Council to fulfil its duties as a LLFA lies with the Council and other partner organisations. It is therefore crucial that Warrington Borough Council works alongside these partners as they undertake their responsibilities to ensure effective and consistent management of local flood risk.

Due to the Borough being situated within the River Mersey catchment, the Council is in consultation with neighbouring Local Authorities.

Warrington Borough Council is part of a sub-regional LLFA working group formed in 2010; the Cheshire and Mid-Mersey Flood Partnership. The partnership operates at operational, tactical and strategic levels.

The Risk Management Authorities (RMAs) of the Partnership are:

- Warrington Borough Council – Partnership Lead;
- Cheshire East Council;
- Cheshire West and Chester Council;
- Halton Borough Council;
- St Helens Council;
- Staffordshire County Council;
- Environment Agency;
- United Utilities.

The Partnership has a critical role to play in managing the risk of flooding from all sources and in working with communities to help them become more resilient. It provides a forum to enable RMAs, other partners and communities, to identify how they can work together to deliver an improved, more effective and efficient flood risk management service. It is the role of the Local Authority Flood Risk Coordinator (Match Funded Post) to oversee the delivery of FWMA 2010 between the local authorities in a co-ordinated manner.

The Operational Group

Engineers from Warrington Borough Council, United Utilities and Environment Agency meet on a quarterly basis, or as required, if flood events occur to discuss issues and scheme delivery. The Operational Level is where day-to-day Flood Risk Management activities take place.

The Tactical Group

Technical and operational leads/managers meet on a bi-monthly basis, or as required on a project driven basis, to coordinate delivery, share skills and implement decisions made at the Strategic level. The Tactical Group reports directly to the Strategic Group who are responsible for setting the overall strategic direction of the partnership.

The Strategic Group

Elected Members and senior representatives from the RMAs meet each quarter, or as required on a project driven basis. The meetings are timed to coincide with the financial planning cycle of the Regional Flood & Coastal Committee (RFCC). The Strategic Group sets the direction for joint working and the management of flood risk across the Partnership.

Regional Flood & Coastal Committee (RFCC)

The RFCC for the North West region provides a local democratic role in the management of flood and coastal erosion risk in order to ensure the purposeful and efficient spending of public money and other resources.

The RFCC works across LLFAs, the Environment Agency and other RMAs to develop a mutual understanding of risk across its locality, and use this understanding to help develop plans to manage risk reflecting Defra's aims for flood and coastal erosion risk management. RFCC

meetings are held each quarter, although there may be additional meetings at a sub-group level where local authorities are working together.

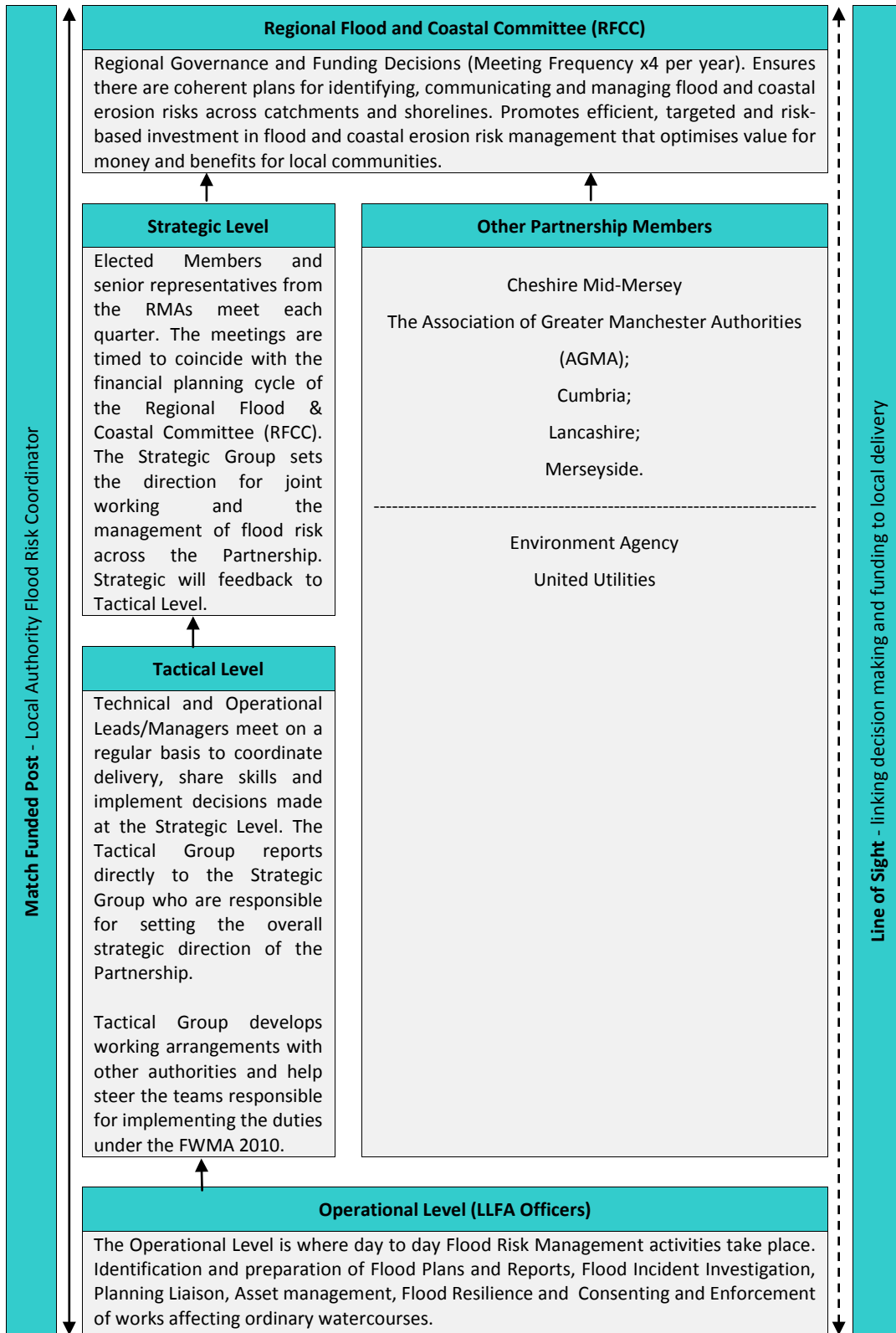
The RFCC provides a platform for frequent knowledge transfer with all Partnerships situated in the North West region. These are;

- Cheshire Mid-Mersey;
- The Association of Greater Manchester Authorities (AGMA);
- Cumbria;
- Lancashire;
- Merseyside.

Public Engagement

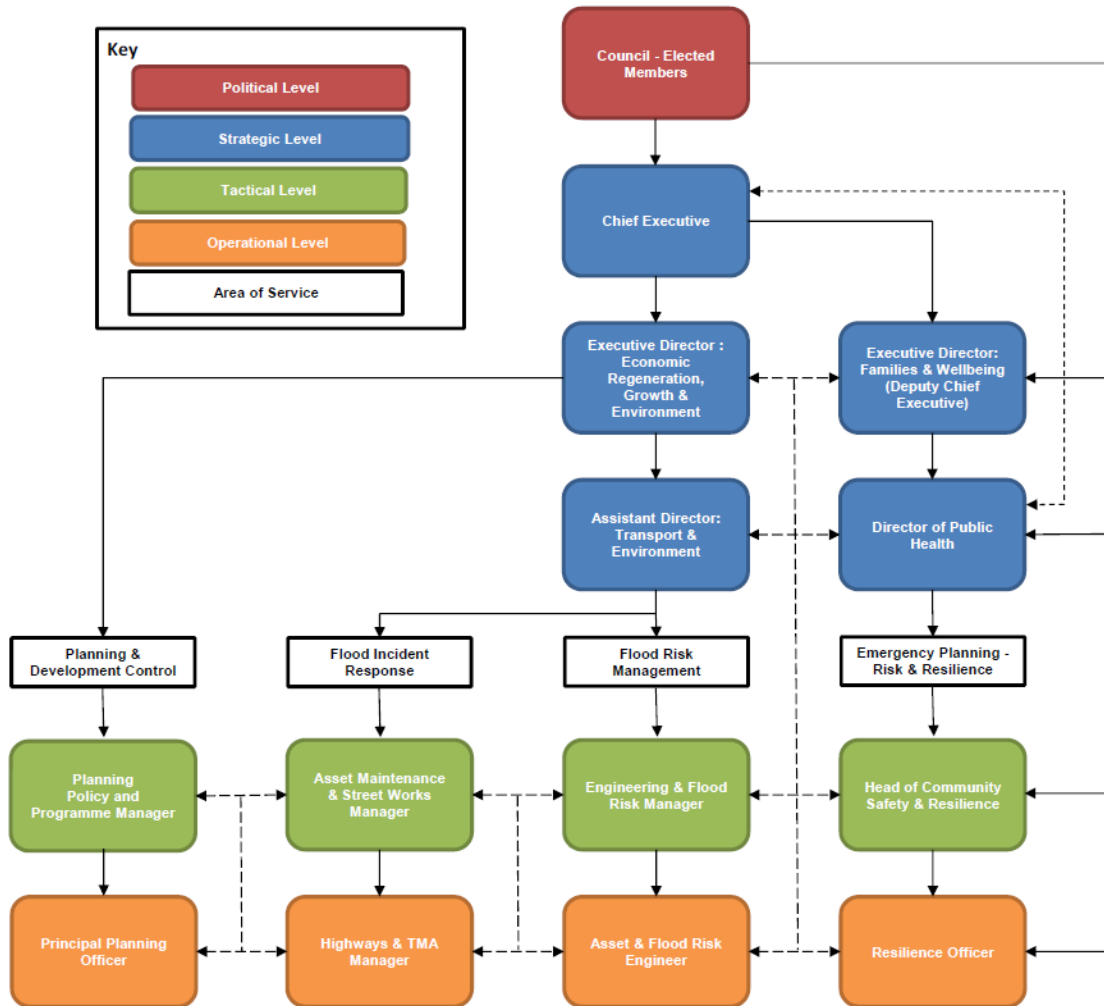
It is recognised that members of the public may also have valuable information to contribute to local flood risk management. The Environment Agency's 'Building Trust with Communities' (2005) document provides the basis of how to communicate risk including the causes, probability and consequences to the general public and professional forums such as local resilience. The FRR 2009 and FWMA 2010 accelerated the need for Councils to increase public engagement. This has brought significant benefits to local flood risk management including building trust, gaining access to additional local knowledge and increasing the chances of stakeholder acceptance of options and decisions proposed in future flood risk management plans.

Figure 2.1: Cheshire Mid-Mersey Flood and Coastal Erosion Risk Management Partnership Structure



2.6.2. Governance of Flood Risk Management within Warrington Borough Council

Figure 2.2: Governance of Flood Risk Management within Warrington Borough Council



3 Objective 2: Assessment of Flood Risk in Warrington

What this section will cover:

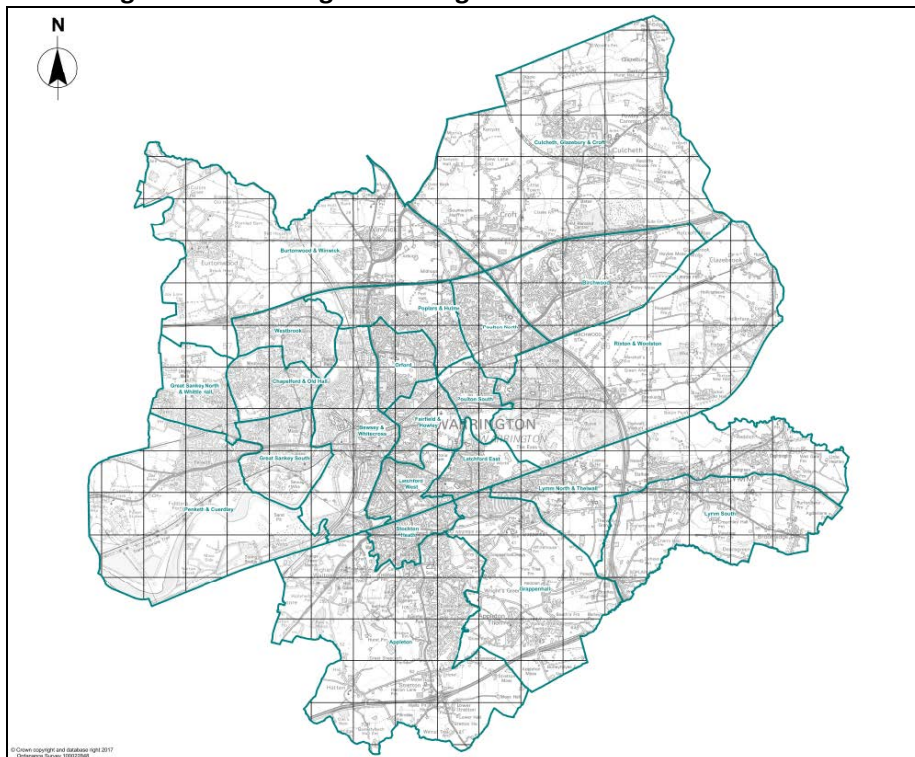
- Overview of flood risk across Warrington.
- Data sources to assess the impact of past, present, and future flooding locations.
- Climate Change.

Further information to the collection and assessment of data is contained within the following documents:

- Preliminary Flood Risk Assessment (2017);
- Strategic Flood Risk Assessment (SFRA) Volume II Technical Report 2011;
- Surface Water Management Plan (SWMP) - Environment & Regeneration Surface Water Flooding Evidence Base 2012.

3.1. Overview of Warrington Borough

Figure 3.1: Warrington Borough Council Administrative Area



Warrington Borough is the most northerly of the local authorities in the Cheshire area. It shares boundaries with Halton, Cheshire West and Chester, Cheshire East, and the four metropolitan boroughs of St Helens, Wigan, Salford and Trafford.

The Borough of Warrington covers some 176km² (68mi²) and is situated in the North West of England between Manchester and Liverpool. At mid-2010, it had an estimated population of 198,900.

The town of Warrington, which is by far the largest settlement in the Borough, owes its existence to the presence of a crossing point across the River Mersey, the importance of which can be traced back as far as pre-roman times.

In 1968 Warrington was designated as a New Town, primarily to take economic advantage of its unique position at the hub of the region's communication network, evidently aided by the arrival of the regions motorways. The Warrington New Town Outline Plan, approved in 1973, set out a strategy to expand the town's population from about 120,000 to 200,000 by the year 2000. Whilst the planned rate of growth was not fully achieved, the town physically expanded further outwards, the population grew significantly and the growth that took place has markedly changed the status, profile and character of the town. As a result Warrington has evolved from being a medium-sized industrial town to the home of major national and international companies, attracting working people from across the region. Since the end of the New Town era, strategic planning policies sought to arrest outward growth of the Town partly through recognition that it was nearing its natural limits to expansion and partly through recognition that the New Town development had remarkably little effect on the older urban areas of Inner Warrington.

Warrington lies at the hub of the region's communications network. The M6, M56 and M62 motorways intersect within the borough, providing good access to all parts of the region and beyond. Warrington also situated on the regions main North-South (West Coast Main Line) and East-West (Trans-Pennine) rail routes. The Borough is also traversed by the Manchester Ship Canal, an important commercial waterway linking the Port of Manchester with the River Mersey. Manchester International and Liverpool John Lennon Airports both lie within easy reach. Warrington's excellent connectivity is not solely confined to conventional transport routes. Green corridors such as the strategically important River Mersey, Trans Pennine Trail and regionally significant Bridgewater Canal act to highlight the potential of the Borough's greenway network in fulfilling active travel objectives. This connectivity has enabled the Borough to develop a strong and resilient economy with the town constituting a significant centre of employment in the North West, and being widely recognised as a key driver and contributor to the North West's economy.

The Borough has extensive areas of high-grade agricultural land, a varied landscape character and important areas of nature conservation value, mostly within the relatively narrow gaps of open land separating Warrington from urban areas to the west, north and east. The area is generally flat and below 20mAOD with low-lying land within the Mersey floodplain.

The average annual rainfall in the Warrington Borough Council area is approximately 600mm which is reasonably distributed throughout the year with an average low of 40mm in May and an average peak of 69mm in October.

Two significant waterways cross the main urban area; the River Mersey which passes close to the town centre and further south, the Manchester Ship Canal. Various small urban watercourses drain to the River Mersey in a roughly north south direction.

The River Mersey is tidal with the normal tidal limit being at Howley weir in the centre of the town of Warrington. The Manchester Ship Canal runs through Warrington having split from the River Mersey at Bollin Point. Upstream from Warrington the Manchester Ship Canal receives flows from the River Mersey at Irlam and the Rivers Irwell, Irk and Medlock in Manchester. The total catchment area draining into the Manchester Ship Canal upstream of Bollin Point covers an area of approximately 1,965 km².

Warrington Borough Council owns and maintains parts of the St Helens Canal within the Warrington Borough Council boundary.

There are three other canals within Warrington which are:

- The Bridgewater Canal - owned and operated by The Bridgewater Canal Company Limited, part of The Peel Group, in conjunction with the Bridgewater Canal Trust. The Bridgewater Canal Company is the statutory body responsible for navigation and maintenance of the Bridgewater Canal. It is managed as part of Peel Land and Property Group;
- The Manchester Ship Canal Company - owned and operated by Peel Ports Group, which has two shareholders - The Peel Group and Deutsche Asset Management. The Manchester Ship Canal Company is the statutory body responsible for navigation and maintenance of the Manchester Ship Canal governed by Acts of Parliament, and;
- The Woolston New Cut Canal - owned by the Manchester Ship Canal Company.

The water company that serves the administrative area is United Utilities.

3.2. Data Availability

3.2.1. Data Collection

Due to collaborative working at the catchment scale the following authorities and organisations regular share information to keep an accurate record of flooding incidents within the Warrington area:

- United Utilities;
- Environment Agency;
- Emergency Services, and;
- Cheshire Fire and Rescue Service.

Table 3.1: Relevant Information and Datasets Description

Owner	Dataset	Description	Confidence Rating
Environment Agency	Risk of Flooding from Surface Water (RoFSW)	Published 2013 national surface water flood map supersedes: <ul style="list-style-type: none"> • Areas Susceptible to Surface Water Flooding maps (2008). • Updated Flood Map for Surface Water (2010). Dataset provides banding for High, Medium and Low risk to depth and velocity. Dataset is updated annually.	2
	Flood Map (Rivers & Sea)	Shows the extent of flooding from rivers with a catchment of more than 3km ² and from the sea.	2
	Areas Susceptible to Groundwater Flooding (AStGF)	1 kilometre square grid that identifies at a broad scale areas susceptible to flooding from groundwater on the basis of geological and hydrogeological conditions.	3
	National Receptor Database (NRD)	A national dataset of social, economic, environment and cultural receptors including residential properties, school, hospitals, transport infrastructure and electricity substations.	2
	Indicative Flood Risk Areas	Nationally identified flood risk areas, based on the definition of 'significant' flood risk described by Defra.	2
	Historic Flood Map (HFM)	GIS layer showing the maximum extent of all individual Recorded Flood Outlines from river, the sea and groundwater springs and shows areas of land that have previously been subject to flooding	3
	Mersey Estuary Catchment Flood Management Plan (CFMP)	CFMP's consider all types of inland current and future flooding, from rivers, groundwater, surface water and tidal flooding and are used to plan and agree the most effective way to manage flood risk in the future.	2
	LiDAR Data	Topographic Information held for Warrington is generally high resolution data.	1
	Rain Gauge Information	2no. Gauge information available at selected sites across Warrington – available on request	2
	Telemetry	Operates telemetry system across Warrington, watercourse level and flow information collected. – available on request	1
Warrington Borough Council	Anecdotal information	Anecdotal information: flood risk, flood history and local flood hotspots.	4
	Area Flood Risk Studies	Flood Risk Studies commissioned by the Council for: <ul style="list-style-type: none"> • Grappenhall; • Longford/Orford; • Croft; • Culcheth; • Burtonwood. 	2
	CMM Partnership Ordinary Watercourse Critical Asset Identification & Condition Survey	Outputs from partnership work consist of: <ul style="list-style-type: none"> • Identification of critical assets • CCTV survey of identified culverts • Flood modelling • Ordinary Watercourse Condition data 	2
	Warrington Flood Risk Asset Inspection Project	Borough wide asset inspection works undertaken by Consultant on behalf of Warrington Borough Council & Blockage Sensitivity Testing.	2
	Strategic Flood Risk Assessment Level 1	The Stage 1 SFRA focuses on collecting information regarding all sources of flooding. This helps to identify the spatial distribution of flood risk sources.	3

Owner	Dataset	Description	Confidence Rating
	Strategic Flood Risk Assessment Level 2	The Stage 2 SFRA focuses on the details nature of flood hazard taking into account the presence of flood risk management measures such as flood defences and the location of key development and regeneration areas.	2
	Critical Infrastructure dataset	Contains information of critical infrastructure.	2
	Water Cycle Strategy	The Water Cycle Strategy identifies the water services infrastructure that is needed to support and enable sustainable development in the mid Mersey area.	2
	Surface Water Management Plan Flood Depth Mapping	Surface Water Flood Modelling conducted as part of the SWMP Stage 2.	2
	Surface Water Management Plan Stage Interim Reports	Information on future surface water flood risk is outlined in these documents.	2
	S19 Flood Investigation reports	LLFAs have a duty to investigate and record details of significant flood events within their area. Reports include photographic evidence recorded during and after flood events.	2
	Historic Flooding Records	Historic records of flooding from surface water, groundwater and ordinary watercourses.	2
	Asset Register/Record	Register of flood risk management assets.	2
	Scheme Business Cases	Business cases for schemes contain information regarding risk and potential solutions.	2
Fire & Rescue	Incident Response Register	Issue logs of all events recorded by Cheshire Fire and Rescue Service. This includes internal floods such as burst pipes and sewerage problems	2
United Utilities	Modelling Information	Models of drainage systems operated and maintained by United Utilities.	2
	Asset Register	Asset register available to Warrington Borough Council on request.	2
	Telemetry	Information regarding sewer performance	2
	Flooding Register	Registers logs and records of sewer flooding incidents for each area.	2
Other Sources	Media Records	Information obtained from online media – news websites/social media etc.	2

Table 3.2: Summary of data restrictions and licensing details

Organisation	Restrictions on Use of Data
United Utilities	The use of provided data is restricted to Warrington Borough Council and their partners for the preparation of their documents associated with FWMA 2010.
Environment Agency	The use of some data is restricted to Warrington Borough Council for the preparation its documents associated with FWMA 2010. The use of other data is unrestricted.

3.2.2. Data Limitations

Since implementation of the FWMA 2010 a number of processes have improved but a number of limitations still remain.

Inconsistent Recording Systems

Previously the lack of a consistent flood data being captured within one central recording system within Warrington Borough Council had led to inconsistencies in the recording of flood event data. The Council addressed this issue as part of undertaking Sections 19 and 21 of the FWMA 2010. Only sections of the Warrington area that have recently been flooded have been scrutinised for consistency. The limitation of inconsistent recording still applies for those sections of the Warrington area that have only experienced flooding historically.

Incomplete Datasets

Some of the datasets collated are not exhaustive. Warrington Borough Council along with the other stakeholders, have strived to reduce the number of incomplete datasets since 2011. Records for recent flooding locations are now comprehensive, however knowledge gaps still remain in sections of Warrington that have only experienced flooding historically and therefore hinder the identification of accurate flood risk areas.

Varied Quality of Data

Depending upon stakeholder objectives, when collecting information there has been varied quality in historic flood records. This has made it difficult to accurately assess the consequences of historic local flooding.

Records of Consequences of Flooding

It is not always possible to clearly identify and compartmentalise flooding, particularly from engineered systems that are typically interconnected, which results in flooding from a combination of sources.

Data records provided by the other partner organisations were not always comprehensive for specific past flood events. Since 2011 there has been increased co-operation with stakeholders to standardise the recording procedure to become more aligned and comprehensive, increasing confidence to identifying flooding source and consequence.

Quality Assurance

Data collected was subject to quality assurance measures to monitor and record the quality and accuracy of acquired information and datasets. A data quality score was given, which is a qualitative assessment based on the Data Quality System provided in the Surface Water Management Plans (SWMP) Technical Guidance document (March 2010). This system is explained in Table 3.1. A confidence rating for the dataset was then determined as summarised in Table 3.3.

Table 3.3: Recording the Quality of Data

Data Quality Score	Description	Explanations	Example
1	Best possible	No better available; not possible to improve in the near future	High resolution LIDAR River/sewer flow data Rain gauge data
2	Data with known deficiencies	Best replaced as soon as new data are available	Typical sewer or river model that is a few years old
3	Gross assumptions	Not invented but based on experience and judgement	Location, extent and depth of surface water flooding Operation of un-modelled highway drainage 'future risk' inputs e.g. rainfall, population
4	Heroic assumptions	An educated guess	Ground roughness for 2D models

3.3. Historic Flood Risk – Assessment of Past Flooding

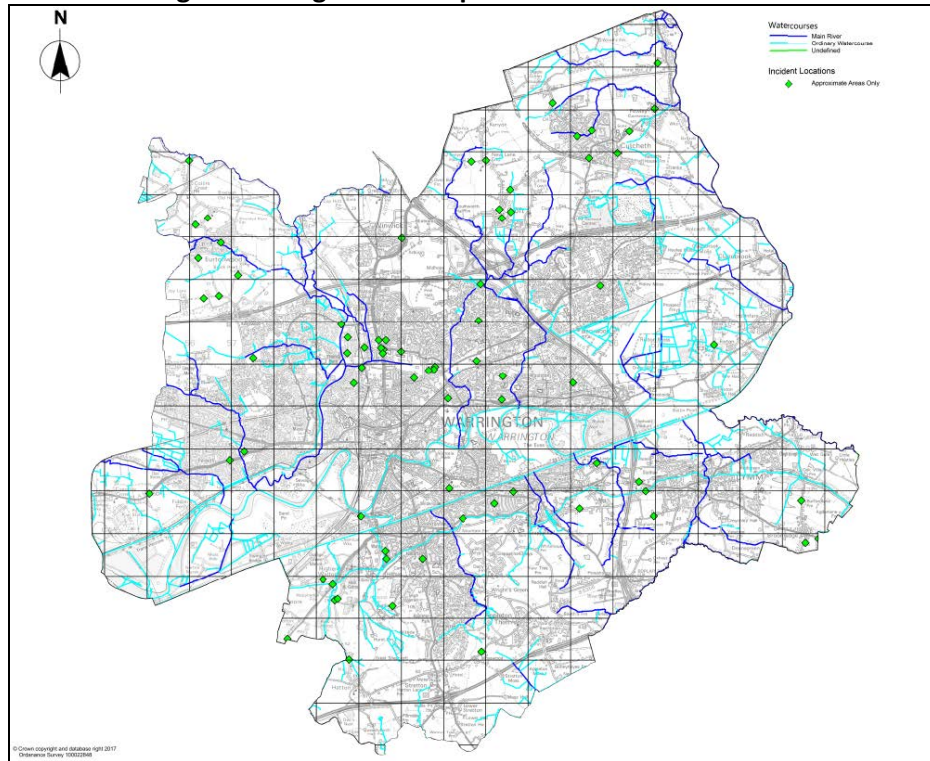
3.3.1. Surface Water Flooding (Overland Flow)

Surface water flooding within the United Kingdom is becoming a regular issue due to the high rate of developments creating large impermeable surfaces. There are certain locations within Warrington where this flooding mechanism is more prominent due to the increased urban nature of the catchment, combined with the complex hydraulic interactions between the tidal River Mersey, urban watercourses, surface water drainage systems, and combined sewer systems at overflow locations.

Some records do not identify the number, and duration, of properties flooded. This has led to low confidence as often only street names have been reported, regularly from local media, and do not specifically identify the nature of the flooding, possible causes, or exact locations.

Figure 3.2 shows the locations of historic flood events held by Warrington Borough Council. There are a total of 197 recorded historical surface water flooding events of varying significance and type.

Figure 3.2: Warrington Borough Council Spatial Distribution of Historic Flood Records



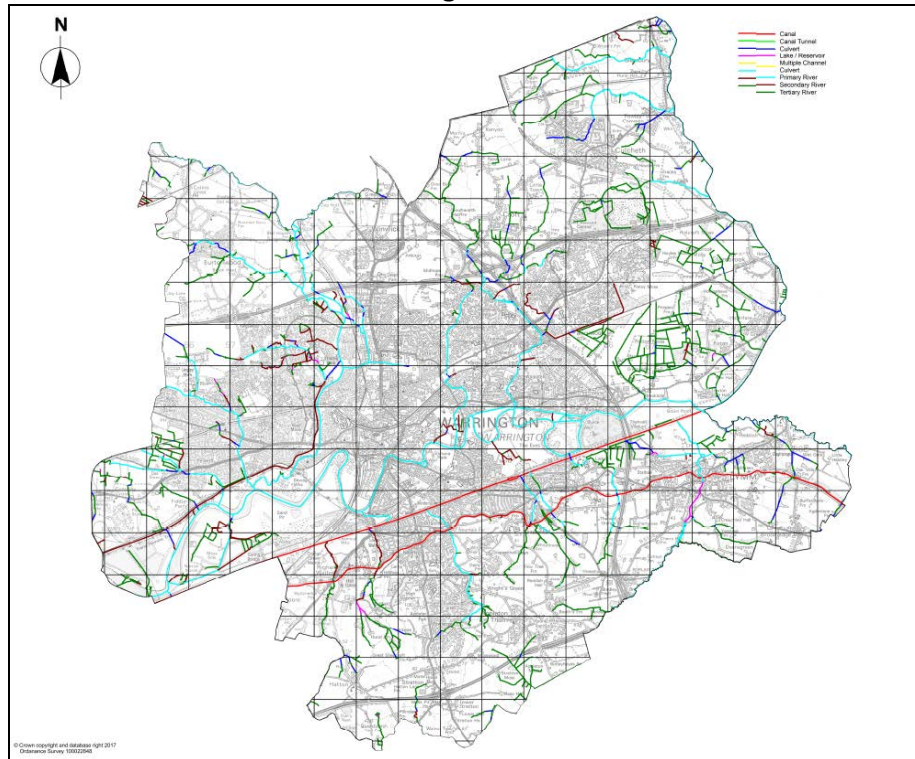
Information was provided by Cheshire Fire and Rescue regarding incidents of flooding to which they responded. The information was filtered to remove incidents internal to property such as burst water pipes leaving those relevant to the strategy. There were 26 incidents recorded between August 2004 and December 2015.

Warrington Borough Council has identified no incidents of historically significant harmful consequences for surface water flooding. Areas affected by surface water flooding which have not been classified as having significant harmful consequences will be reviewed as part of Warrington's longer-term strategy.

3.3.2. Ordinary Watercourse

All watercourses within Warrington have been identified using the Environment Agency's Detailed River Network (DRN) and are classified as either Main River or Ordinary Watercourse. Figure 3.3 illustrates the locations of these in Warrington.

Figure 3.3: Classification of Watercourses within the Administrative Boundary of Warrington Borough Council



Main rivers are usually larger rivers and streams. Other rivers are called Ordinary Watercourses. The Environment Agency carries out maintenance, improvement or construction work on main rivers to manage flood risk under the Water Resources Act 1991. Environment Agency powers to carry out flood defence work apply to main rivers only. Lead local flood authorities, district councils and internal drainage boards carry out flood risk management work on ordinary watercourses. The Environment Agency decides which watercourses are main rivers. It consults with other risk management authorities and the public before making these decisions. The main river map is then updated to reflect these changes.

Ordinary Watercourses are any watercourses that are not designated a main river by the Environment Agency and therefore come under the powers of Warrington Borough Council. These include every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows and which does not form part of a main river. Ordinary watercourses with known flood risks associated to them (limited channel capacity, channel constrictions or a poor maintenance regime) were previously designated Critical Ordinary Watercourses (COWs). In 2006/7, the Environment Agency reclassified all COWs as main rivers and took over responsibility for their maintenance and management, in a process known as enmainment.

Although there are several recorded incidents of localised flood events related to ordinary watercourses that were not enmainned, none of these have had 'significant harmful consequence'.

Warrington Borough Council has identified no historically significant harmful consequences for fluvial flooding from ordinary watercourses. Areas affected by fluvial flooding which have not been classified as having significant harmful consequences will be reviewed as part of Warrington’s longer-term strategy.

3.3.3. Interaction with Main Rivers

It is identified in the Mersey Estuary Catchment Flood Management Plan (CFMP) and the Environment Agency Warrington Flood Risk Management Strategy that there is a long history of fluvial and tidal flooding in central Warrington dating back to 1767.

Fluvial flooding is associated more with the River Mersey tributaries and main watercourses, such as Dallam, Sankey, and Whittle Brooks, rather than the River Mersey itself. The Environment Agency is responsible for managing these main tributaries. Warrington has benefited from the Manchester Ship Canal which transfers a significant flow of water past Warrington and reduces the risk of fluvial flooding along the River Mersey.

High water levels in the River Mersey are commonly due to tidal and fluvial events. Although flooding from main rivers does not need to be included in the PFRA/Local Strategy, it is thought that there is a strong link between surface water flooding, sewer flooding incidents and flooding from ordinary watercourses and water levels on the River Mersey and its tributaries such as Dallam Brook and Sankey Brook. There is evidence to suggest that surface water flooding is exacerbated in some areas, during high tidal cycles when gravity drains and outfalls are blocked with high tidal waters. However due to the incomplete nature of the information available at present, the degree of influence on local flood risks cannot be determined.

Table 3.4: Warrington Borough Council Significant Fluvial & Tidal Flooding Incidents

Date	Event
1697	Fluvial event along Dallam Brook.
April 1967	Fluvial flooding along Whittle Brook where 50 properties were flooded
February 1990	Tidal flooding along the River Mersey where 17 properties, 8,000m ³ of commercial floor space and a public school were flooded
October 2000	Fluvial flooding along Dallam Brook where 15 houses in the Dallam area were flooded

Information about historical flooding will often be due to an unknown source, or because of interactions between sources. This interaction will be difficult to identify without detailed flood risk studies.

3.3.4. Sewer Flooding

Sewer flooding is often caused by drainage systems exceeding hydraulic capacity during periods of intensive, or prolonged, rainfall. These drainage systems, owned and maintained by the sewage undertaker (United Utilities), receive either:

- Foul only flows;
- Surface water flows, or;
- Both foul and surface water flows (combined system).

Combined sewerage systems are mostly associated with sections of Warrington developed during the Victorian era. To maintain hydraulic efficiency the combined system contains a number of relief structures to divert excess flows to adjacent watercourses to reduce the risk of sewer flooding from manholes. These structures are known as Combined Sewer Overflows (CSOs). The operation of these increases the risk of fluvial flooding, as well as pollution of the watercourse. Developments from the late 1970s/early 1980s have been constructed using individually separate foul and surface water systems.

There are some housing developments from the early 20th century that utilise the principles of the separate system where both foul and surface water flows are routed in the one manhole. These dual manholes operate in a similar manner to CSOs and are normally situated at the head of the sewerage network, whereas CSOs are situated in the main body of the system. Dual manholes can cause major pollution problems from storm sewage discharges or dry weather discharges via surface water sewers as a result of foul sewer blockages or poor asset maintenance.

Some of the sewers across Warrington date back to Victorian times which include the areas of Penketh and Great Sankey. The population and size of Warrington has grown as the community around Warrington expanded. More houses and businesses mean an increase in the amount of drainage systems and discharges and less permeable surfaces for rainwater to drain into. Climate change is also leading to longer, heavier periods of rain. These two factors can result in the existing sewers and drains not being able to cope at certain times during heavy rainfall. United Utilities have provided an incident register for locations that have experienced internal (i.e. flooding within a property) and external flooding from a number of sources. The register has been filtered to identify hydraulic issues, such as overloading of the sewerage system or restriction at outfall locations caused by high level in the receiving watercourse. "Other" causes of flooding, for example blockages, asset failure or other operational issues, have been discounted from this assessment.

Figure 3.5: Approximate locations of flooding caused by Hydraulic Issues (United Utilities)

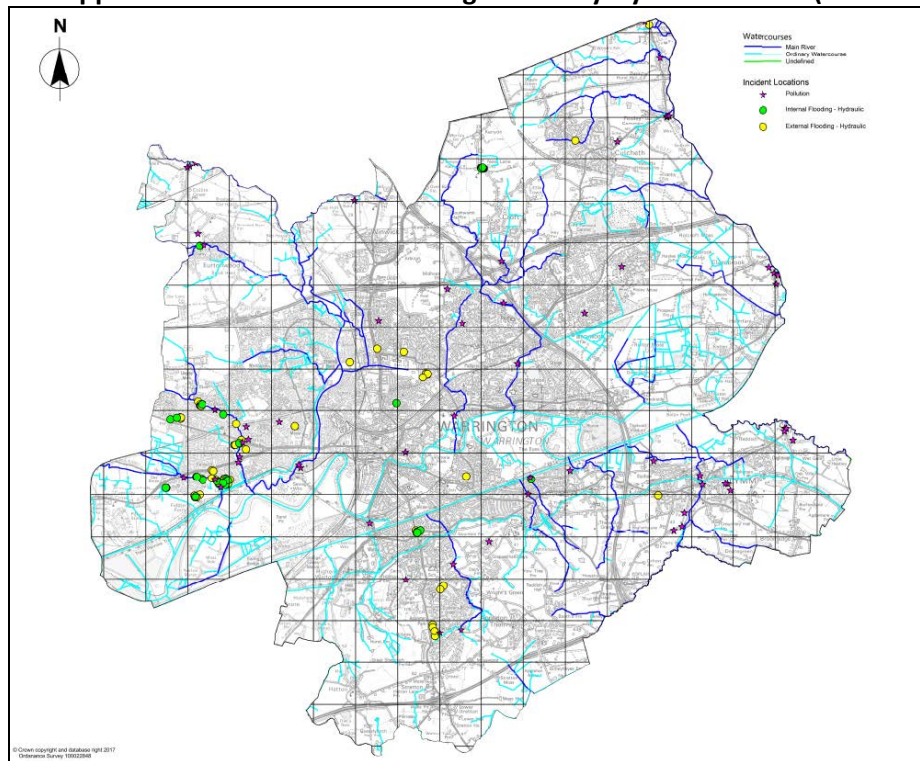


Figure 3.5 illustrates the historic sewer flooding information provided by United Utilities. There have been a total of 154 flooding incidents (113 external and 41 internal) across Warrington.

Warrington Borough Council has identified no historically significant harmful consequences due to flooding from the sewerage system. Areas affected by sewer flooding which have not been classified as having significant harmful consequences will be reviewed as part of Warrington’s longer-term strategy.

3.3.5. Groundwater Flooding

Groundwater flooding occurs when the water table rises above normally expected and anticipated levels and emerges at the ground surface. Groundwater flooding occurs in response to a combination of already high groundwater levels (regularly during mid or late winter) and intense or unusually prolonged periods of rainfall. Other mechanisms which produce groundwater flooding including:

- Artificial structures;
- Groundwater rebound (which occurs when abstraction, typically for drinking water, industrial or mine dewatering purposes, stops and water levels return to pre-abstraction levels);
- Mine water rebound;
- High in-bank river levels.

The occurrence of groundwater flooding is usually localised and, unlike flooding from watercourses, does not generally pose a significant risk to life due to the slow rate at which the

water level rises but can last several months and can cause significant social and economic disruption to the affected areas.

There are known locations with high groundwater within Warrington however, there are no specific records or reported incidents of groundwater flooding. Therefore it is considered currently that there are no groundwater flood incidents that would result in 'significant harmful consequences'.

3.3.6. Canals

Warrington Borough Council owns and maintains parts of the St Helens Canal within the Warrington Borough Council boundaries.

There are three other canals within Warrington which are:

- The Bridgewater Canal - owned and operated by The Bridgewater Canal Company Limited, part of The Peel Group, in conjunction with the Bridgewater Canal Trust;
- The Manchester Ship Canal Company - owned and operated by Peel Ports Group, which has two shareholders - The Peel Group and Deutsche Asset Management, and;
- The Woolston New Cut Canal - owned by the Manchester Ship Canal Company.

These engineered systems are heavily controlled and are unlikely to respond in the same manner during periods of rainfall as natural watercourses. The probability of flooding is more associated with residual risks, such as overtopping of canal banks, breaching of embanked reaches or asset (e.g. gate) failure. Each canal also has significant interaction with other sources of flood risk, such as the main rivers and the minor watercourses that feed them, or drains that cross beneath them.

There are no assets owned or maintained by the Canal & Rivers Trust, formerly British Waterways, in the Warrington administrative area.

Warrington Borough Council has identified one historical flood event as a result of flooding from canals which resulted in significant harmful consequences. Details of this can be found in following Section 19 Report.

WAY MARKER 3.1

S19 report - Thelwall/Lymm Investigation Report

https://www.warrington.gov.uk/download/downloads/id/11115/s19_report_-_thelwalllymm_investigation_report.pdf

3.4. Future Flood Risk

Whilst analysis of past flooding provides valuable information on the nature and extents of flooding that have occurred in Warrington in the past, it does not necessarily inform about how and where flooding may occur in the future.

Predictions of future flood risk are produced using combinations of hydrological and hydraulic modelling and analysis of past hydrological records to make future predictions. The following sections of this strategy discuss the potential sources of flooding within Warrington. The following sources of flooding have been considered in subsequent sections of this report:

- Ordinary watercourses (fluvial);
- Surface water;
- Groundwater;
- Canals.

3.4.1. Surface Water Flooding

Since 2008, the Environment Agency has produced a series of surface water flood maps to aid local authorities in determining areas at risk of flooding. The latest incarnation of the maps is the Risk of Flooding from Surface Water (RoFSW) maps.

Environment Agency guidance on using surface water flood risk information recommends that Warrington Borough Council, as an LLFA, should: review, discuss, agree and record, with the Environment Agency, United Utilities, and other interested parties, what surface water flood data best represents their local conditions, known as “locally agreed surface water information”. Whilst this is not a requirement under the Regulations, it does inform the PFRA process as this information should play an important role in identifying FRAs.

Warrington Borough Council has agreed with all interested parties that the Risk of Flooding from Surface Water (RoFSW) mapping is the most appropriate dataset that represents the risk of flooding from surface water within Warrington at a high level. Further information to the limitations of this dataset is contained within Warrington PFRA 2017.

Figure 3.6: Extract of the Environment Agency’s Risk of Flooding from Surface Water Dataset (December 2013)

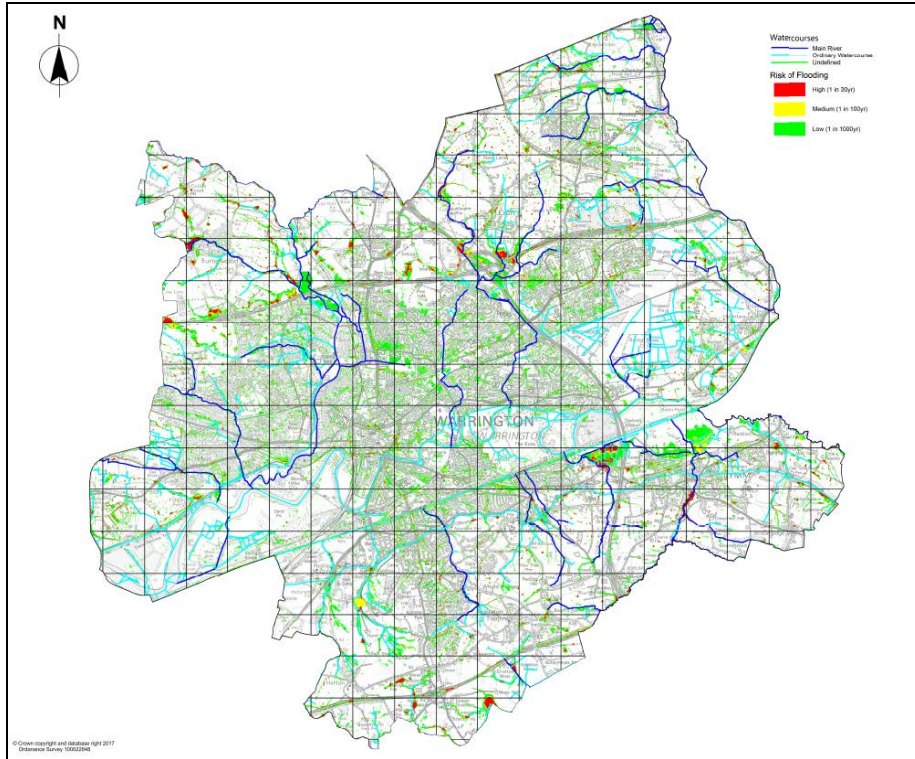


Table 3.5: Numbers of Properties Potentially at Risk from Surface Water Flooding in the Future

Property Type	Susceptibility to surface water flooding banding		
	Low	Medium	High
All	8,897	1,176	Not available
Residential	7,298	890	201*
Non-Residential	855	117	Not available
Key Services	142	25	Not available

* Property count information provided by the Environment Agency with the exception of high risk surface water banding.

3.4.2. Sewer Flooding

Hydraulic (1D) sewer models have been created which cover the majority of the sewerage network maintained by United Utilities. These have been verified against a flow survey to provide an accurate representation of network performance during both dry weather and storm conditions. A suite of design storm events of differing return periods, durations, and inclusive of the effects of climate change, are then applied to the models to assess hydraulic performance. The outputs include a range of predicted surcharge levels and flood volumes at individual node locations. Clusters of flooding nodes are then grouped based upon the common hydraulic deficiencies and/or geographic location and are checked against historical records to confirm existing flooding locations, as well as a tool to predict future flooding locations.

Whilst this data allows a high-level analysis of sewer flood risk, there are a number of limitations with the data:

- Not all sewer networks are modelled.
- Model confidence is low in sections of the network that were not covered by flow monitor during the survey period, or where conditions were too poor to record accurate data.
- The models are calibrated for a particular period and conditions the flow survey was installed and may not fully take into consideration the effects of seasonality.
- 1D models do not represent the flow path unlike 2D and Integrated Catchment Modelling (ICM) models. Predicted flood volume in 1D models departures and returns to the system at the same node location, in truth this may not be the case.
- Not all models accurately represent interaction watercourses at outfall locations. A number of 1D models are to be upgraded to include representation of watercourses, Integrated Catchment Modelling (ICM) which includes the 2D element, during the coming years. This will enable increased understanding of hydraulic interactions of all systems, in particular the operational performance of CSOs and flood routing paths of surfaces waters.

Figure 3.5 presents the historic sewer flooding information provided by United Utilities. There have been a total of 154 flooding incidents (113 external and 41 internal) across Warrington. These known flooding locations are coherent with predictions from the hydraulic sewer model, therefore providing confidence to sections of Warrington where flooding is predicted but has gone unreported.

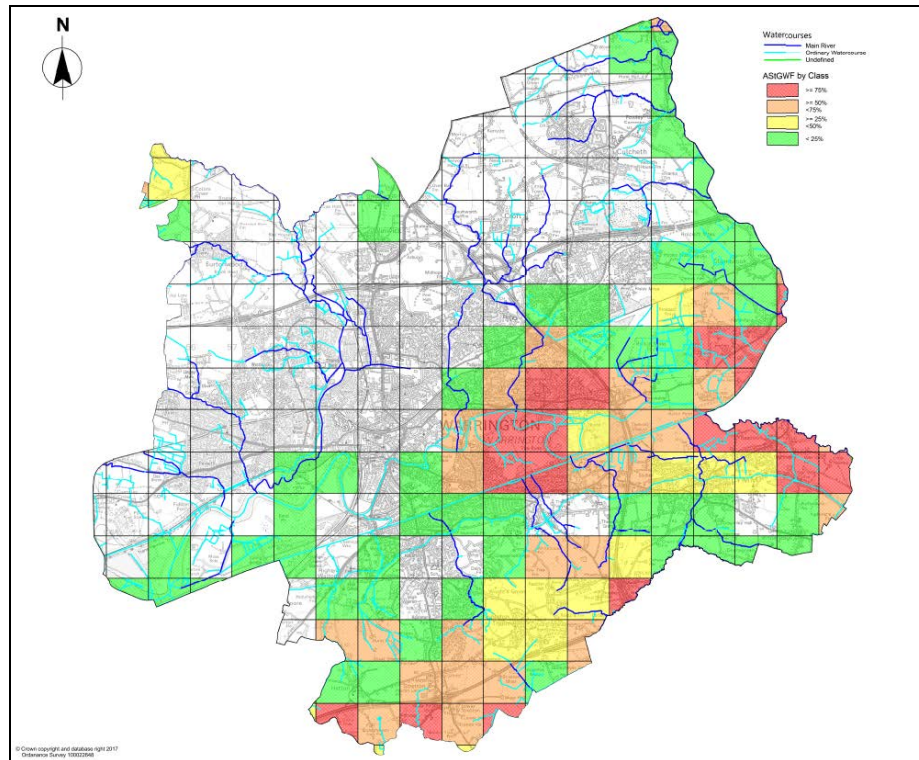
Based on information readily available on their website in their “Strategic Direction Statement” United Utilities are proposing to address a significant number of sewer flooding problems by 2020. Based on figures from 2015, this will include a 40% reduction to the number of properties experiencing internal foul flooding. This is to be achieved through investment in the completion of a number of studies and capital works projects.

3.4.3. Groundwater Flooding

The Environment Agency’s national dataset, Areas Susceptible to Groundwater Flooding (AStGWF) provides the main dataset used to assess the future risk of groundwater flooding.

The AStGWF map (Figure 3.7) uses four susceptible categories to show proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring. In common with the majority of datasets showing areas which may experience groundwater emergence, this dataset covers a large area of land, and only isolated locations within the overall susceptible area are actually likely to suffer the consequences of groundwater flooding. Unless an area identified as “susceptible to groundwater flooding” is also identified as “at risk from surface water flooding”, it is unlikely that this location would actually experience groundwater flooding to any appreciable depth, and therefore it is unlikely that the consequences of such flooding would be significant.

Figure 3.7: Extract of the Environment Agency's Areas Susceptible to Groundwater Flooding Dataset



The ASrGWF dataset was derived using the British Geological Society (BGS) 1:50,000 scale Groundwater Flood Susceptibility Map produced in 2010, utilising the top two susceptibility bands. Two hydrogeological conceptual models have been used in the development of the susceptibility dataset. These are:

- Permeable Superficial Deposit (PSD) flooding - Associated with shallow unconsolidated sedimentary aquifers which overlies non-aquifers. These aquifers are susceptible to flooding as the storage capacity is restricted. Direct rainfall recharge can be relatively high and the sediments may be very permeable thus creating a good hydraulic connection with adjacent watercourses. Intense rainfall can cause a rapid response in groundwater levels; rising river levels. As the upstream catchment responds to the rainfall, this can create increased heads that drive water into the aquifer.
- Clearwater flooding - caused by the water table in an unconfined aquifer rising above the land surface in response to extreme rainfall. Occurs when antecedent conditions of high groundwater levels and high unsaturated zone moisture content combine with intense rainfall.

The Groundwater Flood Susceptibility Map does not incorporate anomalous discharge from springs or flooding associated with urban groundwater rebound, mine water discharge, urban drainage, or any other flooding associated with changes in the engineered environment.

Figure 3.7 shows the AStGWF map and indicates that extensive areas in the eastern part of the borough are at risk from rising groundwater levels whilst Table 3.6 provides a breakdown of data. However, it is not backed up by historical evidence and high groundwater levels are known to exist in other areas not highlighted by the dataset.

Table 3.6: Properties at Risk of Groundwater Flooding

Flood Type and Class	Residential Properties	Non-Residential Properties	Critical Services	Totals
Clearwater	28,199	1,959	413	30,571
< 25%	15,348	959	202	16,509
>= 25% <50%	2,622	174	38	2,834
>= 50% <75%	4,946	511	109	5,566
>= 75%	5,283	315	64	5,662
Clearwater and Superficial Deposits Flooding	1,385	77	13	1,475
< 25%	126	13	1	140
>= 25% <50%	836	10	8	854
>= 50% <75%	23	6	1	30
>= 75%	400	48	3	451
Superficial Deposits Flooding	5,730	316	86	6,132
< 25%	3,688	89	41	3,818
>= 25% <50%	618	116	21	755
>= 50% <75%	754	62	13	829
>= 75%	670	49	11	730
Grand Total	35,314	2,352	512	38,178

As well as the national Groundwater Flood Map, there are a number of other national and more local datasets and studies which contain some details about possible groundwater flooding in Warrington.

The Environment Agency's CFMPs identified a number of locations in Warrington, including significant areas of the River Glaze and Sankey Brook that are at risk of groundwater flooding using Defra's Groundwater Study and Groundwater Emergence Maps (GEMs). These maps do not necessarily imply flooding of properties, only that groundwater would emerge at the surface first within the indicated areas.

The Environment Agency prepared the Lower Mersey and North Merseyside Water Resources Study in 2009 (Final Report 6588R4), which contains details about possible groundwater flooding in Warrington. As well as a number of locations outside of Warrington, the study focuses on areas surrounding the River Mersey, Glaze Brook and Sankey Brook where most groundwater would naturally discharge.

3.4.4. Ordinary Watercourses

There is at present no specific Borough wide modelling for ordinary watercourses, however the Environment Agency have produced Flood Zone Maps which shows the results of coarse modelling of catchments over 3km². The Environment Agency Flood Map does not provide information on flood depth, speed or volume of flow.

In order to better understand the risk of flooding from ordinary watercourse, Warrington Borough Council in 2012 commissioned JBA Consulting to assist the Council with development of an asset database and also to determine the flood risk associated with the assets collated.

JBA Consulting simulated flooding caused by 100% blockage scenario in pipes, culverts or bridges using JScreen software. JScreen defined the extent of flood, and analysed its consequences highlighting the different property types that are vulnerable to flood if a culvert or any other flood risk asset were to fail.

In 2014/15, Warrington Borough Council as part of the Cheshire Mid-Mersey Partnership (CMMP) undertook a project to improve the knowledge of flood risk from the ordinary watercourse network across the partnership area by undertaking asset inspections, topographical surveys and modelling works on ordinary watercourses which had been identified using the best available information at the time as potentially high risk. This project was considered to build upon the previous work completed by JBA due to the increase in collection of information.

CH2M Hill was appointed in November 2014 under the Water and Environment Management (WEM) Framework to undertake appropriate assessment of more than 30 km of non-main watercourse across the CMMP areas. Three separate surveys were outlined to capture the required data for the proposed study outputs:

- T98 Conditional Asset Assessment;
- CCTV survey;
- Topographical survey;

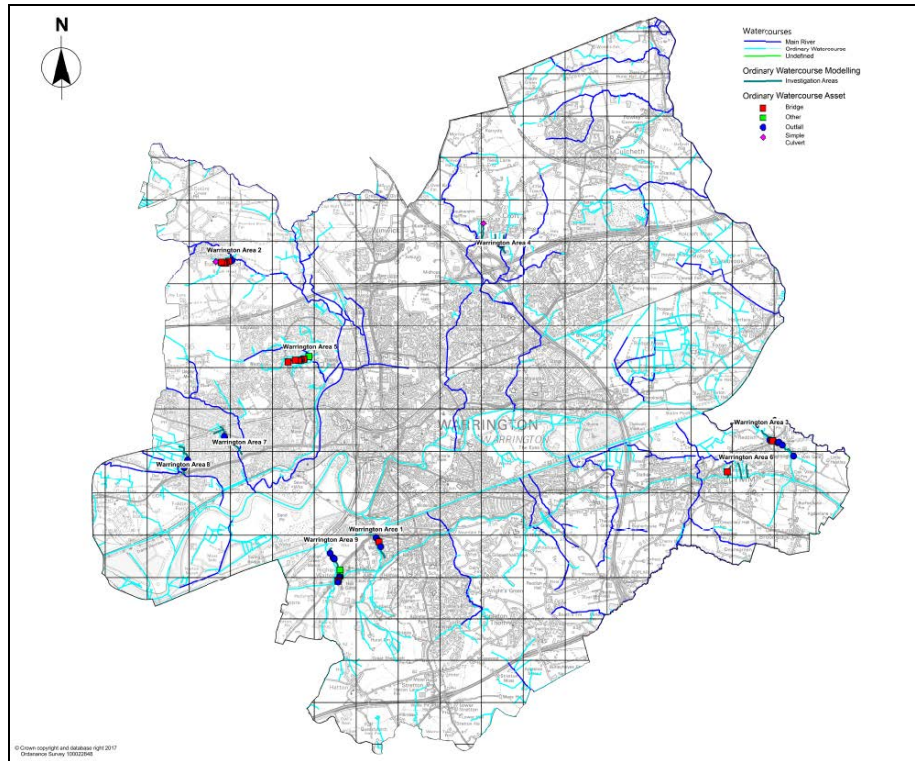
Catchment wide modelling and mapping was undertaken by CH2M following the completion of the survey investigations enabling visualisation of possible implications of events with return periods of 1 in 5 year, 1 in 30 year and 1 in 100 year. The modelled flood risk mapping represents the current situation of assets on the ground using the surveyed data to populate model data.

Model results have been used to produce depth grids, flood outlines and property counts based on properties from the Nation Receptor Database (NRD) to identify properties at risk.

The small size of the watercourses considered within this study means there were no observed flow data sets available, therefore best practice outlined by the Environment Agency was followed:

- Catchments delineated using GIS and FEH CDROM.
- Catchment descriptors from FEH CDROM used within ReFH analysis to calculate inflows for required return periods.

Figure 3.8: Extract of Ordinary Watercourse Model Outputs



Summary of property counts (locations extracted from NRD) within flood outline for modelled reach as part of CH2M Hill study are shown in Table 3.7.

Table 3.7: Numbers of Properties Potentially at Risk from Modelled Ordinary Watercourses Flooding in the Future

Location	Description	Property Count 1 in 5yr	Property Count 1 in 30yr	Property Count 1 in 100yr
Warrington Site 1	Lower Walton	4	4	4
Warrington Site 2	Burtonwood	21	23	26
Warrington Site 3	Heatley	0	10	32
Warrington Site 4	Croft	0	0	0
Warrington Site 5	Westbrook – Ladywood Road	8	10	12
Warrington Site 6	Lymm	47	53	60
Warrington Site 7	Penketh – Penketh High School	7	9	13
Warrington Site 8	Penketh - Stocks Lane	0	0	0
Warrington Site 9	Higher Walton	0	0	0
Total		87	109	147

Although it appears that flooding may occur at these sites, property counts do not achieve the threshold to be determined as having “significant harmful consequences”. Lymm (Warrington Site 6) is predicted to be the most vulnerable area within the administrative area of Warrington Borough Council.

Note – The River Mersey

The Environment Agency do not classify the reach of the River Mersey through Warrington as main river, as it is a heavily modified river system as extensive re-sectioning and embankment works were carried out in the 1960s. Although not classified as a main river, the Environment Agency does manage the river. The River Mersey and its five main tributaries form the focus of the Environment Agency's Flood Risk Management Strategy for Warrington.

3.4.5. Interaction with Main Rivers

The Flood Map for Planning (Rivers and Sea) dataset is designed to support flood risk assessments in line with Planning Practice Guidance; and raise awareness of the likelihood of flooding to encourage people living and working in areas prone to flooding to find out more and take appropriate action. The information provided is based on modelled data and is therefore indicative rather than specific. Locations may also be at risk from other sources of flooding, such as high groundwater levels, overland run off from heavy rain, or failure of infrastructure such as sewers and surface water systems.

The Flood Map for Planning (Rivers and Sea) does not provide information on flood depth, speed or volume of flow. It doesn't show flooding from other sources, such as groundwater, direct runoff from fields, or overflowing sewers.

The Environment Agency updates the data every three months. The data is released as a whole dataset quarterly, but only update it in locations where new information is available.

The Flood Map for Planning (Rivers and Sea) only shows the predicted likelihood of flooding from rivers or the sea for defined areas, and is not detailed enough to account for precise addresses. Individual properties therefore may not always face the same chance of flooding as the areas that surround them.

The flood zones do not take into account the possible impacts of climate change and consequent changes in the future probability of flooding.

Figure 3.10: Extract of Environment Agency Flood Map for Planning

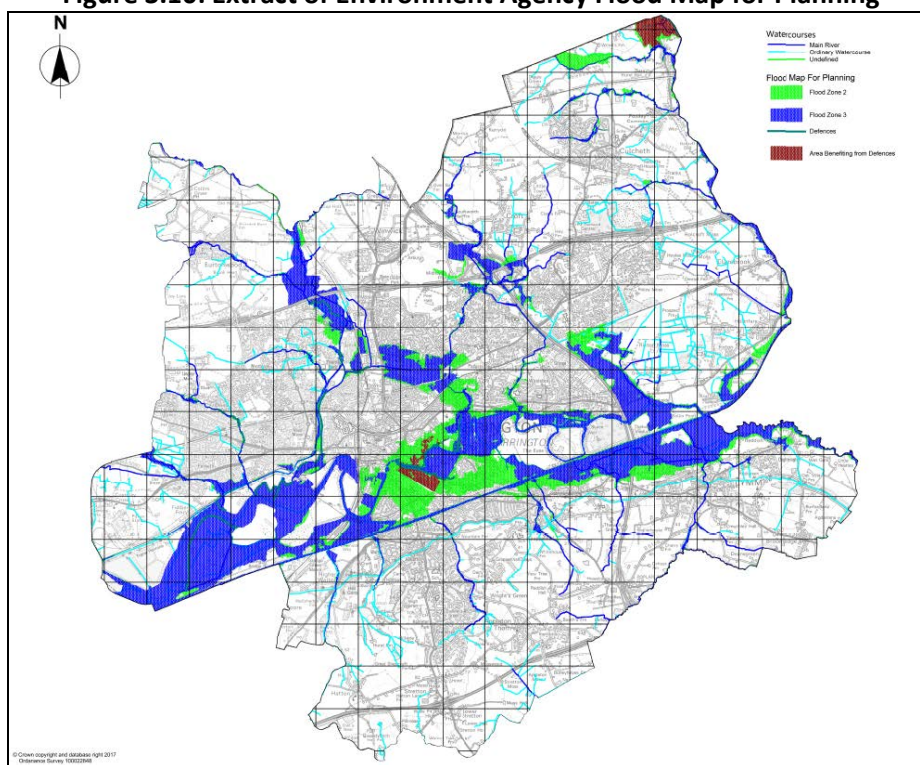


Table 3.8: Flood Zone Definition

Flood Zone	Definition
1 – Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding (all land outside Zones 2 and 3)
2 – Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
3a – High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding
3b – The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 3.9: Features at Risk within Flood Zones 2 and 3

Classification	Flood Zone 3	Flood Zone 2	Absolute Increase
Camping	0	0	0
Car Park	1	5	4
Education	13	34	21
Electrical Asset	64	163	99
Emergency Service	1	1	0
Forces	0	1	1
Health	6	14	8
Hotel	1	1	0
Industry	236	400	164
Leisure and Sport	11	21	10
Miscellaneous	672	1,461	789
Offices	132	305	173
Prison	0	0	0
Public Building	11	78	67
Residential	5,705	15,681	9,976
<i>Detached</i>	547	1,347	800
<i>Flat</i>	656	2,601	1,945
<i>Semi Detached</i>	2,823	7,040	4,217
<i>Terraced</i>	1,562	4,497	2,935
<i>Unclassified</i>	117	196	79
Residential Home	6	9	3
Retail	124	399	275
Sport	21	35	14
United Utilities	2	2	0
Warehouses	75	174	99
Grand Total*	6,409	17,323	10,914

*Excludes "Miscellaneous" features, e.g. Street Record, Property Shell, etc.

Table 3.10: Absolute increase of features in Flood Zones 2 and 3

Classification	Flood Zone 3	Flood Zone 2	Number of people at Risk*			
			Flood Zone 3	Flood Zone 2	Absolute increase between Flood Zone 3 and 2	Percentage increase in people at risk
Residential	5,705	15,681	13,122	36,066	22,945	175%
Non-Residential**	602	1,406	-	-	-	-
Critical Services**	102	236	-	-	-	-

*Average population per household within Warrington is 2.30, national average is 2.34.

**Excludes “Miscellaneous” features, e.g. Street Record, Property Shell, etc.

*** Critical services are defined by the Environment Agency as:

- Schools;
- Police Stations/Prisons;
- Nursing/Care/Retirement Homes;
- Fire Stations/Ambulance Stations/Hospitals;
- Electricity Installations/Sewage Treatment Works.

3.4.6. Canals

The Environment Agency’s Flood Zone Mapping includes flood risk from the Manchester Ship Canal. Due to the Ship Canal being such a large body of water which is fed directly by main rivers it is not considered to be a ‘local’ flood issue. Warrington has and continues to benefit from the Manchester Ship Canal which transfers a significant flow of water past Warrington and reduces the risk of fluvial flooding along the River Mersey.

Despite the construction of the Manchester Ship Canal, the River Mersey is at potential risk of tidal flooding, with the most significant recent flood events occurring in February 1990 and October/November 2000. Any mitigation for this risk and interactions between the canal and the main rivers is being managed by the Environment Agency.

The Environment Agency therefore provides a major role in management of the flood risks from the canal and its interactions with the River Mersey.

At present the flood mapping of the Manchester Ship Canal in Warrington may be subject to revision as a result of further work needed to establish the level of risk if any from the Manchester Ship Canal and this is being led by the Environment Agency.

3.5. Climate Change and Long Term Development

Generally, preliminary assessment reports in 2011 described only the broad implications of climate change at river basin district level, based on UK Climate Projections, 2009 (UKCP09).

WAY MARKER 3.2

UK Climate Projections

<http://ukclimateprojections.metoffice.gov.uk/>

The next set of climate projections is due in 2018 (UKCP18). Until then UKCP09 is still a valid tool to aid decision-makers to assess the full range of risks from the changing climate and advise to adapt.

3.5.1. Initial Review

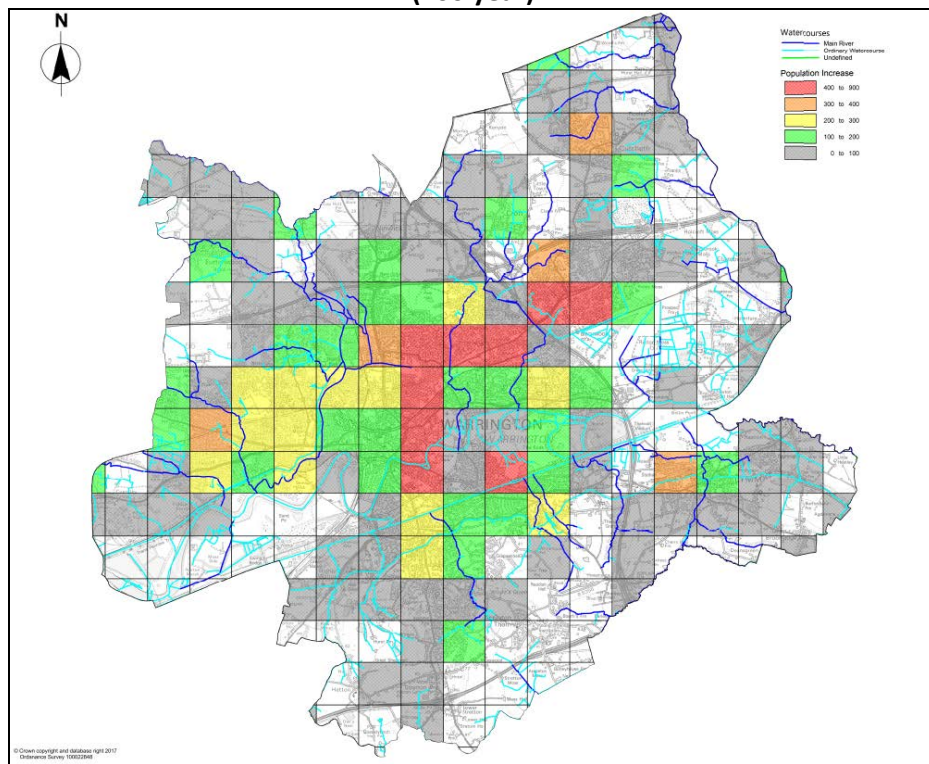
Whilst a significant amount of work has been completed since the introduction of the PFRA in 2011 it is still recognised that the implications of climate change for local flood risk are still not well understood.

For the 2017 PFRA review, the Environment Agency have carried out a simple analysis at the national level to compare the number of people at risk from surface water flooding for a rainfall event with a 1% chance (1 in 100 year return period) of occurring in any year with the number at risk from an event with a 0.1% chance (1 in 1000 year return period) of occurring in any year. The numbers of people at risk are counted per 1 kilometre grid square across England. The

resulting 'heat map' shows how the absolute number of people at risk increases between these two rainfall events for each 1km grid square.

This method is not based on climate projections, and it does not account for future population growth. It does provide a simple way, however, of identifying areas that could be susceptible to increased rainfall intensity as a proxy for climate change. It is a reasonable proxy for an upper end climate change scenario for the end of the century, both in the pattern of change across the country and the percentage increase in intensity compared to the current climate. Figure 3.11 shows an extract from the 'heat map'. Red and orange squares indicate the highest increase in numbers of people at risk, and green and grey indicate lower increases.

Figure 3.11: Extract from the 'heat map' illustrating absolute increase in numbers of people at risk from surface water flooding for a 0.1% (1000 year) rainfall event compared to a 1% event (100 year)

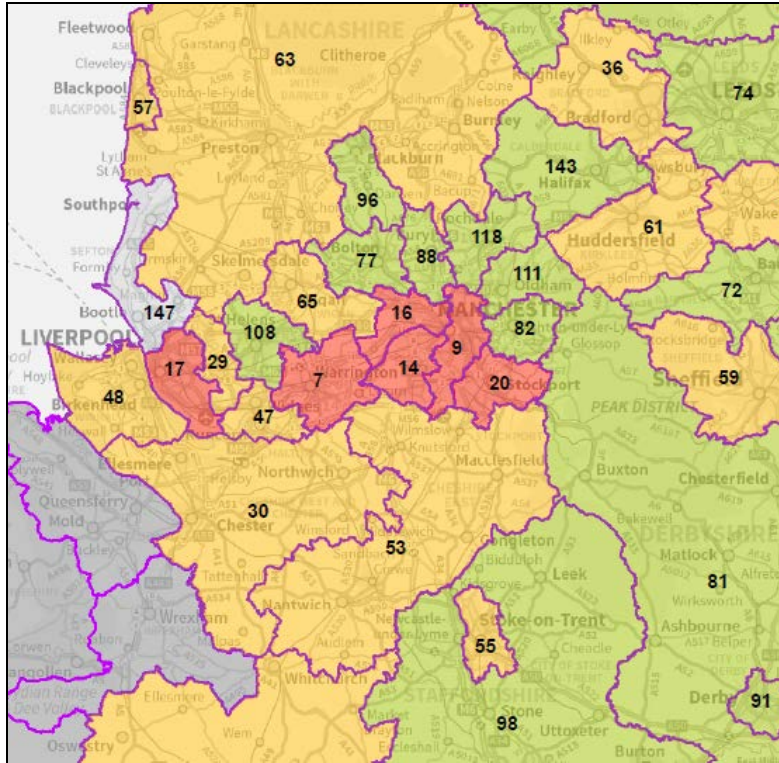


This 'heat map' provides an initial understanding of how climate change may affect local flood risk in the future, and helpful when considering the indicative FRAs as part of the PFRA review. At the national scale the administrative area of Warrington Borough Council is positioned 7th out of 152 LLFAs when reviewing the percentage increase in people at risk of flooding in LLFAs for the 0.1% rainfall event compared with the 1% event.

Table 3.11: Absolute and percentage Increase in the number of people at risk of flooding by LLFA for 0.1% (1000 year) rainfall event compared with 1% (100 year) event

Rank	LLFA Name	Residential properties (1 in 100 year)	Residential properties (1 in 1000 year)	Non-residential properties (1 in 100 year)	Non-residential properties (1 in 1000 year)	Number of People (1 in 100 year)	Number of People (1 in 1000 year)	Absolute increase between 1 in 100 and 1 in 1000 year	Percentage increase in people at risk
1	City of Portsmouth (B)	392	5,452	98	617	917	12,758	11,841	1291
2	Newham London Boro	1,463	14,514	109	1,154	3,423	33,963	30,540	892
3	North East Lincolnshire (B)	1,021	9,874	71	688	2,389	23,105	20,716	867
4	City of Peterborough (B)	845	7,369	246	1,144	1,977	17,243	15,266	772
5	York (B)	520	4,530	33	340	1,217	10,600	9,383	771
6	Merton London Boro	1,777	15,077	201	1,056	4,158	35,280	31,122	748
7	Warrington (B)	890	7,298	117	855	2,083	17,077	14,994	720
8	Tower Hamlets London Boro	2,133	16,405	233	1,686	4,991	38,388	33,397	669
9	Manchester District (B)	2,151	15,865	271	1,985	5,033	37,124	32,091	638
10	Barking and Dagenham London Boro	918	6,371	124	645	2,148	14,908	12,760	594

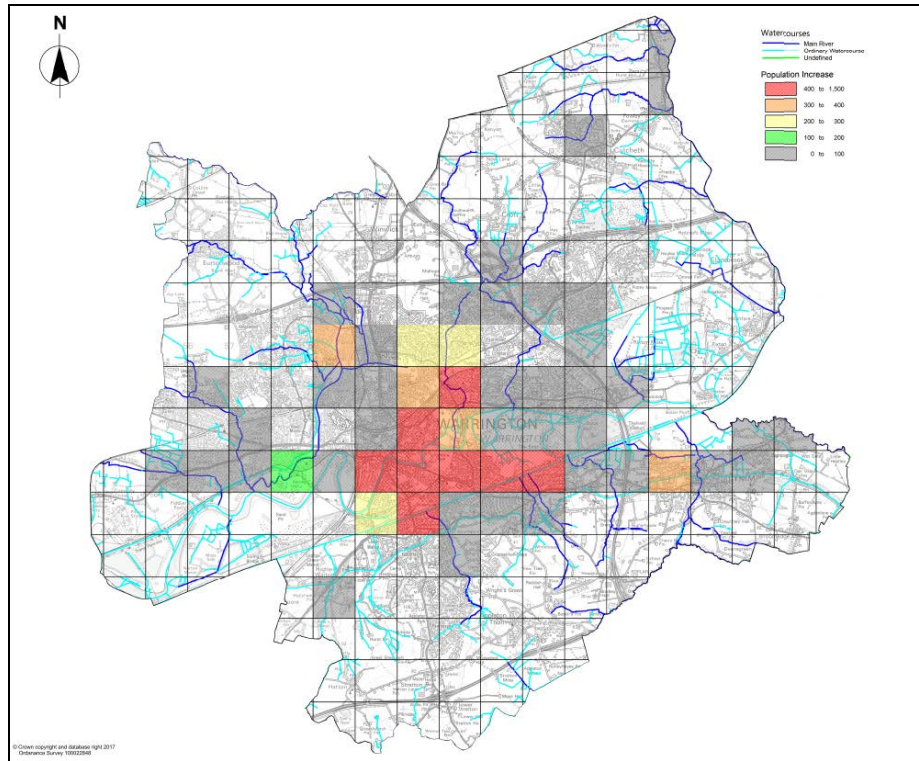
Figure 3.12: Extract from percentage increase in the number of people at risk of flooding by LLFA for 0.1% (1000 year) rainfall event compared with 1% (100 year) event.



*Label in LLFA boundary indicates the rank of the LLFA in order of largest to smallest percentage increase in number of people at risk.

Whilst indicative, the method applied for the PFRA may also be utilised to provide a heat map based on the information contained within the Flood Map for Planning (Rivers and Sea) dataset for the area of Warrington only.

Figure 3.13: 'Heat map' illustrating absolute increase in numbers of people at risk from flooding from Rivers and Sea (Difference between Flood Zones 2 and 3).



Utilising the available data this has enabled Warrington Borough Council to overall rank which wards are most vulnerable to flooding.

Table 3.12: Rank of Percentage of Population at Risk of Flooding by Ward Area

Ward	Rank of Percentage of Population at Risk of Flooding					Average Rank	Overall Rank
	Surface Water	Flood Zone 2	Flood Zone 3	AStGWF	Sewer Network		
Lymm North & Thelwall	2	5	3	4	Sensitive modelling information not available to general public	3.50	1
Latchford East	16	1	9	1		6.75	2
Rixton & Woolston	10	8	8	1		6.75	2
Great Sankey South	5	9	4	12		7.50	4
Latchford West	19	2	1	8		7.50	4
Poulton South	22	3	7	3		8.75	6
Fairfield & Howley	13	4	6	13		9.00	7
Orford	12	6	2	18		9.50	8
Culcheth, Glazebury & Croft	3	13	12	14		10.50	9
Grappenhall	9	16	16	6		11.75	10
Penketh & Cuerdley	7	12	10	18		11.75	10
Stockton Heath	11	15	15	7		12.00	12
Burtonwood & Winwick	1	18	17	15		12.75	13
Bewsey & Whitecross	20	10	5	17		13.00	14
Poulton North	14	14	13	11		13.00	14
Lymm South	6	21	21	5		13.25	16
Poplars & Hulme	15	11	11	16		13.25	16
Appleton	4	20	20	10		13.50	18
Birchwood	8	19	19	9		13.75	19
Westbrook	21	7	14	18		15.00	20
Great Sankey North & Whittle Hall	18	17	18	18		17.75	21
Chapel Ford & Old Hall	17	21	21	18		19.25	22

3.5.2. The Impacts of Climate Change – Future Flood Risk

Over the past century around the UK sea level rises have occurred and more of our winter rain falls in intense wet spells. Seasonal rainfall is highly variable. It seems to have decreased in summer and increased in winter, although winter amounts changed little in the last 50 years. Some of the changes might reflect natural variation; however the broad trends are in line with projections from climate models.

Greenhouse gas (GHG) levels in the atmosphere are likely to cause higher winter rainfall in future. Past GHG emissions mean some climate change is inevitable in the next 20-30 years.

Lower emissions could reduce the amount of climate change further into the future, but changes are still projected at least as far ahead as the 2080's.

There is enough confidence in large scale climate models to say that Warrington Borough Council and the UK must plan for change. There is more uncertainty at a local scale but model results can still help to plan to adapt. For example it is now understood that rain storms may become more intense, even though there are still uncertainties about exactly where or when. By the 2080s, the latest UK climate projections (UKCP09) are that there could be around three times as many days in winter with heavy rainfall (defined as more than 25mm in a day). It is plausible that the amount of rain in extreme storms (with a 1 in 5 annual chance or rarer) could increase locally by 40%.

Increased rainfall affects river levels and land and urban drainage systems. Table 3.13 shows anticipated changes in extreme rainfall intensity in small and urban catchments.

Table 3.13: Peak rainfall intensity allowance in small and urban catchments

Changes to extreme rainfall intensity compared to a 1961 – 90 baseline applied to:	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
North West England			
Upper end estimate	25%	35%	65%
Change factor	15%	25%	30%
Lower end estimate	5%	10%	10%
All of England			
Upper end estimate	10%	20%	40%
Change factor	5%	10%	20%
Lower end estimate	0%	4%	10%

Warrington Borough Council will prepare by endeavouring to understand current and future vulnerability to flooding, developing plans for increased resilience and building the capacity to adapt. Regular review and adherence to these plans is critical to achieving long-term, sustainable benefits which protect our communities and ensure business continuity. Warrington Borough Council will continue to monitor and correlate weather patterns to increase our understanding and response to extreme weather events.

3.5.3. Improving Risk Understanding

Warrington Borough Council will continue to monitor flood events in tandem with the Environment Agency/Met Office forecasts, main river gauge records, rainfall data and actual flood extents compared to predictive mapping. This combination of analysis will over time allow to:

- Refine risk models;
- Monitor recorded flood incidents;
- Implement residual risk management measures;
- Improve and localise community advice and response, and;
- Seek to share Environment Agency telemetry data for analysis and improved warnings at a more local level.

4 Objective 3: Managing Local Flood Risk

What this section will cover:

- Flood risk management functions.
- Sustainable Drainage Systems (SuDS).
- Collaborative working.

Warrington Borough Council, as the Lead Local Flood Risk Authority, will coordinate and manage flood risk and where appropriate reduce the risk and consequences of flooding through a range of activities, across internal departments and external partners.

4.1. Community Focus, Partnership Working and Encouraging Community Resilience

People who live and work in flood risk areas have a critical role in managing the risks they and their communities face. Warrington Borough Council and other risk management authorities will support this role.

4.1.1. Responsibilities

Communities and individuals in areas at risk of flooding should take responsibility for understanding the risks and, where appropriate, take steps to protect themselves. For example:

- Signing up to the Environment Agency's flood warning system in the designated areas;
- Preparing a flood plan for their household or business;
- Creating or joining a local flood action group;
- Taking steps to protect their property and others (for example, where they own land adjoining ordinary watercourses and have maintenance responsibilities).

Riparian owners have responsibilities for maintaining watercourses so that they are free of obstructions and able to transmit flows downstream without putting other properties at risk.

Further details are available in the Environment Agency's publication 'Living on the Edge'.

WAY MARKER 4.1

Environment Agency: Living on the Edge
<https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities>

4.1.2. Partnering

Warrington Borough Council will work with partners to make communities and individuals more aware of flood risks. The aim of this is to help communities to participate as far as possible in Local Flood Risk Management. To do this, Warrington Borough Council will work with partners to publish up to date information on risks and liaise with those groups who may be better placed to provide links with communities.

4.1.3. Communities

Communities at risk, led by Warrington Borough Council, will plan for the future and take appropriate steps to adapt to changing flood risks. Defra, the Environment Agency, Warrington Borough Council and others will support communities by working with them to:

- Develop an understanding of how they can adapt to change;
- Identify the costs and benefits of different approaches;
- Providing practical approaches and examples that can be shared.

In particular, these will focus on adaptation, planning, engagement and implementing long term innovative solutions with multiple benefits.

4.1.4. Householders

Householders and businesses at flood risk should take appropriate steps to better protect their properties through property-level resistance and resilience measures. Warrington Borough Council will support this work by raising awareness and understanding, and in some cases supporting the wider up-take of flood resistance and resilience measures to reduce damage to buildings.

When flooding does occur, Warrington Borough Council will provide advice and liaise with specialist groups such as the National Flood Forum to aid recovery.

WAY MARKER 4.2

National Flood Forum

www.nationalfloodforum.org.uk

4.1.5. Publicity

Warrington Borough Council will publicise the importance of insurance as a means of protection. Affordable and widely available flood insurance is a means of sharing the risk between individuals, businesses, and insurance companies.

Flood risk has long been included as standard in most building and contents insurance policies. The Government and insurance industry both aim to support the wide availability of insurance beyond the expiry of the Statement of Principles in 2013, whilst recognising that policy terms are likely to reflect. Flood RE, created in April 2016, which replaced the Statement of Principles agreed between the government and insurance companies to provide flood insurance coverage to domestic properties deemed at significant risk of flooding (1.3% or 1 in 75 annual probability of flooding).

WAY MARKER 4.3

Association of British Insurers - Flooding

<https://www.abi.org.uk/products-and-issues/topics-and-issues/flooding/>

Flood RE

<http://www.floodre.co.uk/>

Further information can be obtained from the Association of British Insurers and Flood RE websites.

4.1.6. Localism Act 2011

The Localism Act 2011 aims to facilitate the devolution of decision-making powers from central government control to individuals and communities.

WAY MARKER 4.4

Localism Act 2011

<http://www.legislation.gov.uk/ukpga/2011/20/contents/enacted>

The main measures of the Act include:

- New freedoms and flexibilities for local government;
- New rights and powers for communities and individuals;
- Reform to make the planning system more democratic and more effective;
- Reform to ensure that decisions about housing are taken locally.

The Localism Act 2011 identifies a duty to cooperate in joint planning, in particular where sustainable development or use of land that has or would have a significant impact on at least two planning areas and therefore cannot be addressed by a single authority.

The priority given to any strategic issues will be dependent on local circumstances. However this may include consideration of infrastructure, greenbelt land at sites of special scientific interest.

4.2. Spatial Planning

4.2.1. Planning Policy

Spatial planning is fundamental to reducing flood risk in the Warrington area. Spatial planning is the responsibility of Warrington Borough Council as the Local Planning Authority (LPA). It therefore allows for close working arrangements with the Council's other statutory functions as the LLFA.

The Planning and Compulsory Purchase Act 2004, Localism Act 2011, and accompanying regulations require LPAs to produce spatial plans in the form of Local Planning Frameworks. These documents will form the statutory development plans against which planning applications must be determined, unless material considerations indicate otherwise.

Warrington Borough Council is currently in the process of reviewing the Local Plan to replace the adopted Local Core Strategy (2014). As part of this process, but not exclusively, the vision and objectives and Policy QE 4 will be assessed to ensure they meet the needs of the Borough and conform to National Planning Policy Framework 2012. Until then the Local Core Strategy (2014) remains valid.

Spatial planning creates a policy framework within which all those engaged in the planning process can actively contribute to a more sustainable approach to managing flood risk. This will provide opportunities to:

- Adopt a catchment-wide approach.
- Develop integrated sustainable developments, which deliver multiple benefits.
- Factor flood risk into planning decisions from the outset of the spatial planning process.

- Develop local authority, developer and community-led initiatives to reduce flood risk/enhance the environment.
- Ensure that both the direct/cumulative impacts of development on flood risk are acknowledged and mitigated.
- Ensure that decisions fully consider the implications of climate change and provide greater clarity and certainty to developers regarding which sites are suitable for developments of different types.

Policy QE4 of the adopted Local Plan Core Strategy sets out the Councils approach regarding flood risk for new developments.

Figure 4.1: Policy QE4 of Warrington Borough Council Local Plan Core Strategy 2014

Policy QE 4

Flood Risk

The Council will only support development proposals where the risk of flooding has been fully assessed and justified by an agreed Flood Risk Assessment.

A site specific Flood Risk Assessment is required for:

- Proposals of 1 hectare or greater in Flood Zone 1 and Critical Drainage Areas as defined by the SFRA and;
- All proposals for new development in Flood Risk Zones 2 and 3, and;
- Proposed minor development or change of use in Flood Risk Zones 2 and 3 where a more vulnerable use may be susceptible to other sources of flooding.

The Flood Risk Assessment should also address, if required, the sequential and exceptions tests as set out in National Planning Policy.

Where the sequential and exception tests are satisfied, the Council will require development proposals to:

- Provide safe and clear access and egress routes in the event of a flood;
- Manage surface water run-off to ensure that flood risk is not increased and that a reduction of at least 30% will be sought on previously developed land, rising to a minimum of 50% in Critical Drainage Areas or in areas susceptible to intermediate or high risk surface water flooding;
- Use Sustainable Drainage Systems that incorporate natural drainage, rather than using traditional piped systems in new developments unless it can be demonstrated that such techniques are impractical or would present an unacceptable pollution risk;
- Provide compensatory storage where development is proposed in undefended areas of the floodplain;
- Ensure that the layout and design of a site is considered to provide the opportunity to provide flood resilience measures and reduce flood risk within the development;
- Apply a sequential approach at a site level to minimise risk by directing the most

- vulnerable development to areas of lowest risk;
- Avoid the use of culverting and building over watercourses and where practical to re-open existing culverts;
- Ensure that appropriate mitigation is included within the design of the development to make it safe for the future users of the site without adversely affecting others;
- Ensure that developers have considered the impacts of climate change to ensure that the future users of the development are not put at additional danger of flooding, which may be exacerbated by climate change over the lifetime of the development.

In addition, in areas identified by the Council as being at intermediate and high risk of surface water flooding, development proposals that are greater than 0.5 hectares should be supported by a Flood Risk Assessment which considers information in Warrington's Strategic Flood Risk Assessment and Preliminary Flood Risk Assessment to demonstrate that the development;

- Is not at risk from existing drainage systems or overland flows;
- Will make a positive contribution to managing or mitigating flood risk;
- Will not adversely affect existing flooding conditions.

In respect of flood risk the following documents will inform the Local Planning Framework:

- Warrington Surface Water Management Plan (SWMP) 2012;
- Mersey Estuary Catchment Management Plan (CFMP) 2009;
- Strategic Flood Risk Assessment Level 2 (SFRA Level 2);
- Mid Mersey Water Cycle Strategy Study 2011;
- National Planning Policy Framework (NPPF) 2012.

4.2.2. Surface Water Mapping and Land Use Considerations

The Environment Agency advises that LPAs and developers should carry out assessments of surface water flooding in line with National Planning Policy Framework (NPPF) 2012.

Since 2008, the Environment Agency has produced a series of surface water flood maps to aid local authorities in determining areas at risk of flooding. The latest incarnation of the maps is the Risk of Flooding from Surface Water (RoFSW) maps.

Environment Agency guidance on using surface water flood risk information recommends that Warrington Borough Council, as an LLFA, should: review, discuss, agree and record, with the Environment Agency, United Utilities, and other interested parties, what surface water flood data best represents their local conditions, known as "locally agreed surface water information". The mapping has been reviewed against local historic data and local knowledge. Warrington Borough Council has agreed with all interested parties that the RoFSW mapping is the most appropriate dataset that represents the risk of flooding from surface water within the Warrington area at a high level.

The Environment Agency's RoFSW mapping is not appropriate to use as the sole evidence for any specific planning decision, at any scale, without further supporting studies or evidence. The

RoFSW will act as a starting point to highlight areas where the potential for surface water flooding needs particular assessment and review.

The output from these assessments can then be used to inform development allocations within the local development plan and outline the requirements for site level flood risk assessments to be carried out by developers.

The LPA is required to appraise risk, manage risk and reduce risk using a partnership approach. Risk appraisal entails:

- Identifying land at risk;
- Assessing the degree of risk of flooding from river, sea and other sources;
- Preparing Strategic Flood Risk Assessments (SFRA's) as freestanding assessments that contribute to the sustainability appraisals of Development Plan Documents (DPDs).

The Sequential Test advised by the NPPF Guidance Document is used by Warrington Borough Council in allocating sites for development, or determining planning applications. This is set out by Policy QE4 of Warrington Borough Council Local Plan Core Strategy 2014 (Figure 4.1). In using the sequential test, sites are "zoned" in order of preference according to the flood risk probability, identified by the SFRA. Appropriate land uses for each flood zone are also listed to provide guidance for LPA's when they are considering appropriate use of sites within each zone.

Strategic development will be approached through planning, appropriate design, situation and location of future development, all of which can contribute to reducing the risk of flooding, including:

- Application of SuDS techniques with new developments;
- Application of property and location-specific flood protection measures;
- Reference to the LLFA developments affecting ordinary watercourses;
- Planning enforcement in respect of unauthorised development undertaken in liaison with the LLFA;
- Identify river corridors and the natural flood plain to provide potential riverside storage and urban river corridors in built up areas.

4.3. Sustainable Drainage Systems (SuDS)

Flood and Water Management Act 2010:

Section 27: Sustainable Development

In exercising a flood or coastal erosion risk management function, an authority listed in subsection (3) must aim to make a contribution towards the achievement of sustainable development.

Schedule 3 – “Sustainable Drainage”

2 “sustainable drainage” means managing rainwater (including snow and other precipitation) with the aim of –

- (a) reducing damage from flooding,*
- (b) improving water quality,*
- (c) protecting and improving the environment.*
- (d) protecting health and safety, and*
- (e) ensuring the stability and durability of drainage systems.*

Approaches to managing surface water which take account of water quantity, water quality, public amenity and biodiversity issues are collectively referred to as Sustainable Drainage Systems (SuDS).

Conventional drainage systems employ underground pipe networks which prevent localised flooding by conveying water away as quickly as possible; they are only effective at managing water quantity (flows and volumes). SuDS are able to manage surface water flows and volumes in open features on the ground surface, whilst also providing benefits to water quality, public amenity and biodiversity. These systems are more sustainable than conventional drainage methods because they:

- Manage runoff volumes and flow rates, reducing the impact of urbanisation on flooding;
- Protect or enhance water quality;
- Are sympathetic to the environmental setting and the needs of the local community;
- Provide a habitat for wildlife in urban watercourses.

Under Schedule 3 of FWMA 2010, LLFAs were to be required to establish a SuDS Approval Body (SAB) which would have required Warrington Borough Council to approve, adopt and maintain SuDS features in new developments. In December 2014, the Government announced that Schedule 3 would not be enacted because SuDS would be dealt with by strengthening existing planning policy instead. This change, which took effect in April 2015, required LPAs to make the final decision about the suitability of the SuDS provision on new developments and whether it is proportionate to the level of flood risk affecting the site. These changes are set out in Paragraph 103 of the NPPF and are supported by Defra’s Non-Statutory Technical Standards for SuDS; consequently Schedule 3 in the FWMA 2010 is currently lying ‘dormant’.

Warrington Borough Council is, at present, not required to establish a SAB. The Council is a statutory consultee for major developments which have surface water implications. This responsibility requires Warrington Borough Council to provide comments in relation to surface water drainage aspects of planning applications, usually within 21 days.

In considering planning applications, the LPA should:

- Consult the relevant LLFA on the management of surface water;
- Satisfy themselves that the proposed minimum standards of operation are appropriate;
- Ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.

Warrington Borough Council has produced a SuDS Guidance document. This guidance is primarily aimed at Developers, to identify the information that they need to provide to enable the assessment of SuDS proposals by Warrington Borough Council as LLFA and other Statutory Consultees. Providing both design and technical guidance, the document is intended to provide a standardised approach to the selection of appropriate SuDS and identify the information that the Developer is required to provide to enable the Local Authority and Statutory Consultees to effectively review planning applications.

WAY MARKER 4.5

Sustainable Drainage Systems (SuDS) Guidance

https://www.warrington.gov.uk/info/201080/streets_and_transport/2037/floodin g

4.4. Watercourse Regulation: Enforcement and Consenting Powers

The following changes in legislation give administrative powers to the Lead Local Flood Authority:

Schedule 2, paragraph 30 of FWMA 2010 repeals Section 17 of the Land Drainage Act 1991.
Requires Local Authorities to exercise their powers in accordance with their local FRM strategy.

Schedule 2 paragraph 32 (6) of FWMA 2010 amends Section 23 of the Land Drainage Act 1991.
The Environment Agency's role as a drainage board for ordinary watercourses outside an internal drainage district is taken over by Lead Local Flood Authorities.

Schedule 2, paragraph 33 of FWMA 2010 amends Section 25 of the Land Drainage Act 1991.
Give the powers of the Environment Agency to Lead Local Flood Authorities.

'Regulation' is the management of any activity that has the potential to create obstructions to flow in watercourses and comprises two key activities:

- Consenting of works (including any temporary works) before they are constructed, and;
- Enforcement actions to bring about the remediation of any unconsented or unacceptable work or the removal of obstructions.

Any work that is carried out without consent has the potential to increase flood risk to people and property, including those unconnected with the works. Consenting by LLFAs is undertaken through the use of powers under sections 23, 24 and 25 of the Land Drainage Act 1991.

No person shall obstruct the flows in a watercourse under Section 23 of the Land Drainage Act 1991.

No person shall erect any obstruction or culvert in any ordinary watercourse that would be likely to affect flow of any ordinary watercourse without the written consent of the Local Authority.

An application fee of £50 is required and consent will not be unreasonably withheld.

A notice shall be produced under Section 24 if any person fails to comply with Section 23 of the Land Drainage Act 1991.

If any persons acts in contravention of, or fails to comply with, any notice served a fine shall be issued not exceeding level 5 on the standard scale and, if failure to continue after conviction, to further fine not exceeding £40 for every day on which the contravention or failure is so continued.

Failure to comply the Local Authority may, without prejudice to any proceedings, take such actions as may be necessary to remedy the effect of the contravention or failure, and recover the expenses reasonably incurred by the person.

Powers to require works for maintaining flow of watercourse are contained in Section 25 of the Land Drainage Act 1991.

If the proper flow of water in an ordinary watercourse is impeded then the Local Authority concerned may, by serving a notice under Section 25 require that person to remedy that condition.

Before exercising their powers under Section 25 the Local Authority shall, under Section 26, notify either the drainage board for that district or the Environment Agency.

4.4.1. Procedure

Formal consents will be approved and issued by the Engineering and Flood Risk Management Team. Typical conditions will be used to ensure that works are carried out responsibly and within a given time frame. Warrington Borough Council have consulted with the Environment Agency and adapted existing procedures to suit the needs of the Council. Works will eventually be recorded onto GIS and the asset database.

The Environment Agency will retain an overview role and LLFAs must consult the Environment Agency when they are consenting work that they are themselves proposing to minimise the potential for conflict of interest.

WAY MARKER 4.6

Warrington Borough Council – Consent form application guidance notes

https://www.warrington.gov.uk/downloads/id/11027/consent_form_application_guidance_notes.pdf

Warrington Borough Council – Consent form application

https://www.warrington.gov.uk/downloads/id/11026/consent_form_application.pdf

Environment Agency – Consent Information

<https://www.gov.uk/permission-work-on-river-flood-sea-defence>

4.4.2. Local Byelaws

The purpose of these are to apply detail to the Enforcement and Consenting powers to ensure the basic powers within the Land Drainage Act 1991 are strengthened and provide effective flood risk action at the local level.

WAY MARKER 4.7

Guidance – Local Government

Legislation: Byelaws

<https://www.gov.uk/guidance/local-government-legislation-byelaws>

4.5. Power to Carry Out Works

Flood and Water Management Act 2010:

Schedule 2 Section 29 makes amendment to the Land Drainage Act 1991 Section 14A.

LLFAs to undertake flood risk management works for the purpose of managing a flood risk in the authority's area from surface runoff or groundwater.

General powers to undertake flood risk management works by Local Authorities are provided by Schedule 2, Section 29 of the Flood and Water Management Act 2010, which adds Section 14A Land Drainage Act 1991 and gives general powers to Local Authorities in relation to flood risk management works. This work has to be undertaken having regard to the Local Flood Risk Management Strategy for an authority's area. Operations to manage a flood risk include maintaining existing works, improving existing works, constructing new works and altering or removing works.

Flood and Water Management Act 2010:

Works powers are extended to ordinary watercourses by the Land Drainage Act 1991 under Schedule 2 Section 32 (6) Flood and Water Management Act 2010.

(6) to allow for work to be undertaken to reduce flooding. For subsection (8) (b) substitute –

“(b) in relation to a watercourse in an area outside an internal drainage district, are references to the lead local flood authority for the area.”

To undertake works, on land owned by others, facilitating powers (powers of entry, compensation and compulsory purchase) are provided.

- Powers of entry are needed to get access to land;
- Compensation powers are needed if damage occurs when carrying out works, for example it may be necessary to move heavy equipment across a garden damaging the lawn and flowerbeds;
- Compulsory purchases - It may be necessary for the risk authority to own the land in order to carry out and maintain works. If the land cannot be bought by agreement, a compulsory purchase order could be applied as a last resort.

4.5.1. Powers to acquire land and Compulsory Purchase

Powers to acquire and dispose of land, including compulsorily, are provided within Section 62 of the Land Drainage Act 1991. These powers are not altered by the FWMA 2010 - Schedule 2

Section 29 (12) and the powers in Section 62 are available for use with the flood risk management works powers, as Section 14A is inserted into the Land Drainage Act 1991.

Section 62 Land Drainage Act 1991:

Powers to acquire and dispose of land, including compulsorily.

Flood and Water Management Act 2010:

Schedule 2 Section 29 provides clarity to Land Drainage Act 1991 (Section 14A - General powers: flood risk management works)

(12) The powers under Section 62 and 64 are available to an authority for a purpose in connection with the exercise of powers under this section.

Where such powers may be needed, for example in Section 29 FWMA 2010, they are provided for within Section 14A of the Land Drainage Act 1991 which requires the Minister to apply compensation provisions, together with powers of entry and compulsory purchase provisions, to the incidental flooding or coastal erosion powers. The Minister must use the Water Resources Act 1991 provisions but may amend them. The Water Resources Act provisions are slightly different from those found in the Land Drainage Act 1991.

WAY MARKER 4.8

Water Resources Act 1991

www.legislation.gov.uk/ukpga/1991/57/contents

4.6. Asset Management

4.6.1. Asset Register – Ordinary Watercourses and Surface Water Flooding

Flood and Water Management Act 2010:

Section 21 Lead Local Authorities: Duty to Maintain a Register

(1) A lead local flood authority must establish and maintain –

(a) A register of structures or features which, in the opinion of the authority, are likely to have a significant effect on a flood risk in its areas, and

(b) a record of information about each of those structures or features, including information about ownership and state of repair.

(3) The lead local flood authority must arrange for the register to be available for inspection at all reasonable times.

Since the introduction of the FWMA 2010, Warrington Borough Council has ensured there are records of all significant assets available for use by risk management authorities (asset record) and for inspection by the public (asset register). This is available online via the Warrington

Borough Council website which is updated on a regular basis. Assets are in relation to ordinary watercourses and surface water flooding only.

Warrington Borough Council has defined the criteria of “features” which are likely to have a significant effect on flood risk in its area:

WAY MARKER 4.9

Warrington Borough Council Asset Register

<http://www.jbamap.co.uk/map/la/warringtonassetregister/>

- Resulted in major disruption to the flow of traffic;
- Posed, or could have posed, a risk to human health;
- Adversely affected the functioning of critical infrastructure;
- Caused harmful impacts to environmentally and socially important assets;
- Caused internal flooding to a property used for residential or commercial purposes.

These features can be either natural or manmade and may include, but not limited to:

- Sluices;
- Channels;
- Culverts;
- Walls;
- Embankments;
- Bridges;
- SuD Systems;
- Grillages and Screens.

The asset record includes a map of local flood risk assets along with clarification as to whether the asset is publicly or privately owned. The asset register provides further information about each asset, for example condition status. By collating information and mapping flood risk assets, Warrington Borough Council is able to:

- Develop informed maintenance regimes, which can take account of assets important for managing flood risk, particularly in high-risk areas;
- Establish where the entire surface water drainage and watercourse systems are, allowing for quicker identification of the responsible authority in incidences of flooding;
- Produce and publish a maintenance schedule for the assets as well as providing guidance to riparian owners as to how they should maintain their assets.

Although a significant amount of information has already been collated from a variety of sources there is a programme in place to regularly review and update the register when new, modified and/or abandoned assets have been identified via responding to flooding incidents, flood incidents, investigations and maintenance works, and adopt third party developments.

Records are held on GIS and on the Council’s asset management system. Any inspections undertaken follow the established Environment Agency assessment template which has been identified by Warrington Borough Council as a best practice approach.

WAY MARKER 4.10

Environment Agency: Asset Performance Tools – Asset Inspection Guidance

http://evidence.environment-agency.gov.uk/FCERM/Libraries/FCERM_Project_Documents/APT_2_report.sflb.ashx

4.6.2. Asset Register – Main Rivers

The Environment Agency’s Creating Asset Management Capability (CAMC) is an ongoing programme to develop its asset management capability. An outcome of this was the Asset Information System (AIMS) which replaced the National Flood and Coastal Defence Database (NFCDD). AIMS is an inventory of all assets relevant for flood risk management from main rivers, estuaries and the coast, and is continuously updated following review or inspection of assets.

Information contained on AIMS is not currently available to the general public but is available to Local Authorities. The information has been utilised to develop the Warrington Borough Council asset register, in particular for main river assets where the Council is riparian land owner, as well as understanding interactions in flood risk areas.

4.6.3. Asset Management Responsibilities

Table 4.1 provides an overview to Asset Management Responsibilities within Warrington.

Table 4.1: Overview of Asset Management Responsibilities

Responsible Body	Main River	Ordinary Watercourses	Surface Water	Ground Water
Environment Agency	Overall management of main river network and flood warning service. Enforcement in respect of riparian owners.			
Warrington Borough Council	Inspection and maintenance of assets on Council owned land.	Maintenance of assets on Council owned land. Advice to private land owners on management.	Maintenance of highway drainage and water courses on Council owned land.	Management on Council owned land.
		Permissive intervention for maintenance of riparian owned assets as deemed appropriate.	Advice or Enforcement of private land owners causing flood discharge.	Advice to riparian land owners.
		Enforcement in respect of riparian owners where integrity of water course is compromised.	Permissive intervention for maintenance of riparian owned assets as deemed appropriate.	
United Utilities			Maintenance of adopted surface water, foul & combined sewers.	

Responsible Body	Main River	Ordinary Watercourses	Surface Water	Ground Water
Riparian Land Owners	Maintenance of private assets to prevent flooding. Responsibility to accept incoming natural flow.	Maintenance of private assets to prevent flooding. Responsibility to accept incoming natural flow.	Prevention of surface water discharge from private land.	Management on privately owned land.

The Manchester Ship Canal, a subsidiary company of Peel Ports Group, is deemed a “principle watercourse” although privately owned and managed, and not technically a main river. Flood risk management issues are currently led via the Environment Agency due to the size and extent of the canal. This watercourse is not considered a local issue and is not currently considered by Warrington Borough Council or the Environment Agency to be a local flood risk management issue for the purposes of this strategy.

4.7. Reservoirs

The Environment Agency is responsible for regulating reservoir safety, flooding and water scarcity, via the Reservoirs Act 1975. Sections of the Act were updated in the FWMA 2010 (Schedule 4) which included:

- Reducing the capacity at which a reservoir will be regulated from 25,000m³ to 10,000m³;
- Ensuring that only those reservoirs assessed as a higher risk are subject to regulation;
- All undertakers with reservoirs over 10,000m³ must register their reservoirs with the Environment Agency;
- Inspecting engineers must provide a report on their inspection within 6 months;
- All undertakers must prepare a reservoir flood plan;
- All incidents at reservoirs must be reported.

High-risk reservoirs are those where human life would be endangered if there were an uncontrolled release of water from the reservoir. Owners of ‘high risk’ reservoirs will need to comply with all the requirements of the Act. Owners of reservoirs that are not designated as ‘high risk’ still need to register, but will not need to comply with the inspection and supervision requirements of the Act. Registering the reservoirs means that in case of maintenance or flood risk incidents clear communication lines can be set up to manage maintenance work and flood risk incidents.

The main reservoirs with the administrative area of Warrington Borough Council are:

- Lymm Dam;
- Appleton Reservoir (aka Walton Reservoir);
- Winwick.

According to the Environment Agency, there are a number of reservoirs located outside of Warrington, which pose a risk to people and property in Warrington. These include reservoirs upstream of:

- The River Bollin (such as the Mere and Knutsford Moor Nature Reserve);
- Sankey Brook (Carr Mill Dam, St Helens).

There are no recorded incidents of reservoir flooding or failure at the aforementioned locations. Compliance with the requirements listed above aims to ensure that there are no such incidents in the future.

In April 2008, Defra instructed the Environment Agency to assess the impact of dam breach flooding from all large raised reservoirs in England and Wales registered under the Reservoirs Act 1975, and produce flood maps for Local Resilience Forums to use for emergency planning. The maps provide an indication of the areas that could be affected by reservoir flooding and together with local knowledge can be used to plan for emergency response. The maps should be used to prioritise areas for evacuation/early warning and to help reservoir owners produce on-site plans and Local Resilience Forums produce off-site plans.

The model outputs of a dam breach do not:

- Show the risk to individual properties of dam breach flooding;
- In any way reflect the structural integrity of the dam or the chance of it failing;
- Indicate or relate to any particular probability of dam breach flooding.

The detailed maps are available on the Resilience Direct website for Local Resilience Forums to use as part of their emergency role under the Civil Contingencies Act 2004.

4.8. Designation of Features

Flood and Water Management Act 2010:

Section 30: Designation of features Schedule 1 (Designation of features) shall have effect.

Effect of Designation 5

(1) A person may not alter, remove or replace a designated structure or feature without the consent of the responsible authority.

(2) A designation is a local land charge

LLFAs and the Environment Agency are known as 'designating authorities'. They may 'designate' natural or artificial features or structures that are significant for flood risk management. The process is set out within the FWMA 2010.

The aim of designating flood risk assets is to safeguard them against unchecked works which could increase flood risk in the area. Designation of features or structures is not something that will be done regularly but only when there are concerns about the asset.

The following conditions need to be satisfied to designate a feature or structure.

1. The designating authority considers the existence or location of the structure or feature affects:
 - a) a flood risk, or
 - b) a coastal erosion risk;

2. The designating authority has flood or coastal erosion risk management functions in respect of the risk which is affected;
3. The structure or feature is not designated by another authority;
4. The owner of the structure or feature is not a designating authority.

If an asset becomes 'designated' its owner cannot alter or remove it without first consulting the designating risk management authority. The designation process covers both the initial designation by the designation authority and an appeals process which is available to the owner of the structure or feature. Once designated the designating authority will have enforcement powers should the structure or feature be altered or modified without permission. An individual may appeal against a designation notice, refusal of consent, conditions placed on consent or an enforcement notice.

In addition to garden walls and other structures, many sustainable drainage systems (SuDS) may be designated and will be issued with a Provisional Designation Notice. As a minimum the notice will set out the following important information about provisional designation:

- The feature in question;
- Why the feature is being provisionally designated;
- The period in which representations may be made;
- The date from which the feature is provisionally designated, and;
- How the owner of the feature may make representations to the LLFA in respect of the notice.

During the period of notice, the owner has the right to make representations to the designating authority on the provisional designation, which the authority must consider before confirming a designation by means of a designation notice. The LLFA may cancel a designation (including a provisional designation). It may do so at the owner's request or where it thinks it appropriate for another reason, for example if a new flood defence system has been provided that negates the need for the designation. An owner may appeal if their request for a cancellation is denied.

Although there is no obligation on the riparian landowner to maintain a designated feature, the owner will be able to do so provided that they are maintaining it to at least its existing state/standard when designated.

Warrington Borough Council will act with due diligence before designating any features and taking on maintenance liabilities. Warrington Borough Council anticipates any additional features considered for designation will be identified via the continual development of the Asset Register.

4.9. Investigations and Flood Reporting

Flood and Water Management Act 2010: Section 19. Local authorities: Investigations

(1) On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate-

(a) which risk management authorities have relevant flood risk management functions, and

(b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.

(2) Where an authority carries out an investigation under subsection (1) it must-

(a) publish the results of its investigation, and

(b) notify any relevant risk management authorities.

4.9.1. Threshold for Investigation

Warrington Borough Council will, on becoming aware of a flood incident, undertake a Post Incident Review to determine the consequences of the flooding incident. The Post Incident Review will determine the likely cause of the flooding and what was flooded during the incident.

If a flood event is deemed to have had a significant consequence, then a Formal Investigation of the flooding incident will be undertaken. A flood event with significant consequences is one that has had, or could have had if action had not been taken, one or more of the following impacts:

- Resulted in major disruption to the flow of traffic;
- Posed, or could have posed, a risk to human health;
- Adversely affected the functioning of critical infrastructure;
- Caused harmful impacts to environmentally and socially important assets;
- Caused internal flooding to one property used for residential or commercial purposes.

A Formal Investigation may be undertaken by Warrington Borough Council at the discretion of the Flood Risk Manger if a flood event has not met the above criteria but considered appropriate.

4.9.2. Disclosure of Information

It should be noted that initial reports are likely to be received as anecdotal evidence from members of the public; in depth investigations will likely require officers to visit and undertake their own evidence collection. The published report does not have to detail the specific detail of what was affected or proposed mitigation, e.g. specific addresses. Generic areas can be referred

to. However it is worth noting that if properties have flooded then the owners have obligations to declare flood information in any insurance contract or property sale.

4.9.3. Reporting of Flooding Investigations

Flooding incidences that are deemed significant will be investigated by Warrington Borough Council and recorded internally. A published Formal Investigation will be initiated for every flood event captured and reported by a member of the Flood Risk Team. Therefore, it is essential that the threshold for triggering a Formal Investigation should recognise the actual significance of the flooding incident with any repeated events also recorded but not published.

All events will be reviewed at the Operation Flood Risk Management Task Group. Continual mapping of flood incidents and the results of investigation will inform future work programmes and maintenance regimes.

The purpose of flood investigation reports is to inform which risk management authorities have relevant functions relating to the flood incident. Flood investigation reports will include, but not be exclusive of, the following information:

- Site location, maps and photos;
- Site characteristics and drainage;
- Flood history and extent;
- Details of the flood event which includes:
 - Incident reference number;
 - Date of flood event;
 - Date flood event reported to Warrington Borough Council;
 - Date of investigation;
 - Threshold for investigation;
- Rainfall analysis;
- Identified sources/probably causes;
- Role and responsibilities;
- Outcomes of investigation including proposed activities and recommendations.

Warrington Borough Council has set the following targets to complete a formal flood investigation report.

Table 4.2: Targets to complete a formal flood investigation report

Local Investigation Targets	Time scale following event
Ascertaining responsibility	One week
Agree with responsible actions and timescales	One month
Final report	Two months

Timescales for investigations are subject to the scale and complexity of incidents being investigated.

4.9.4. Publications of Flood Investigation Reports

The findings of all formal flood investigation reports will be made publicly available via the Council website and linked to internal records. The internal records will contain all flooding

incidents reported to Warrington Borough Council and will not be available to the general public.

WAY MARKER 4.11

Section 19 Flood Investigation Reports

https://www.warrington.gov.uk/downloads/download/2472/investigating_after_a_flood

4.10. Communications and Public Engagement

Communications are based around internal partners, external partners and local community. The purpose of communications and engagement with regard to flood risk management are to:

- Ensure understanding of the roles and responsibilities of the flood risk partners (Warrington Borough Council, Environment Agency, and United Utilities).
- Manage expectations and be clear about what can and cannot achieve.
- Build a greater awareness of flood risk and ownership of the problem at a local level.
- Generate a culture of personal responsibility for being prepared for flooding.
- Coordinate with the Council’s Emergency Plan.

4.10.1. Consultation Stakeholder Identification

The following objectives have been set to guide Warrington Borough Council’s communications with its community and stakeholders:

- Identify and raise awareness of areas as potentially at risk of surface water flooding;
- Managing risks collaboratively.

Table 4.3 provides a summary to, but not exclusive of, Consultation Stakeholders within the administrative area of Warrington.

Table 4.3: Consultation Stakeholder Identification

Consult Criteria	Identification	
Local Authorities and Partners	Cheshire Mid-Mersey Partnership United Utilities Environment Agency	RFCC Peel Ports Group
Political stakeholders	MPs and MEPs Portfolio heads Ward members	Parish councillors Neighbouring Authorities
Transport and infrastructure	Highways Agency Planning Department	Other utility companies Transport Operators (e.g. Network Warrington)
Environmental stakeholders	RSPB NFU Environment Agency	English Heritage Natural England
Emergency services	Fire service Other “blue light” services	Police Community Support Officers Resilience Forum

Consult Criteria	Identification	
Business and industry	Warrington Chamber Local Businesses Business Forums	Employees Landowners where known
Communities and individuals	Resident Association Groups Faith centres Doctors and community services Landlords Housing associations	Recreation groups – Friends of Parks, Cycling groups, Ramblers Association Hospitals Schools Local Media

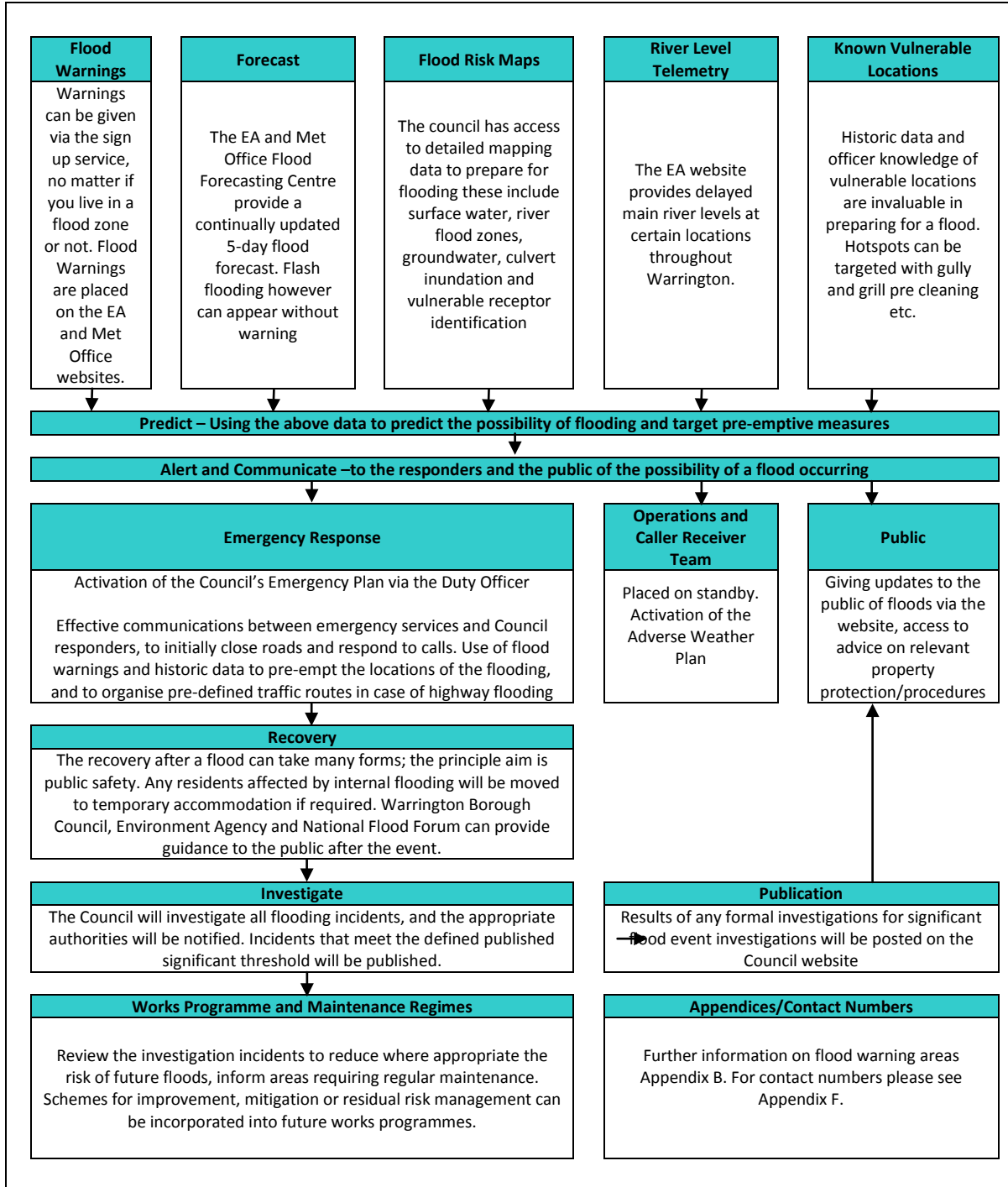
4.11. Preparedness and Emergency Response

4.11.1. Preparedness

Warrington Borough Council aims to reduce flood risk and minimise the harm caused by flooding by taking a risk-based approach to achieve the best results possible using the budget and resources available. Warrington Borough Council continues working to reduce both the likelihood and impact of flooding. Sufficient lead time is vital to inform communities at risk of flooding in order to action protection measures.

Figure 4.2 provides an overview to how Warrington Borough Council prepares for a potential flood emergency.

Figure 4.2: Preparedness and Flood Risk Predictions



4.11.2. Responding

The Civil Contingencies Act 2004 is one of the most relevant pieces of legislation in relation to emergency planning for flooding. It formalises a number of duties on Local Authorities, the emergency services and other organisations involved in responding to any emergency.

WAY MARKER 4.12

The Civil Contingencies Act 2004
<http://www.legislation.gov.uk/ukpga/2004/36/contents>

Amongst these are contingency planning and risk assessment for emergencies at the local level, including flooding. The Environment Agency is the Lead Responder for provision of flood warnings and information to the public. However all Category One responders have a role to play in communicating with the public and will either lead or play a significant part at some stage in a flood event, e.g. Police (public safety announcements and information in the consequence management phase), the Council (recovery phase), etc.

The principal method of warning the public of flood risk in Warrington is via the Environment Agency's Flood Line Warnings Direct system, and messages that the Environment Agency issue via local media. It is the property owner's responsibility under law to protect their own property from flooding. However the Environment Agency, Warrington Borough Council and the Emergency services where possible will offer assistance in the event of a flood.

The Council has a Multi-Agency Flood Response Plan which allows all responding parties to work together on an agreed coordinated response to flooding. Local Resilience Forums (LRFs) bring together Category 1 and 2 responders within a local police area for the purpose of cooperation in fulfilling their duties under the Civil Contingencies Act 2004.

The Multi-Agency Flood response Plan is activated upon the request of the emergency services or other responding agencies via a 24/7 duty Emergency Planning officer service. The aim of the plan is to:

- Save life and treat casualties;
- Minimise damage;
- Provide flood warning messages and other information;
- Minimise disruption to essential services;
- Facilitate evacuation and shelter;
- Restore normality at the earliest opportunity.

The Council will respond and advise on the following:

- Surface water, groundwater flooding, flooding from non-main rivers and coordinate the response with other Flood Management Authorities for main river;
- Work with the other Category 1 and 2 responders as part of the multi-agency response to floods;
- Activate and coordinate emergency support from the voluntary sector;
- Liaise with other responders to share information and provide support to the emergency services as appropriate.

- Manage the local transport and traffic networks initially on safety grounds followed by signing and diversionary routes;
- Mobilise trained Crisis Support workers and emergency assistance;
- Deal with environmental health issues, such as contamination and pollution;
- Coordinate the recovery process.

If serious flooding involves people having to be evacuated, the Council may be able to offer temporary shelter in the form of Rest Centres where basic practical support can be provided such as refreshments, access to information and other support services where available. Emergency services (Fire, Police, Ambulance and the Army) will help to evacuate people who are stranded or in danger. Where required, they will also provide medical assistance and emergency life-saving treatment.

It is important to understand that although these bodies can assist at the time of flooding, they are not required by the law to protect residential or other properties from flooding. The responsibility to do that lies with the property holder.

Further information can be obtained on the Council website via the following link.

WAY MARKER 4.13

Warrington Borough Council - Emergencies

<https://www.warrington.gov.uk/info/201107/emergencies>

4.11.3. Communications

Good communications are vital on the build up to, and during an emergency. This is an area Warrington Borough Council continually refines as forecasting techniques and information technology develops particularly in the use of social media.

Public advice/information and press releases will be agreed and co-ordinated at the multi-agency commence and control. The Council's website has proved to be a most effective and easily accessed source of information at times of flooding and thus utilised as the primary source of information. Local media (i.e. radio stations), agency websites and social media will utilised as secondary sources. When appropriate the Councils network of highway variable message signs will be used to inform of road closures.

Warrington Borough Council will continue to work with our partners at the Environment Agency to raise awareness of the flood warning service in the designated high-risk zones.

WAY MARKER 4.14

Pre-Flood Event

Warrington Borough Council – Flooding Advice for Residents

https://www.warrington.gov.uk/downloads/download/494/flooding_advice_for_residents

Environment Agency – Flooding From Groundwater Advice

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/297421/flho0911bugi-e-e.pdf

During/Post Flood Event

Warrington Borough Council

Website

<https://www.warrington.gov.uk/floods>

Facebook

<https://www.facebook.com/warringtonbc>

Twitter

<https://twitter.com/warringtonbc>

4.11.4. Sandbag Policy

The Council has no legal duty to provide sandbags to the community unless the flooding is due to flooding from the Highway or other Council owned land.

Although the Council has no legal responsibility to provide assistance to residents during times of flooding, where possible, the Council will provide sandbags and other equipment to protect people or property within areas being affected by flooding. However, in times of emergency the Council will be trying to protect the public at large and may not be able to assist a large number of individual homeowners who find their properties threatened.

Further information to Sandbag Policy is contained within Appendix G of this document.

4.11.5. Continuous Improvement

All partners are committed to continually improving capability to predict and respond to flooding events.

Warrington Borough Council will:

- Continue to improve operational practices by regularly reviewing Operational Plans.
- Provide secure remote sand bag stores on a priority risk basis for self-use;
- Continue to evaluate light weight flood defence equipment for emergency use;
- Continue to work with the Environment Agency as the national providers of the Flood Warning Service to improve our understanding of flood risk through correlation of rainfall and river gauge data to improve our ability to respond and prepare for likely events at a local level;
- Review the sandbag policy on an annual basis.

5 Objective 4: Funding and Actions & Interventions to Reduce Flood Risk

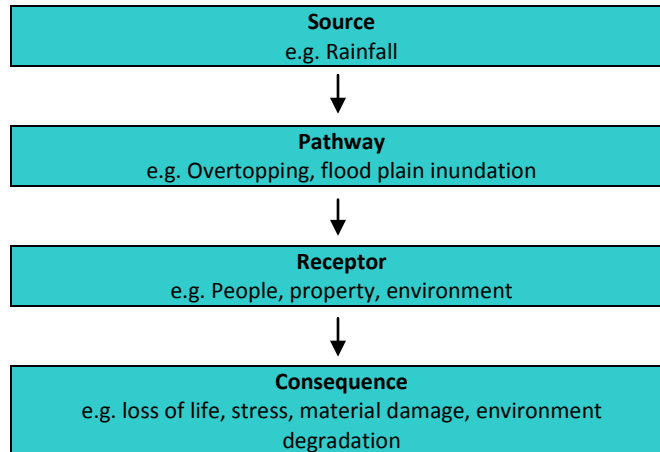
What this section will cover:

- Approach to maintenance regimes and works.
- Works and maintenance schedules.
- Improving Information Provision.
- Funding improvements.

5.1. Overview

There are many different options that can be utilised to reduce the risk of flooding to individuals. However these options cannot remove the risk completely as there can always be an extreme event that may exceed the design standard of the measure put in place. It is also important when considering measures to consider the Source, Pathway, Receptor and Consequences Conceptual model.

Figure 5.1: Source, Pathway, Receptor and Consequences Conceptual model



When deciding what combination of flood risk management measures or strategies to adopt it is important that the same general performance features are considered for each and every option. These should be considered together with the specific characteristics that affect the performance of that option. Warrington Borough Council believes it is important to use every approach available to manage risk and this strategy reflects this thinking throughout from prevention to intervention. In considering interventions and works the emphasis will be on supporting individuals, businesses, and communities.

Appendix H provides an overview to some of the options available to managing flood risk within Warrington utilising the conceptual model.

Warrington Borough Council will work with a wide range of partner organisations and communities so that, where appropriate, it can identify sustainable measures to reduce the risk of flooding.

A catchment wide-approach that addresses flooding issues with green infrastructure solutions is currently employed in order to maximise opportunities for wider community or environmental benefits. Where appropriate, actions may focus on identifying a range of opportunities, which cumulatively provide significant improvement. This can range from enhanced management of current infrastructure, such as regular blockage removal from river channels, to adaption of small areas of land along a river valley, to hold flood water. For the urban areas the emphasis will be on managing the social and economic dimensions. In rural areas the emphasis will be on working with natural processes and promoting biodiversity.

Warrington Borough Council's approach therefore to developing maintenance and intervention measures in respect of reducing flood risk will be undertaken as follows:

- Work closely with the Environment Agency to identify, fund and implement schemes in regard to fluvial flooding from main river;
- Consider managing residual risk where it is not economically feasible to undertake works through property resilience and flood warning site telemetry;
- Identify as far as possible responsible riparian owners;
- Consider long term sustainable solutions encompassing leisure and habitat creation;
- Develop risk based maintenance programmes to maximise reducing financial resources;
- Collaboration with United Utilities and other interested stakeholders to identify and implement partnership working.

5.2. Works to mitigate or reduce flood risk

Mapping evidence collated by Warrington Borough Council and partner organisations has identified a number of "hotspot areas" to indicate the pathway to flooding and is assessed against the RoFSW maps produced by the Environment Agency.

To date records indicate flood events are mostly the result of main rivers overtopping. In these cases the Environment Agency is the lead authority. The degree of intervention by the Environment Agency is based on flood risk to property.

In Warrington, highway surface water drainage systems maintained by the Council are the main pathways causing economic damage. Warrington Borough Council will continue to work closely with the Environment Agency especially in seeking funding where the cost benefit is low when taken on a national basis (see Section 5.5 Funding).

5.3. Maintenance

Maintaining surface water assets within the highway is undertaken to relevant service standards by Warrington Borough Council as the Highways Authority. The maintenance of assets other than the highway gullies, such as ordinary watercourses and ditches, is often poor where local land owners are responsible especially when culverting has taken place. Dumping of waste is problematic and causes blockages which increase the risk of flooding. In many cases the location of assets is unknown. Management of these assets requires significant development.

Since the introduction of FWMA 2010 Warrington Borough Council has done extensive work to locating features, inspecting and establishing ownership. Risk based regimes can then be established or in the extreme situation enforcement action taken.

5.4. Community Information Provision

In times of adverse events, the Flood Risk and Water Management section on Warrington Borough Council's website has recorded large numbers of visits. The Council will therefore utilise this as the main form of information provision and continue to develop the web pages with appropriate links to specialist publications, and social media as outlined in Section 4.11.3.

5.5. Funding

Flood and Water Management Act 2010:

Section 16. Funding

(1) The Environment Agency may make grants in respect of expenditure incurred or expected to be incurred in connection with flood or coastal erosion risk management in England.

(3) A grant may be subject to conditions (including conditions as to repayment and interest).

It is important that the Strategy sets out how the proposed actions and measures will be funded and resourced. It is also important that this strategy sets out the different types of funding that are available to Warrington Borough Council at both the national and local level.

5.5.1. Flood and Coastal Risk Management Grant in Aid (FCRM GiA)

The Government, through Defra, provides the majority of funding for Flood and Coastal Risk Management (FCRM) activities in England in the form of Grant in Aid (GiA). This is administered by the Environment Agency through its Regional Flood and Coastal Committees (RFCCs).

FCRM GiA is either capital or revenue funding:

- Capital funding is generally used for new assets, or extending the life of existing assets, and is available to all Risk Management Authorities;
- Revenue funding is generally used for 'day-to-day' Environment Agency activities and maintenance activities.

FCRM GiA capital funding is only available to Warrington Borough Council.

Process

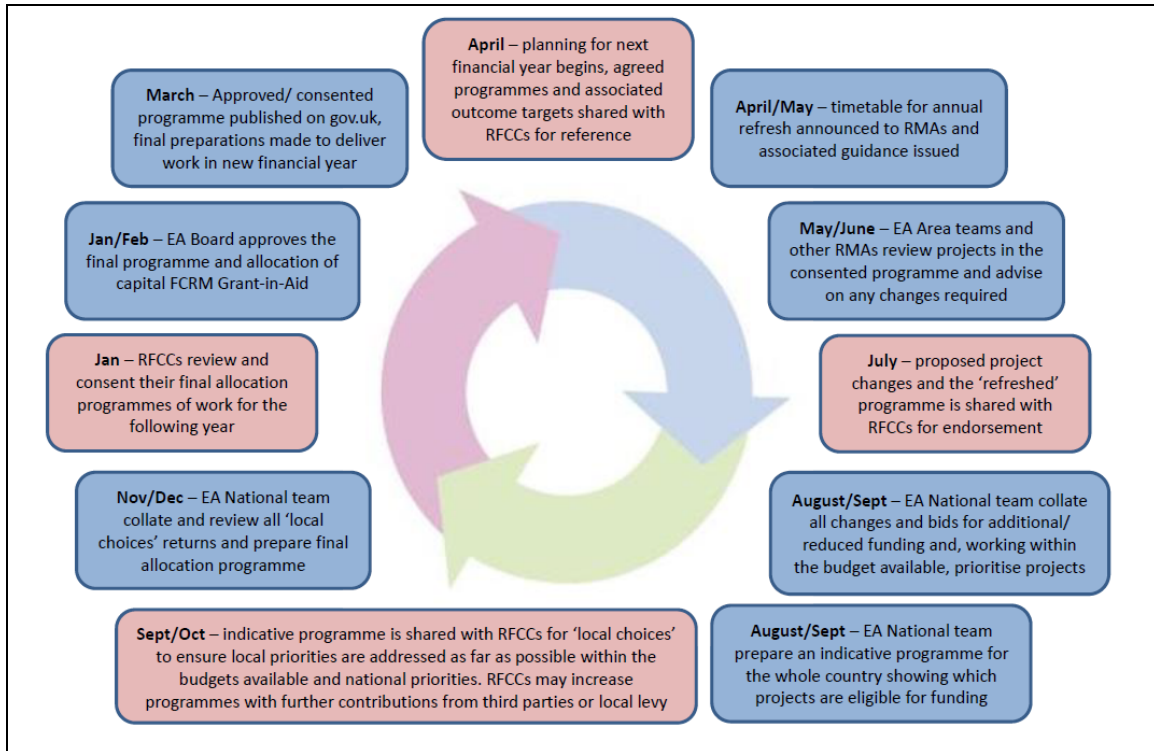
The Environment Agency currently has a 6 year capital programme with confirmed funding up until 2020/21. A separate project is currently taking place to put proposals together for the next long term capital funding programme beyond 2021.

Before Central Government committed to a 6 year funding period, Environment Agency programmes were substantially revised and changed each year as part of the annual funding process. With the 6 year programme, the Environment Agency largely expect all RMAs to adhere to the approved programme as far as possible, and undertake an annual refresh of the

programme to allow projects to be removed or added where priorities or deliverability has changed.

This annual refresh of the programme and subsequent approval by RFCCs is a constant cyclical process. The process for allocating FCRM GiA capital funding and refreshing the programme is summarised in Figure 5.2. It sets out where RFCCs input and approve the programme as part of the annual cycle of Committee meetings.

Figure 5.2: Annual Process for Allocating Capital Funding



Attracting Funding

There are four categories under which projects can attract FCRM GiA capital funding. These are:

- All benefits arising as a result of the investment, less those valued under the other outcome measures (Outcome Measure 1 – OM1);
- Households moved from one category of flood risk to a lower category (Outcome Measure 2 – OM2);
- Households better protected against coastal erosion (Outcome Measure 3 – OM3);
- Statutory environmental obligations met through flood and coastal erosion risk management (Outcome Measure 4 – OM4).

The maximum amount of FCRM GiA funding available is calculated using a formula which considers the monetary value of the above benefits against projected project costs. Some projects will qualify for full national capital funding, but others may need to identify cost savings

or must attract other sources of funding to proceed under the partnership approach described in Partnership Funding Approach.

Partnership Funding Approach

Defra's current policy provides a system of funding which applies to all FCRM projects seeking GiA funding. It is a way of increasing overall investment in FCRM by encouraging external contributions as a means to unlock GiA funding. GiA is capped based on the number of outcome measures a project will deliver, with each project having a Partnership Funding score as a means of prioritisation. It is expressed as the percentage of project costs and all projects must score a minimum of 100% to be eligible for central funding.

Projects will go ahead if costs can be reduced or if money can be found to meet shortfalls in central funding. If a scheme qualifies for partial funding, then local partners including local authorities can decide what action to take. For example, a project qualifying for 90% funding can still go ahead if costs are reduced by 10%, or a 10% contribution is found, or a combination of the two. FCRM projects, on average, prevent damages worth eight times the cost of the investment over the lifetime of a scheme, so even a small contribution would deliver a significant return on the level of local investment.

It is important to note that, whilst central funding will be more in some years based on the number of projects coming forward, the funding is limited and payments are subject to availability.

Key partners with direct interest in schemes are potential funders or may be able to contribute to schemes in other ways such as coordinating their work to achieve scheme objectives or allowing works to take place on their land. Where there is a shortfall of funding, Warrington Borough Council as a scheme promoter is encouraged to look more widely for alternative sources of funds.

Where the circumstances of flooding dictates or where there are related implications for flood risk management, the following partner organisations (not exclusive to) will be approached as potential partners as appropriate:

- United Utilities;
- The Highways Agency;
- Network Rail;
- Housing Associations and Registered Social Landlords;
- Private Developers.

Since 2010 Warrington Borough Council has increased its experience in developing and delivering multi-source funded schemes. Success has been down to early identification of areas at risk to flooding, early interaction with partner organisations, and early involvement of elected representatives in choices that may require political support.

Water and sewerage companies (i.e. United Utilities) play an important role in local flood risk management. Their sewer networks provide drainage for a significant proportion of rainfall, particularly that falling in urban areas. Section 94 of the Water Industry Act 1991 effectively sets

out a flood risk management function for water and sewerage companies. It imposes a duty to 'effectually drain' their areas of responsibility. They also have a responsibility to resolve sewer flooding affecting properties. Partnership funding will be sought particularly where flood risk arises from sewer under-capacity and when there is correlation with United Utilities sewer Asset Management Programme (AMP) and co-ordination with their planned capital schemes.

WAY MARKER 5.1

Water Industry Act 1991

<http://www.legislation.gov.uk/ukpga/1991/56/contents>

5.5.2. Local Levy

The local levy is an additional, locally-raised, source of income for the RFCC. The income is raised by way of a levy on the County Councils and Unitary Authorities within the committee boundaries, which is voted for by the local authority members of the committee and administered by the Environment Agency on behalf of the RFCC.

The local levy is used to support, with the approval of the committee, flood risk management projects that are not considered to be national priorities and hence do not attract full national funding through GiA. The local levy also allows locally important projects to go ahead to reduce the risk of flooding within the committee area.

6 Objective 5: Environment and Sustainability

What this section will cover:

- How to undertake flood risk management in a sustainable manner.

Flood and Water Management Act 2010:

Section 27: Sustainable Development

In exercising a flood or coastal erosion risk management function, a lead local flood authority must aim to make a contribution towards the achievement of sustainable development.

Sustainable Development is defined as “... *development that meets the needs of the present without compromising the ability of future generations to meet their own needs*”. Bruntland Commission, 1987 (UK Government Adopted Definition)

6.1. National Strategy

Referring to Section 2.14, The National Flood and Coastal Erosion Risk Management Strategy for England (2011) sets out five objectives to support delivery of FWMA 2010 and ensure that it is properly managed by using the full range of options available in a co-ordinated way. These are:

1. Understanding the risks of flooding and coastal erosion, working together to put in place long-term plans to manage these risks and making sure that other plans take account of them;
2. Avoiding inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks;
3. Building, maintaining and improving flood and coastal erosion management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society;
4. Increasing public awareness of the risk that remains and engaging with people at risk to encourage them to take action to manage the risks that they face and to make their property more resilient;
5. Improving the detection, forecasting and issue of warnings of flooding,

The main purpose of this Local Strategy document is to set out the strategy for implementing flood risk management measures across Warrington with respect to the national objectives. However there is an opportunity to derive significant benefit in the process, in respect to borough and country-wide aspirations in the wider context of sustainability, environmental and social improvement.

Delivering multiple benefits will require working with partners to identify local priorities and opportunities. Where appropriate, and in line with the principles of the National Strategy, contributions that help to deliver these additional improvements could be sought from those partners that benefit. Higher levels of government funding may also be accessible when wider benefits are delivered as part of the Local Strategy.

To achieve this Warrington Borough Council will utilise, where known, the most up to date and best practice advice and guidance where applicable when undertaking its duties with regard to flood risk management.

6.2. How does the Local Strategy contribute to Sustainability?

Warrington Borough Council's aim to support communities by managing risks in ways that take account of all impacts of flooding (for instance on people, properties, cultural heritage, infrastructure, environment and the local economy) and the whole-life costs of investment in risk management.

Risk management measures take account of potential risks that may arise in the future and be adaptable to climate change. Where possible, opportunities need be taken to enhance the environment and work with natural processes. Adopting more sustainable approaches to the management of flood risks can greatly improve the environmental condition of rivers, wetlands, coastal areas, and the social and economic circumstances around and within Warrington.

Flood risk management can bring significant economic, environmental and social benefits. It can enhance and protect the built and natural environment, cultural heritage and biodiversity by preventing loss and damage to habitats and heritage assets and reducing pollution. It can contribute to regeneration and income generation, protect infrastructure and transport links, and contribute to economic growth. In all instances, flood risk management should avoid damaging the environment and seek to provide environmental benefit. It is important that communities are able to shape risk management actions to take account of local priorities, and that this is supported, where appropriate, by local contributions to achieve additional benefits that might not be possible otherwise. This principle should also apply to other activities, for example development, land use or infrastructure planning where flood risk management benefits may also be achieved alongside the main objectives.

6.3. How does the Local Strategy contribute to the Environment?

The environmental objectives and measures specific to the Local Strategy which will contribute to the effective management of local flood risk are:

- To reduce the impact and consequences for individuals, communities, businesses and the environment from flooding and coastal erosion;
- To ensure that planning authority decisions are properly informed by flooding issues and the impact future planning may have on flood risk management and long term developments;
- To improve and/or maintain the capacity of existing drainage systems by targeted maintenance;
- Take a sustainable approach to flood risks management balancing economic, environmental and social benefits;
- Promote, and provide guidance, to the use of SuDS and other natural flood management schemes in Warrington.

In addition to the Local Strategy specific objectives, the strategy should also contribute where possible to achieving national environmental objectives. These are contained within the documents and legislation as outline in the Way Markers of this document. The Local Strategy

should not hinder aims and objectives but has the potential to contribute to the achievement of them.

Through undertaking its duties the Council can have a positive impact on the environment.

6.3.1. Ordinary Watercourses: Enforcement and Consenting

Ordinary watercourse regulation is to control certain activities that may have an adverse impact on flood risk and the environment. If works are carried out without consent, the Council has enforcement powers to remove or modify them.

The ordinary watercourse consenting process is in place to ensure that any works carried out do not have a detrimental effect on other people or the environment. It also ensures that any works which may affect flood risk are properly designed and where necessary environmental considerations are designed for i.e. fish passes etc.

In determining an application it is necessary to consider other Legislation including, but not exclusively:

- The Environment Act (1995);
- The Conservation of Habitats and Species Regulations (2010);
- The Water Framework Directive (2003);
- The Countryside and Rights of Way Act (2000);
- The Salmon and Freshwater Fisheries Act (1975);
- The Eel Regulations (2009).

Refer to Section 4.4 of this document for further information.

6.3.2. Designation of Third Party Assets

The purpose of this legislation is to try and ensure that owners do not inadvertently alter structures and other features and potentially increase flood risk to themselves, their neighbours and the wider community hence having a negative social effect.

6.3.3. SuDS

SuDS play a crucial role in managing the surface water from developments on site and hence reducing the flood risk however they have many environmental and social benefits, including:

- Protecting and potentially enhancing surface water quality by filtering pollutants;
- Improving groundwater recharge;
- Providing habitats for wildlife;
- Providing landscape amenity for the community;

As well as planning for new Green Infrastructure, Local Flood Risk Management Strategies need to protect existing wetlands due to their important role in surface water management.

Refer to Section 2.3.6 of this document for further information.

6.3.4. Capital Works

In assessing potential solutions there may be conflicts between measures that are more or less sustainable. Warrington Borough Council will assess sustainability with the economic, environmental and social benefits of any proposed scheme. Warrington Borough Council will be transparent about the trade-offs in both the short and long term and explain decisions taken.

6.3.5. Maintenance Works

Since 2010 Warrington now undertakes a more pre-emptive view of maintenance particularly those areas known to have significant flood risk attached.

Some rivers are designated under the Habitats Directive as Special Areas of Conservation (SAC). Any maintenance activities that Warrington Borough Council may wish to carry out, including dredging and weed cutting, must comply with the requirements of the Habitats Directive. This may affect the amount or timing of what Warrington Borough Council is permitted to undertake. In some exceptional cases it may prevent any dredging or weed cutting at all.

WAY MARKER 6.1

The Conservation of Habitats and Species Regulations 2010

<http://www.legislation.gov.uk/uksi/2010/490/contents>

The Water Framework Directive does not prohibit dredging. The Directive calls for the reinstatement of natural river channels and, as far as possible, for a reduction in interference in the natural river process.

Appendices

Appendix A	Mapping
Appendix B	Environment Agency Flood Warning Areas
Appendix C	Cheshire Mid-Mersey FWMA Programme 2017 - 18
Appendix D	Objectives, Measures and Schemes
Appendix E	Abbreviations and Definitions
Appendix F	Principle Contact Numbers
Appendix G	Principle Contact Details
Appendix H	Options Suitable for Warrington Borough Council
Appendix I	References



Appendix A – Mapping




Table A.1: List of Figures


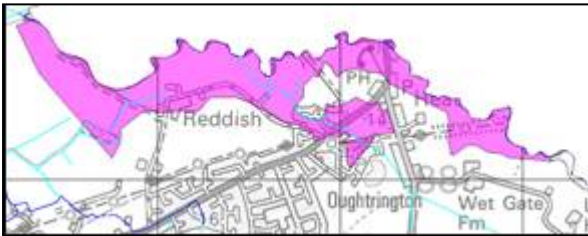

Figure Number	Drawing Title
1	Cheshire Mid-Mersey Catchment Area
2	Warrington Ward Boundaries
3	Detailed River Network
4	River Network
5	Distribution of Historic Flood Records (Council)
6	Distribution of Historic Flood Records (United Utilities)
7	Environment Agency Flood Map for Planning
8	Environment Agency Risk of Flooding from Surface Water
9	Environment Agency Risk of Flooding from Rivers and Sea
10	Environment Agency Areas Susceptible to Groundwater Flooding
11	Environment Agency Flood Warning Areas
12	Ordinary Watercourse Modelling
13	Locations of Recording Stations
14	Critical Services at Risk from Surface Water
15	Heat map for Population Increase from Surface Water
16	Blue Squares (Surface Water)
17	Critical Services at Risk from Rivers and Sea
18	Heat map for Population Increase from Rivers and Sea
19	Blue Squares (Rivers and Sea)
20	Rank of Percentage of Population at Risk of Flooding by Ward Area



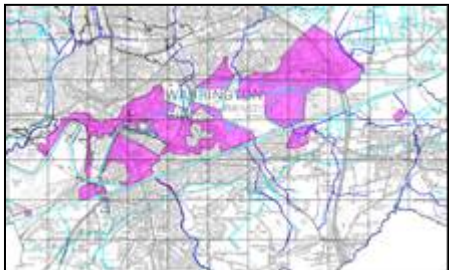
Appendix B – Environment Agency Flood Warning Areas




Table B.1: Summary of Flood Warning Area in Warrington

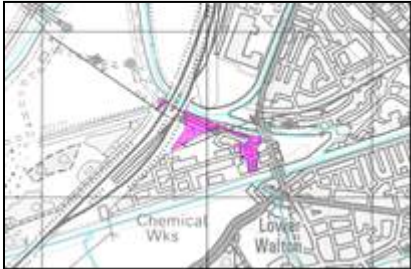


Code	Name	Description	Watercourse	Residential Properties	Non-residential Properties	Critical Services	Location
013FWF CH14	Sankey Brook at Gemini	Areas at risk include commercial and retail property off Europa Boulevard at Gemini Industrial Park. Additional properties at risk include parts of Fairbourne Close.	The Sankey Brook	0	36	5	
013FWF CH17	Sankey Brook around areas of Gemini, Dallam, Bewsey, Longford, Orford, Great Sankey and Penketh	Areas at risk include properties on Alder and Hall Lane. Also Winwick Quay, Longford, Hawleys Business Park, Orford, Callands, Bewsey. Also parts of Penketh and Sankey Bridges South of the A562 and A57 and Gatewarth Industrial Estate	Sankey Brook	2,816	204	35	



Code	Name	Description	Watercourse	Residential Properties	Non-residential Properties	Critical Services	Location
013FWF CH28	Sankey Brook at Dallam (Area A)	Areas at risk include Chepstow Close, Colwyn Close, and properties on and around Higham Avenue, Tavlin Avenue, Hodgkinson Avenue, Marshall Avenue, Hawleys Lane and Mullen close.	Sankey Brook	125	3	2	
013FWF CH29	Sankey Brook at Dallam, (Area B)	Areas at risk include properties between Callands Road and Sankey Brook. Other areas at risk include Marshall Avenue, Hawleys Lane, Southworth Avenue, Charter Avenue and Longshore Street from Hawleys Lane to the allotments.	Sankey Brook	435	1	3	
013FWF CH30	Sankey Brook at Sankey Bridges, (Area A)	Areas at risk include Liverpool Road from Kent Road to Beaufort Street, Rostherne Close, Evelyn Street and Huntley Street.	Sankey Brook	361	40	7	

Code	Name	Description	Watercourse	Residential Properties	Non-residential Properties	Critical Services	Location
013FWF CH31	Sankey Brook at Sankey Bridges, (Area B)	Areas at risk include the Sankey Recreation ground, Samuel Street, Booth Street, Dale Close, Bond Close and parts of Hephherd Street and Marina Avenue.	Sankey Brook	142	7	0	
013FWF GM77	River Bollin at Heatley	Areas at risk include land adjacent to the Ship Canal and River Bollin, Reddish Hall, and some properties on Rushes Avenue, Birch Brook Road and Chaise Meadow. Property on Old Mill Lane.	River Bollin	114	0	1	 Section contained within council boundary
013FW TTCH1	Mersey Estuary at Moss Side	The area at Moss Side Lane and Lapwing Lane are at risk of flooding from the estuary due to high tides.	River Mersey/Irish Sea	5	1	0	

Code	Name	Description	Watercourse	Residential Properties	Non-residential Properties	Critical Services	Location
013FW TTCH10	Mersey Estuary at Centre Park, Warrington	The Centre Park area is at risk of flooding from the Estuary due to high tides. Areas at risk include the industrial units between the driving range and Arpley Meadows on Slutchers Lane	Mersey Estuary	0	83	13	
013FW TTCH11	Mersey Estuary at Westy, Warrington	Areas including Newman High School, Brook Avenue, Davenport Avenue, Waring Avenue, Bryant Avenue, Bowman Avenue and Mort Avenue are at risk of flooding from the Estuary due to high tides	Mersey Estuary	188	0	3	
013FW TTCH12	River Mersey from Runcorn to Lymm	Areas at risk include parts of Manor Park and Sandymoor Runcorn. Also parts of Howley, Wilderspool, Latchford, Westy, Paddington, Woolston, Thelwall and Lymm	Mersey Estuary	3,539	400	67	

Code	Name	Description	Watercourse	Residential Properties	Non-residential Properties	Critical Services	Location
013FW TTCH18	Mersey Estuary at Victoria Park, Knutsford Road, Warrington	Victoria Park including the car park, bowling greens, running track, allotments, playground, skate park and sports pitches.	Mersey Estuary	2	5	1	
013FW TTCH3	Mersey Estuary at Arpley Bridge, Warrington	Chester Road between Brian Bevan Island and Arpley Railway Bridge; and Arpley Road in Warrington	Mersey Estuary/Irish Sea	0	5	0	
013FW TTCH4	Mersey Estuary at Fiddlers Ferry, Warrington	Fiddlers Ferry area including the Sailing Club, The Ferry Tavern and Riverside Trading Estate are at risk of flooding from the Mersey Estuary due to high tides.	Mersey Estuary/Irish Sea	2	3	0	

Code	Name	Description	Watercourse	Residential Properties	Non-residential Properties	Critical Services	Location
013FW TTCH5	Mersey Estuary at Eastford Road, Warrington	Property is at risk of flooding from the Estuary due to high tides. In particular houses on Eastford Road backing onto the disused canal, properties on Baronet Road and Taylor Street closest to the junction with Eastford Road and Morley Common are at risk	Mersey Estuary	39	1	0	
013FW TTCH6	Mersey Estuary at Knutsford Road, Warrington	The Knutsford Road area of Warrington is at risk of flooding from the Estuary due to high tides. Properties at risk extend from Knutsford Road to the railway embankment behind St Marys Street.	Mersey Estuary	1,349	66	6	
013FW TTCH7	Mersey Estuary at Howley, Warrington	The Howley area of Warrington is at risk of flooding from the Estuary due to high tides. Areas at risk include the Riverside Retail Park; Wharf Street; Wharf Street industrial estate; Riverside Close, Parr Street; Cleeves Close; Harbord Street; Fairclough Avenue & Sutton Street	Mersey Estuary	141	31	5	

Code	Name	Description	Watercourse	Residential Properties	Non-residential Properties	Critical Services	Location
013FW TTCH8	Mersey Estuary at Bank Quay, Warrington	The Bank Quay area of Warrington is at risk of flooding from the Estuary due to high tides. Areas at risk include industrial units behind the railway embankment at Bank Quay Station next to the Estuary and property around the Atherton Quay area.	Mersey Estuary	0	74	10	
013FW TTCH9	Mersey Estuary at Kingsway North, Warrington	The Kingsway North area of Warrington is at risk of flooding from the Estuary due to high tides. Areas at risk include; Bennett Ave, Princess Ave, Bibby Avenue; Peacock Avenue; Kingsway North; the units behind Farrell St; the ambulance station and allotments	Mersey Estuary	390	14	4	
Total				9,648	974	162	

Appendix C – Cheshire Mid-Mersey FWMA Programme 2017 - 18

Table C.1: Cheshire Mid-Mersey FWMA Programme 2017 - 18

Category	Comment
HIGH	Work that is to support the delivery of flood and coastal erosion risk management on a priority basis or to meet deadlines.
MEDIUM	Work which can be scheduled routinely within the capability of the Partnership. This work is subject to the availability of resources, and may be consolidated to obtain efficiency of operation.
LOW	Work that is either: <ul style="list-style-type: none"> Desired but not essential to protect, preserve, or deliver and is not tied to a specific milestone. Work which is integral to the functioning of the Partnership on a day-to-day basis but maybe postponed/rescheduled for completion because of higher priority work, funds shortage, or conditions outside the control of the organisation or Partnership.

Work Stream	Task for Co-ordinator	Task for LLFAs	Progress/Delivery Measure
<p>Local Flood Risk Management Strategies</p> <p>Statutory Duty – Section 9 FWMA 2010</p>	<ul style="list-style-type: none"> Support LLFAs in delivering their Local Flood Risk Management Strategies and accompanying supporting documents, and then deliver their actions, where appropriate. HIGH Review individual action plans and ensure relevant actions are included in the Investment Programme. HIGH Research different Strategy approaches to keep up-to-date with new approaches HIGH Participate in the process of review and renewal of Strategies. HIGH 	<ul style="list-style-type: none"> LLFAs to produce a Local Strategy which should be a robust representation of local issues and vehicle for delivery of improved FRM, not only to address them but also to recognise their part within the CMM context. It will also support the development of a partnership funding, and delivery of a strategic investment programme. HIGH Monitor/review the delivery of the Strategy through an appropriate means e.g. annual monitoring report, quarterly updates on progress at Tactical/Strategic Meetings etc. HIGH When appropriate, begin the process of review and renewal of the Strategy. HIGH 	<ul style="list-style-type: none"> All Local FRM Strategies adopted by end 2016/17 financial year. HIGH Local FRM Strategy monitoring framework in place in all LLFAs. HIGH Timetable for Strategy review should be outlined and authorities building into their service plans for future years as appropriate. HIGH

Work Stream	Task for Co-ordinator	Task for LLFAs	Progress/Delivery Measure
<p>S19 Investigations</p> <p>Statutory Duties – Section 19 FWMA 2010</p>	<ul style="list-style-type: none"> Work with LLFAs to identify opportunities to: <ol style="list-style-type: none"> Further improve response in flood aftermath, and identify any further improvements which can be made to their S19 policy and approach. HIGH Identify opportunities to share best practices following flood events through review, and report back findings to CMM. HIGH Provide standard method/template to S19 reporting. MEDIUM 	<ul style="list-style-type: none"> Ensure that internal processes for capturing and recording data during a flood event are in place HIGH Review existing S19 investigation policy and approach (i.e. triggers) based on past experiences Ensure that any new approach/policy is approved through the necessary means. HIGH 	<ul style="list-style-type: none"> All LLFAs have a ‘refreshed’ S19 policy and/or approach in place which is fully approved and ‘adopted’ by the LLFA. HIGH/MEDIUM Process/arrangements developed for reviewing and sharing best practice following a flood event which triggered a S19. HIGH/MEDIUM
<p>Duty to maintain an Flood Risk Asset Register</p> <p>Statutory Duties – Section 21 FWMA 2010</p>	<ul style="list-style-type: none"> Ensure all Authorities have a register in place and investigate how this aligns with the Environment Agency Asset Information Management System (AIMS). HIGH Review potential for a standardised approach across CMM. Encourage CMM authorities to have a standardised approach to data collection and recording. HIGH 	<ul style="list-style-type: none"> All Authorities should use the information in the Asset Register to better prioritise their individual investment plans by aligning with known historic flooding data and new surface water data. HIGH LLFA build knowledge and gather information in relation to flood risk assets; what assets CMM have, what is their current condition, how to ensure consistency etc. HIGH Identify links to other FRM roles, for example it could be a source of intelligence when: <ol style="list-style-type: none"> Investigating incidents of flooding HIGH Responding to planning consultations HIGH Developing investment plans for Capital and Revenue HIGH Informing bids for funding in the Investment Programme, and also more reactively e.g. In-Year Funding HIGH 	<ul style="list-style-type: none"> All CMM authorities commit to using the same asset system to share data openly and consistently, as far as reasonably practicable. HIGH Utilise asset register as a 'tool' to add value to other sections of Flood Risk. E.g. Bridges and Highways HIGH/MEDIUM

Work Stream	Task for Co-ordinator	Task for LLFAs	Progress/Delivery Measure
<p>Preliminary Flood Risk Assessments</p>	<ul style="list-style-type: none"> Support the PFRA refresh across CMM by identifying common areas which need to be updated in all PFRAs. HIGH 	<ul style="list-style-type: none"> LLFAs to review and refresh their PFRAs by the deadline of 22 June 2017 in accordance with 17(3) of the Flood Risk Regulations 2009. HIGH Environment Agency to support LLFAs in this. HIGH 	<ul style="list-style-type: none"> Updated PFRA produced and signed off by 22nd June 2017. HIGH
<p>SuDS</p>	<ul style="list-style-type: none"> Identify common approaches and resource gaps. HIGH Explore the potential of a joint SuDS SPD/SuDS Specification. HIGH Assist in the research and delivery of guidance notes HIGH 	<ul style="list-style-type: none"> Update, or produce, guidance notes to secure betterment on brownfield sites and provide clarify on maintenance expectations for SuDS. HIGH 	<ul style="list-style-type: none"> All LLFAs to produce a SuDS guidance document by June 2017 HIGH
<p>Spatially Targeted Investment Plan</p>	<ul style="list-style-type: none"> Provide an evidence base to create a prioritised spatially targeted investment plan: <ol style="list-style-type: none"> Identification of existing schemes and 5 year forward programme. HIGH Bring together priorities identified by Local Flood Risk Strategies HIGH Design process and milestones. HIGH 	<ul style="list-style-type: none"> Prioritise flood projects and strategic sites for future flood measures at strategic (cross boundary) and site/area specific scales HIGH Step by step approach to identify strategic priorities - evidence from latest flood maps, key strategic areas that are at risk of flooding from any source and has the potential to impact on growth, employment and development. HIGH Scope out metrics for identifying priorities e.g. number of properties, probability and consequence of impacts, economic outcomes, new homes delivered, relationship to other priorities. HIGH Design process and milestones. HIGH Agree and implement process HIGH 	<ul style="list-style-type: none"> Delivery of current year projects and 5 year forward planning. HIGH Adhere to new process and milestones assigned HIGH

Work Stream	Task for Co-ordinator	Task for LLFAs	Progress/Delivery Measure
<p>Data Management</p>	<ul style="list-style-type: none"> Identify existing and future data sources and create process for collating/sharing data for CMM. MEDIUM Support LLFAs in liaising with both internal and external teams to discuss/identify how flood risk data can be used to inform local flood risks in other areas of work. Create a briefing note for the Partnership to identify who to talk to and why. MEDIUM 	<ul style="list-style-type: none"> Manage data relating to flood and coastal erosion risks and the wider water environment. Ensure that data is used appropriately and to inform risks in all areas of work. MEDIUM Create 'Local Flood Zones' to identify areas at risk of 'local' flooding. Partnership to explore the potential to bid jointly for funding to undertake a study along these lines. MEDIUM/LOW Each LLFA to collate and maintain a 'flooding hotspot' register and tackle issues through their Operation Group meetings or other mechanisms as appropriate. MEDIUM Engage with teams internally to discuss and identify how this data can be used inform local flood risks in other areas of work. MEDIUM 	<ul style="list-style-type: none"> Collated list of all data sources and a data process and protocol for its use to be developed to support LLFAs. MEDIUM Production of briefing note for the Partnership to identify what other internal/external teams to engage with in regards to flood risk data and why. MEDIUM Exploration of the potential to develop 'Local Flood Zones' for CMM. MEDIUM/LOW

Work Stream	Task for Co-ordinator	Task for LLFAs	Progress/Delivery Measure
<p>General duties and Governance for the overall catchment</p>	<ul style="list-style-type: none"> • Communications: <ul style="list-style-type: none"> a) Briefings for Members and/to agree and implement actions LOW b) Feed into papers to RFCC to ensure CMM priorities are reflected LOW c) Ensure Terms of Reference for Strategic and Tactical Group meetings are updated LOW d) Coordinate and develop the Partnership Performance Report LOW e) Develop and maintain links between the Strategic and Tactical groups LOW f) Attend Operational Group meetings and provide, where possible, technical assistance. LOW • Work with Environment Agency and relevant Partnerships to align flood risk issues with actions to address issues outlined in River Basin Management Plans (RBMPs) LOW • Work with CMM Risk Management Authorities to proactively consider the issue of maintenance of assets and opportunities where CMM can develop joint innovative approaches. LOW • Work with partners to identify any opportunities for joint projects that could identify funding from multiple sources as well as delivering multiple benefits. LOW • Attend Catchment Partnership meetings for Lower Mersey catchments and engage with the Healthy Rivers Trust, and others, in delivering added benefits to projects in CMM where possible. LOW • Provide technical assistance/advice to members of the Partnership to enable project delivery for existing schemes. MEDIUM 	<ul style="list-style-type: none"> • Programme an annual calendar of Group meetings for which are timed to align with other meetings LOW • LLFAs to collate and maintain a flooding hotspot' register and tackle issues through their Operation Group meetings or other mechanisms as appropriate. LOW • Encourage RMAs to share issues, experiences etc. LOW • Work with partners to identify any opportunities for joint projects that could identify funding from multiple sources as well as delivering multiple benefits. LOW • Utilise the role of the Co-ordinator to provide technical assistance/advice to enable successful project delivery for existing schemes. MEDIUM 	<ul style="list-style-type: none"> • Calendar of meetings programmed on an annual basis. LOW • Meetings are attended by Members and Officers from all LLFAs throughout CMM LOW • Updated Terms of Reference produced and agreed. LOW • Raise profile of the CMM Partnership at a regional level through engagement at the RFCC and by feeding into meeting papers. LOW • Deliver existing schemes on time and within budget MEDIUM

Appendix D – Objectives, Measures and Schemes

Strategic Objectives

1. To clearly set out the different types of flooding, who is responsible and Governance arrangements
2. To assess the total risk of flooding from all sources in Warrington.
3. To manage flood risk and where appropriate reduce the risk and consequences of flooding through a range of activities.
4. To develop actions and interventions to reduce flood risk
5. To undertake flood risk management in a sustainable manner

Actions to Achieve Strategic Objectives

Table D.1: Actions to Achieve Strategic Objectives

Objective Ref:	Potential Action	Description	Lead Body	Partners	Funding Options
3, 4	Asset Management Plan (Drainage)	An Asset Management Plan (AMP) is a tactical plan for managing an organisation’s infrastructure and other assets to deliver an agreed standard of service.	Warrington Borough Council		Warrington Borough Council
2, 3	Asset Register	Warrington Borough Council has a duty to maintain a register of structures or features, which are considered to have an effect on a flood risk. Including details on ownership and condition as a minimum.	Warrington Borough Council	Peel Holdings Environment Agency United Utilities	Warrington Borough Council
3, 4, 5	Best Practice Guidance	Warrington Borough Council will follow published best practice guidance when undertaking actions/duties in relation to flood risk.	Warrington Borough Council		

Objective Ref:	Potential Action	Description	Lead Body	Partners	Funding Options
3, 5	Bye-laws	The Flood and Water Management Act 2010 amends Section 66 of the Land Drainage Act 1991 to allow local authorities to make byelaws for the following purposes: <ul style="list-style-type: none"> To secure the efficient working of a drainage system in its area; To regulate the effects of a drainage system on the environment; To secure the effectiveness of flood risk management work (carried out under either the FWMA 2010 or the Land Drainage Act 1991) 	Warrington Borough Council		Warrington Borough Council
3, 5	Checking and approval of new development drainage designs	Warrington Borough Council will continue to check and pass comment in line with best practice guidance with regard to drainage on key planning applications.	Warrington Borough Council		Warrington Borough Council
5	Climate Local Strategy	Schemes and actions contained within the Local Flood Risk Management Strategy will have regard to the Climate Local Strategy.	Warrington Borough Council		Warrington Borough Council
1, 3	Communication Strategy <ul style="list-style-type: none"> Newsletters Council website Social Media Community Engagement 	The Communications' Strategy document states how Warrington Borough Council will communicate with stakeholders in relation to its flood risk activities.	Warrington Borough Council	Peel Holdings Environment Agency United Utilities	Warrington Borough Council
3, 5	Consenting on Ordinary Watercourses	Under the Land Drainage Act 1991 certain types of work within a watercourse may not be permitted due to the potential increase in flood risk. In order to allow work to take place Warrington Borough Council can issue consent for a proposed scheme by checking that it does not increase the risk of flooding and that it does not adversely affect the environment.	Warrington Borough Council		Warrington Borough Council
2, 3	Designation of Third Party Assets	The Council, as well other flood management authorities, have powers to designate structures and features that affect flooding or coastal erosion in order to safeguard assets that are relied upon for flood or coastal erosion risk management.	Warrington Borough Council		Warrington Borough Council

Warrington Borough Council - Local Flood Risk Management Strategy 2017 - 2023

Objective Ref:	Potential Action	Description	Lead Body	Partners	Funding Options
1, 2, 3, 4	Duty to Co-Operate	FWMA 2010 places a duty on Risk Management Authorities to co-operate with one another. Co-operation between flood and coastal erosion Risk Management Authorities is important because of the mutual benefits they can gain from working together and sharing information.	All Partners		
3, 4, 5	Enforcement on Ordinary Watercourses	The enactment of the FWMA 2010 transfers enforcement powers on ordinary watercourse from the Environment Agency to Local Authorities. The aims of enforcement in flood risk management are to ensure the proper flow of water in a watercourse and over the floodplain, the control of water levels and the security of existing assets.	Warrington Borough Council		Warrington Borough Council
1, 3, 4	Engage with Partner Risk Management Authorities	The Council will seek to engage with partner Risk Management Authorities, and other significant stakeholders, in order to share knowledge and best practice in order to achieve the best possible results.	Warrington Borough Council	Environment Agency United Utilities Peel Holdings	
1, 3, 4, 5	Engage with Riparian Land Owners	Warrington Borough Council will seek to engage with riparian land owners in order to inform them of their duties and responsibilities and to actively encourage them to undertake them with the aim of avoiding enforcement action.	Warrington Borough Council	Environment Agency United Utilities Peel Holdings	All partner Risk Management Authorities
1, 3, 4	Engagement with communities at risk of flooding <ul style="list-style-type: none"> Parish Councils Community Groups 	Communities often lack the support and expertise to improve their own flood resilience. By working together, with local communities and emergency services, Warrington Borough Council can make significant strides towards reducing the impact, disruption and trauma of a flood.	Dependent on source/type of flooding		Warrington Borough Council
2, 3, 4	Flood Mapping/Modelling	Where necessary and appropriate, Warrington Borough Council and partner organisations will undertake flood mapping/modelling in order to aid our understanding of the mechanisms which lead to an area flooding.	All Partners		All partner Risk Management Authorities

Warrington Borough Council - Local Flood Risk Management Strategy 2017 - 2023

Objective Ref:	Potential Action	Description	Lead Body	Partners	Funding Options
1, 3	Flood Warning Service	<p>The Environment Agency offers a free flood warning service for many areas at risk of flooding from rivers and the sea.</p> <p>The warnings can give advance notice of when flooding from rivers and the sea is likely to happen and allow time for residents to prepare.</p> <p>Warrington Borough Council where appropriate will promote the Flood Warning Service to residents.</p>	Environment Agency	<p>Warrington Borough Council</p> <p>United Utilities</p>	Environment Agency
2, 3, 4	Identification of Critical Assets	<p>As part of the Councils duty to maintain a register of structures or features, which are considered to have an effect on flood risk. The Council will also identify assets which play a significant role in flood risk management.</p>	Warrington Borough Council	<p>Environment Agency</p> <p>United Utilities</p> <p>Peel Holdings</p>	Warrington Borough Council
1, 2, 3, 4	Investigations	<p>The Council has a duty to co-ordinate the investigation and recording of significant flood events within their area. This duty includes identifying which authorities have flood risk management functions and what they have done or intend to do with respect to the incident, notifying Risk Management Authorities where necessary and publishing the results of any investigation carried out.</p>	Warrington Borough Council	<p>Environment Agency</p> <p>United Utilities</p> <p>Peel Holdings</p>	Warrington Borough Council
1, 2, 3, 4	Joint Funded/Identified Schemes (Partnership working)	<p>All partner organisations will endeavour to work together where appropriate to achieve the best possible outcomes.</p>	All Partners		All partner Risk Management Authorities
1, 2, 3, 4, 5	Local Flood Risk Management Strategy	<p>The Council is required to develop, maintain, apply and monitor a Local Strategy for flood risk management in its area. The Local Strategy will build upon information such as national risk assessment and will use consistent risk based approaches across different local authority areas and catchments.</p>	Warrington Borough Council	<p>Environment Agency</p> <p>United Utilities</p> <p>Peel Holdings</p>	Warrington Borough Council
2, 3	Power to Request Information	<p>Under Section 14 of FWMA 2010, Warrington Borough Council and Environment Agency have the power to request information relevant to flood risk management. Where considered appropriate Warrington Borough Council will use this power.</p>	All Partners		All partner Risk Management Authorities

Warrington Borough Council - Local Flood Risk Management Strategy 2017 - 2023

Objective Ref:	Potential Action	Description	Lead Body	Partners	Funding Options
2	Recording and Reporting of Flood Incidents	The Council will record all flood incidents which are reported to the flood risk management team and where appropriate report on the incident.	All Partners		All partner Risk Management Authorities
3	Site Specific Flood Response Plans	Flood response plans for known at risk locations within the borough enable a more targeted use of resources should a flood occur, they should state who will respond and how.	All Partners		All partner Risk Management Authorities
3, 5	Spatial Planning Policy	Planning policy influences what can be built and where, planning policy is key to deciding where appropriate development should be sited.	Warrington Borough Council		Warrington Borough Council
2, 3	Strategic Flood Risk Assessments (SFRA)	There is a Level 2 SFRA in place which was undertaken in 2011 by Planning Policy. The SFRA allows for application of the sequential test as set out in the NPPF. Warrington Borough Council will update the SFRA as necessary to ensure an up to date and best informed knowledge base to undertake assessment of planning applications.	Warrington Borough Council		Warrington Borough Council
2, 3, 4	Surface Water Management Plans (SWMP)	A Surface Water Management Plan (SWMP) is a plan which outlines the preferred surface water management strategy in a given location. Where appropriate/necessary Warrington Borough Council will undertake SWMPs.	Warrington Borough Council		Warrington Borough Council
1	Website Flood Risk Content Update	As a key communication tool for information regarding flood risk it is important that the borough website is accurate. Warrington Borough Council provides regular updates to the information contained on the website.	Warrington Borough Council		Warrington Borough Council

Borough Wide Draft Maintenance Programme

Table D.2: Borough Wide Draft Maintenance Programme

Asset	Action	Status	Solution Medium Term	Solution Long Term or Additional Works	Authority	Possible Funding
Gully/Highway Drains	Regular cleaning	Implemented	Programme continually reviewed and amended	Risk based system of maintenance	Warrington Borough Council	Warrington Borough Council
Ditch	Regular cleaning	Implemented	Programme continually reviewed and amended	Intelligence and risk based system of maintenance	Warrington Borough Council	Warrington Borough Council Riparian Owner
Culvert Screens	Identify culvert screens to produce inspection and maintenance regime	Implemented	Programme continually refined as asset management registers develops	Intelligence and risk based system of maintenance Replacement of identified deficient screens, etc.	Warrington Borough Council	Warrington Borough Council
Asset Inspection	Regular inspection of assets at high risk locations identified	High risk locations identified from initial desk top exercise	Programme frequency and locations continually reviewed and amended	Identifying and informing riparian land owners	Warrington Borough Council	Warrington Borough Council Riparian Owner
Telemetry Systems	Regular inspection and maintenance of telemetry	Actioned	New telemetry systems will initially be in a maintenance period.	Ongoing maintenance regime by Council contractor	Warrington Borough Council	Warrington Borough Council
Surface Water Pumps	Regular inspection and maintenance	Actioned	Monitor pumping stations as part of inspection regime by Council contractor	Replacement/repair as required	Warrington Borough Council	Warrington Borough Council
Critical Flood Risk Management Assets	CCTV programme of critical flood risk management assets	Developing programme	Develop programme to CCTV critical flood risk management assets	Ongoing programme under continual review	Warrington Borough Council	Warrington Borough Council

Appendix E – Abbreviations and Definitions

Abbreviations and Definitions used in this document are contained in Tables A.5.1 and A.5.2. These are also common place in the area of Flood Risk Management.

Table E.1: Abbreviations

Item	Description
ABI	Association of British Insurers
ADA	Association of Drainage Authorities
AGMA	Association of Greater Manchester Authorities
AStSWF	Areas Susceptible to Surface Water Flooding
BAP	Biodiversity Action Plan
CIRIA	Construction Industry Research and Information Association
CLA	Country Land and Business Association
CLG	Department of Communities and Local Government
CFMP	Catchment Flood Management Plan
COMAH	Control of Major Accident Hazards
DCLG	Department for Communities and Local Government
DEFRA	Department for Environment, Food and Rural Affairs
DPD	Development Plan Document
EA	Environment Agency
EC	European Commission
FCRM/FCERM	Flood and Coastal Risk Management/Flood and Coastal Erosion Risk Management
FWMA	Flood and Water Management Act 2010
FRA	Flood Risk Assessment
GEM	Groundwater Emergence Map
GHG	Greenhouse Gases
GIA	Grant in Aid
HFM	Historic Flood Map
IUD	Integrated Urban Drainage
IDB	Internal Drainage Board
LGA	Local Government Association
LDF	Local Development Framework
LLFA	Lead Local Flood Authority
LoSA	Level of Service Agreements
LPA	Local Planning Authority
LRF	Local Resilience Forum
MoU	Memorandums of Understanding
NRD	National Receptor Database
NFU	National Farmers Union
NPPF	National Planning Policy Framework
RFCC	Regional Flood and Coastal Committee
PPS25	Planning and Policy Statement 25: Development and Flood Risk (Superseded by NPPF Section 10)
PFRA	Preliminary Flood Risk Assessment
PPC	Pollution Prevention Control
PPS	Planning Policy Statement
RBD	River Basin District
RFCC	Regional Flood and Coastal Committee
RoFSW	Risk of Flooding from Surface Water
RSPB	Royal Society of the Protection of Birds
S19	Section 19 - Flood Investigation Report
SA	Sustainability Appraisal

Item	Description
SAB	SuDS Approving Body
SAC	Special Areas of Conservation
SCI	Statement of Community Involvement
SEA	Strategic Environmental Assessment
SMP	Shoreline Management Plan
SFRA	Strategic Flood Risk Assessment
SSSI	Site of Specific Scientific Interest
SPA	Special Protocol Area
SPD	Supplementary Planning Document
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
WBC	Warrington Borough Council
WMS	Water Management Statement
UU	United Utilities

Table E.2: Definitions

Item	Description
Assets	Structures or a system of structures used to manage flood risk.
Attenuation	Reduction of peak flows and increased duration of a flow event.
Balancing Pond	A pond designed to attenuate flows by storing runoff during the peak flow and releasing it at a controlled rate during and after the peak flow has passed. The pond always contains water. Also known as wet detention pond.
Basin	Flow control or water treatment structure that is normally dry.
Bioretention area	A depressed landscaping area that is allowed to collect runoff so it percolates through the soil below the area into an under drain, thereby promoting pollutant removal.
Building Regulations	The UK Building Regulations are rules of a statutory nature to set standards for the design and construction of buildings, primarily to ensure the safety and health for people in or around those buildings, but also for purposes of energy conservation and access to and about other buildings.
Catchment	The area contributing surface water flow to a point on a drainage or river system. Can be divided into sub-catchments.
Climate Change	Any long-term significant change in the “average weather” that a given region experiences. Average weather may include average temperature, precipitation and wind patterns.
Combined Sewer	A sewer designed to carry foul sewage and surface runoff in the same pipe.
Consequence	A condition or occurrence traceable to a cause e.g. the flood was an inevitable consequence of the prolonged, heavy rains.
Cultural Heritage	Buildings, structures and landscape features that have an historic value.
Culvert	A covered structure under a road, embankment etc., to direct the flow of water.
Defences	A structure that is used to reduce the probability of floodwater or coastal erosion affecting a particular area (for example a raised embankment or sea wall).
Defra	Department for Environment, Food and Rural Affairs.
Deposition	The process whereby sediment is placed on the seabed, shoreline, riverbed or floodplain.
Detention Basin	A vegetated depression, normally dry except after storm events constructed to store water temporarily to attenuate flows. May allow infiltration of water to the ground.
Discharge	The discharge of a river is the volume of water, which flows through it in a given time. It is usually measured in cubic meters per second (m ³ /s).
Drainage Authorities	Organisations involved in water level management, including IDBs, the Environment Agency, and RFDCs.
Environment Agency	Is a UK non-departmental public body of Defra with the principle aim of protecting and enhancing the environment to make a contribution towards the objective of achieving sustainable development. The Agency has principle responsibility for river (fluvial) flooding.
Evapotranspiration	The process by which the Earth's surface or soil loses moisture by evaporation of water and by uptake and then transpiration from plants.

Item	Description
Filter drain	A linear drain consisting of a trench filled with a permeable material, often with a perforated pipe in the base of the trench to assist drainage, to store and conduct water, but may also be designed to permit infiltration.
Filter strip	A vegetated area of gently sloping ground designed to drain water evenly off impermeable areas and filter out silt and other particulates.
Flood	A flood is defined as when water covers land that is normally dry.
Flood frequency	The probability of a flow rate being equalled or exceeded in any year.
Flood Mitigation	Methods of reducing the effects of floods. These methods may be structural solutions (e.g. reservoirs) or non-structural (e.g. land- use planning, early warning systems).
Floodplain	Land adjacent to a watercourse that would be subject to repeated flooding under natural conditions.
Fluvial flooding	Flooding from a main watercourse (brooks, streams, rivers and lakes etc.) that occurs when the water features cannot cope with the amount of water draining into them, from the land. When rainfall is heavy and/or prolonged, a large amount of run-off reaches the rivers and eventually causes them to overtop their banks.
Green Infrastructure	The network of land and water that is made up of green spaces and natural elements.
Green roof	A roof with plants growing on its surface, which contributes to local biodiversity. The vegetated surface provides a degree of retention, attenuation and treatment of rainwater, and promotes evapotranspiration.
Greywater	Wastewater from sinks, baths, showers and domestic appliances. A Greywater system captures this water before it reaches the sewer (or septic tank system).
Groundwater	Water that is below the surface of ground in the saturation zone.
Groundwater flooding	Occurs when water levels in the ground rise above the natural surface. Low-lying areas underlain by permeable strata are particularly susceptible.
Highway authority	A local authority with responsibility for the maintenance and drainage of highways maintainable at public expense.
Highways Agency	The government agency responsible for strategic highways, i.e. motorways and trunk roads.
Hydrological	The occurrence, circulation, distribution, and properties of the waters of the earth and its atmosphere.
Impermeable surface	An artificial non-porous surface that generates a surface water runoff after rainfall.
Infiltration	The passage of surface waters through the surface of the ground/the entry of groundwater to a sewer.
Infiltration device	A device specifically designed to aid infiltration of surface water into the ground.
Infiltration trench	A trench, usually filled with stone, designed to promote infiltration of surface water to the ground.
Material Consideration	A legal term describing a matter or subject which is relevant (material) for a local authority to consider when using its powers under planning law in dealing with a planning application.
Model agreement	A legal document that can be completed to form the basis of an agreement between two or more parties regarding the maintenance and operation of sustainable water management systems.
Operating Authorities	Any body, including the Environment Agency, Internal Drainage Board, County Council and Local Authority, who have powers to make or maintain works for the drainage of land.
Ordinary Watercourses	Any watercourse that does not form part of a main river.
Permeability	A measure of the ease with which a fluid can flow through a porous medium. It depends on the physical properties of the medium, for example grain size, porosity and pore shape.
Permeable pavement	A paved surface that allows the passage of water through voids between the paving blocks/slabs.
Permeable surface	A surface formed of material that is itself impervious to water but, by virtue of voids formed through the surface, allows infiltration of water to the sub-base through the pattern of voids, e.g. concrete block paving.
Pervious surface	A surface that allows inflow of rainwater into the underlying construction or soil.
Piped system	Conduits generally located below ground to conduct water to a suitable location for treatment and/or disposal.

Item	Description
Pluvial Flooding	Flooding that results from rainfall generated overland flow before the runoff enters any watercourse or sewer. It is usually associated with high intensity rainfall events. Also referred to as surface water flooding.
Pollution	A change in the physical, chemical, radiological or biological quality of a resource (air, water or land) caused by man or man's activities that is injurious to existing, intended or potential uses of the resource.
Pond	Permanently wet basin designed to retain storm water and permit settlement of suspended solids and biological removal of pollutants.
Porous paving	A permeable surface allowing the passage of water through voids within, rather than between, the paving blocks/slabs.
Porous surface	A surface that infiltrates water to the sub-base across the entire surface of the material forming the surface, for example grass and gravel surfaces, porous concrete and porous asphalt.
Prevention	Site design and management to stop or reduce the occurrence of pollution and to reduce the volume of runoff by reducing impermeable areas.
Probability Event	The statistical probability of a flooding episode (event) occurring.
Protection	The flood event return period above which significant damage and possible failure of the flood defences could occur.
Public sewer	A sewer that is vested in and maintained by a sewerage undertaker.
Recovery	The process of rebuilding and rehabilitating the community following an emergency.
Reservoir	A natural or artificial lake 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.
Residual Risk	The Risk that remains after risk management and mitigation measures have been implemented.
Resilience	The ability of the community, services, area or infrastructure to withstand the consequences of an incident.
Return Period	A return period also known as a recurrence interval is an estimate of the likelihood of an event, it is a statistical measurement typically based on historic data denoting the average recurrence interval over an extended period of time.
Risk	"Risk" as defined by the Flood and Water Management Act 2010 means a risk in respect of an occurrence assessed and expressed as a combination of the probability of the occurrence with its potential consequences.
Risk assessment	A structured and auditable process of identifying potentially significant events, assessing their likelihood and impacts, and then combining these to provide an overall assessment of risk, as a basis for further decisions and action.
Risk Management Authorities	Organisations that have a key role in flood and coastal erosion risk management as defined by the Flood and Water Management Act (2010). These are the Environment Agency, lead local flood authorities, district councils where there is no unitary authority, internal drainage boards, water companies, and highways authorities.
River flooding	Occurs when water levels in a channel overwhelms the capacity of the channel.
Run-off	Water flow over the ground surface to the drainage system. This occurs if the ground is impermeable, is saturated or if rainfall is particularly intense.
Separate sewer	A sewer for surface water or foul sewage, but not a combination of both.
Sequential Test	The Sequential Test advocates that planners use a sequential test when considering land allocations for development to avoid flood risk where possible.
Sewer	A pipe or channel taking domestic foul and/or surface water from buildings and associated paths and hardstandings from two or more curtilages and having a proper outfall.
Sewerage undertaker	A collective term relating to the statutory undertaking of water companies that are responsible for sewerage and sewage disposal including surface water from roofs and yards of premises.
Sewers for Adoption	A guide agreed between sewerage undertakers and developers (through the House Builders Federation) specifying the standards to which new sewers need to be constructed to facilitate adoption.
Significant	Defined threshold of flooding consequence.

Item	Description
Soakaway	A subsurface structure into which surface water is conveyed to allow infiltration into the ground.
Source control	The control of runoff or pollution at or near its source.
Storm water	Rainwater that runs off impervious surfaces and into storm drains rather than being absorbed into the soil.
Sub-catchment	A division of a catchment, allowing runoff management as near to the source as is reasonable.
Surface water flooding	Occurs when the level of rainfall overwhelms the capacity of the drainage system to cope.
Sustainable Drainage Systems (SuDS)	A sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques.
Swale	A shallow vegetated channel designed to conduct and retain water, but may also permit infiltration; the vegetation filters particulate matter.
Treatment	Improving the quality of water by physical, chemical and/or biological means.
Wastewater	This is 'used' water arising from homes and businesses and includes water from sinks, toilets, bathtubs, washing machines and dishwashers – any water that has to be drained, including storm water.
Watercourse	A term including all rivers, streams ditches drains cuts culverts dykes sluices and passages through which water flows.
Wetland	A pond that has a high proportion of emergent vegetation in relation to open water.

Appendix F – Principle Contact Details

Table F.1: Principle Contact Details

Emergency Authorities	Contact Details	Web Address
Cheshire Fire and Rescue Service Headquarters	Sadler Road Winsford Cheshire CW7 2FQ Tel: 01606 868700	http://www.cheshirefire.gov.uk/
Cheshire Police	Warrington Police Station Arpley Street Warrington WA1 1LQ Tel: 0845 458 0000 Email: warrington.lpu@cheshire.pnn.police.uk Dial 999 in an emergency or dial 101 in a non-emergency	https://www.cheshire.police.uk/
Environment Agency	Richard Fairclough House Knutsford Road Warrington WA4 1HT General enquiries 03708 506 506 (Mon-Fri, 8am – 6pm) Incident hotline 0800 80 70 60 (24 hour service) Floodline (24 hour service) 0345 988 1188 General enquiries email enquiries@environment-agency.gov.uk	http://www.environment-agency.gov.uk/
North West Ambulance Service	Cheshire and Merseyside Office Elm House Belmont Grove Anfield Liverpool L6 4EG General Enquires Tel: 0151 260 5220 Dial 999 in an emergency or dial 111 in a non-emergency	http://www.nwas.nhs.uk/

Emergency Authorities	Contact Details	Web Address
Scottish Power Manweb (Electricity)	Emergency Contact Tel: 0845 272 2424	http://www.scottishpower.com/
Nation Grid (Gas)	Emergency Contact Tel: 0800 111 999 General Enquires Tel: 0845 835 1111	http://www.nationalgrid.com/uk/
United Utilities	Haweswater House Lingley Mere Business Park Lingley Green Avenue Great Sankey Warrington WA5 3LP Tel: 0345 672 3723	http://www.unitedutilities.com/
Warrington Borough Council	New Town House Buttermarket Street Warrington WA1 2NH <u>General Enquires</u> contact@warrington.gov.uk Tel: 01925 44 33 22 <u>Flood Risk Team</u> floodrisk@warrington.gov.uk	http://www.warrington.gov.uk

Appendix G - Sandbag Policy

Councils Responsibilities

The Council has no legal duty to provide sandbags to the community unless the flooding is due to flooding from the Highway or other Council owned land.

Although the Council have no legal responsibility to provide assistance to residents during times of flooding, where possible, the Council will provide sandbags and other equipment to protect people or property within areas being affected by flooding. However, in times of emergency the Council will be trying to protect the public at large and may not be able to assist a large number of individual homeowners who find their properties threatened.

Warrington Borough Council has considered the issues in relation to flooding and the impact it can have on the communities affected. As a result, sandbags may be provided on condition that the situation fits the criteria as set out below.

Property Owners Responsibilities

The responsibility for flood protection of property is the sole responsibility of the property owners. As a result all such owners should assess the risk of flooding to their property and take the necessary precautions to protect their own property which may include installing physical flood protection barriers and joining the Environment Agency Flood Warning System.

Where it is safe householders should move valuable possessions and important documents upstairs and consider moving vehicles to higher ground.

WAY MARKER G.2

Flood Warning System

<https://www.fws.environment-agency.gov.uk/app/olr/home>

Long Term Flood Risk

<https://flood-warning-information.service.gov.uk/long-term-flood-risk>

Provision of Sandbags

Sandbags will only be deployed having regard to the order of the following priorities provided stocks are available:

Primary Prioritisations for Allocation

- To prevent loss of life or serious injury.
- To maintain access for emergency services.
- To assist in the protection of vital facilities within the community e.g. hospitals, police and fire stations, residential care homes etc.
- To protect Warrington Borough Council business property that are required for the delivery of essential services.
- To protect key transport and main access routes.

Secondary Prioritisations for Allocation

- To reinforce flood defences preventing the flooding of multiple properties.
- If a privately owned property (not including a garage, garden shed etc.) is at imminent risk of flooding i.e. within the next 2 hours and that the 'fabric' of a building is at risk as a result.
- Mutual aid to other responding agencies.

Control of Sandbag Provision

In a localised minor/major flooding event the decision to deploy sandbags may be taken separately outside the provision of sandbags criteria as above. In this case the decision will be made at the discretion of the Public Realm Division.

In the case of an Emergency flood event the decision would be taken by the Borough Emergency Co-ordinator with advice provided by the Highways Co-ordinator.

Where it is decided to supply sandbags then the number of sandbags delivered to any property will be based on the following:

Domestic Properties in imminent risk of internal flooding:

- 6 per door
- 3 per airbrick
- Up to a maximum of 18

Sandbag Stocks

In order to facilitate the council response 6,000 sandbags are kept in stock.

The Council does not maintain large stockpiles of sandbags for the protection of private residences for the following reasons:

- Sandbags have a limited shelf life;
- Sandbags provide limited protection in the event of a flood and often their correct placement is critical;

- Sandbags are most effective when placed prior to a flood event. In most cases it will not be possible to arrange transportation and placement of sandbags to prevent flood damage. This is due to the limited time available between warnings and the onset of flooding (in some areas no warning will be available);
- Cost of storage.

Delivery of Sandbags

The Council Highways Contractor who provides this service has a 2 hour response time in an emergency situation. That is to say that it will take 2 hours from the initial call to the contractor to the delivery being made on site subject to the availability of labour, equipment and dependent on access due to the flooding.

The Council only has a small stock of sandbags, staff and vehicles that may be deployed to deliver them. Delivery may not be possible to all areas which are flooding. Council resources may be deployed elsewhere in the larger geographical area dependent upon the emergency situation. Priority help will be given to vulnerable people where these are known.

Collection/Removal of Sandbags

Due to the risk of contamination, sandbags will be collected and disposed of by the council following a flood event free of charge unless a specific request is made to retain them.

What the Council Will Not Provide

Warrington Borough Council will not:-

- Provide sandbags for properties not at imminent risk of flooding;
- Provide sandbags to protect gardens;
- Provide sandbags for protecting outbuildings (including garages, whether integral or external);
- Provide sandbags for protecting non-habitable parts of any private dwelling;
- Provide sandbags for protecting commercial premises unless it is deemed to be a community facility e.g. hospitals, police and fire stations, residential care homes etc.;
- Provide sandbags to protect critical infrastructure (e.g. water, gas, electric infrastructure) as this is the responsibility of the property owner.

Warrington Borough Council will assist in the protection of critical infrastructure if the resources of the company are overwhelmed causing an impact on any of the priorities outlined in the allocation protocol. In these cases the council will re-claim the cost of this provision from the company following the incident.

- Provide sandbags as a precautionary measure unless there is a real risk of internal flooding within the next 2 hours;
- Guarantee the supply of sandbags to any premises. Residents are responsible to make their own arrangements before flooding occurs;
- Guarantee the effectiveness or adequacy of supply of sandbag products provided by the Authority;

- Accept responsibility for placement of sandbags, except at locations where the infirmity or disability of the sole occupant is an issue where known.

Appendix H – Options Suitable for Warrington Borough Council

Options below are not exhaustive. Options will be developed through early consultation with all interested stakeholders.

Table H.1: Options to Control the Source – Reducing Catchment Runoff

Method	Potential Stakeholders
<p style="text-align: center;">Land Use</p> <p>Surface water runoff can be reduced through the implementation of certain agricultural practices. Examples include:</p> <ul style="list-style-type: none"> • Ploughing land across the slope of the land thereby, reducing the effect of channelling of water over the land when it rains; • Incorporating buffer strips on farm with tree planting to delay the flow of water through a catchment; • Construction of “leaky dams” to slow the flow of water within a channel. 	<p style="text-align: center;">Farmers</p>
<p style="text-align: center;">Sustainable Drainage Systems (SuDS)</p> <p>Implementation of sustainable drainage measures as part of any development is a necessity to ensure future flood risk is not increased due to an increase in impermeable area. There is also potential to reduce the existing flood risk. Examples include, but not exclusive to swales, attenuation basins and ponds. These methods will act as source control method to reduce the amount of run off entering the drainage network, and therefore reduce the risk of flooding downstream from a severe rainfall event. There are also environmental benefits with the installation of these systems such as a reduction in diffuse pollution entering the watercourses.</p> <p>Further information is contained within Warrington Borough Council’s SuDS Guidance Manual.</p>	<p style="text-align: center;">Landowners</p> <p style="text-align: center;">Developers</p> <p style="text-align: center;">United Utilities</p> <p style="text-align: center;">Environment Agency</p>
<p style="text-align: center;">Storage</p> <p>Providing storage can take up a large land area, but with careful design can take different forms to incorporate them into the existing landscape. These aim to control the rate in which run off is discharged into the watercourse and if ground conditions are suitable allows water to infiltrate.</p> <p>Examples include ponds, ditches or low lying land or by creating new ponds and areas to store water.</p>	<p style="text-align: center;">Warrington Borough Council</p>

Table H.2: Options to Control the Pathway

Method	Potential Stakeholders
<p style="text-align: center;">Storage</p> <p>Where land area allows it may be possible to construct offline and online storage areas, to attenuate the flood water and discharge it from the area at a manageable rate. A large area of land maybe required but can be multifunctional space.</p> <p>If the solution is designed to attenuate over 10,000m³ of water it may be designated as a reservoir (under the Reservoirs Act 1975, as amended by the Floods and Water Management Act 2010).</p> <p style="text-align: center;">Channel Design</p> <p>Reduce or increase the conveyance capacity of the watercourses (for example, by construction of bypass channels or multistage channels, by widening or deepening, or by changing the roughness of the existing channel).</p> <p>Removal of constrictions to the flow within the channel or floodplain.</p> <p style="text-align: center;">Flood Farming</p> <p>Engaging with farmers or landowners to agree to permit their land to be designed to flood more frequently through the construction of measures around an area to contain the water as it flows in. Compensation to the farmer or landowner will need to be taken into consideration.</p>	<p>Farmers</p> <p>Landowners</p> <p>Developers</p> <p>United Utilities</p> <p>Environment Agency</p> <p>Warrington Borough Council</p>

Table H.3: Options to Affect the Receptor – Asset Protection

Method	Potential Stakeholders				
<p style="text-align: center;">Walls and Embankments</p> <p>Hard engineering techniques may be the only viable option in some areas, these methods would involve the construction of embankments and flood walls; these can be costly and have higher environmental implication on the area when compared to other methods.</p> <p style="text-align: center;">Property Level</p> <p>A general approach to improving community resilience should be adopted throughout Warrington, including increasing the general awareness and preparedness for a flood event in areas that are at high risk areas. There are options for home and business owners to take action in relation to resistance and resilience measures.</p> <table border="1" data-bbox="277 646 1144 911"> <tr> <td data-bbox="277 646 716 793"> <p style="text-align: center;">Resilience Measures</p> <p>These are measures that allow buildings to recover quickly in the event of flooding.</p> </td> <td data-bbox="716 646 1144 793"> <p>Existing developments in risk areas could retrofit flood resilience measures therefore allowing a property to be quickly habitable again if a property did flood.</p> </td> </tr> <tr> <td data-bbox="277 793 716 911"> <p style="text-align: center;">Resistance Measures</p> <p>These are described as those measures that prevent water from entering the property.</p> </td> <td data-bbox="716 793 1144 911"> <p>In addition the properties could include property protection schemes, such as demountable flood defences and airbrick covers.</p> </td> </tr> </table> <p style="text-align: center;">Exceedance</p> <p>Overland flow routes or flows that exceed the drainage systems capacity can be controlled along the existing highways or other flow routes to areas designed to attenuate flood water.</p> <p>This can be achieved through:</p> <ul style="list-style-type: none"> • Increasing kerb heights and property thresholds to retain water on designated sections of highway. This could be combined with existing highways maintenance and improvement projects which would make it more cost effective. • Divert flood flows to less vulnerable areas, through bypass channels or a piped network, with a suitable capacity. This can be incorporated into new development as part of the planning and design phase. 	<p style="text-align: center;">Resilience Measures</p> <p>These are measures that allow buildings to recover quickly in the event of flooding.</p>	<p>Existing developments in risk areas could retrofit flood resilience measures therefore allowing a property to be quickly habitable again if a property did flood.</p>	<p style="text-align: center;">Resistance Measures</p> <p>These are described as those measures that prevent water from entering the property.</p>	<p>In addition the properties could include property protection schemes, such as demountable flood defences and airbrick covers.</p>	<p>Farmers</p> <p>Landowners</p> <p>Developers</p> <p>United Utilities</p> <p>Environment Agency</p> <p>Warrington Borough Council</p> <p>Local Residents</p>
<p style="text-align: center;">Resilience Measures</p> <p>These are measures that allow buildings to recover quickly in the event of flooding.</p>	<p>Existing developments in risk areas could retrofit flood resilience measures therefore allowing a property to be quickly habitable again if a property did flood.</p>				
<p style="text-align: center;">Resistance Measures</p> <p>These are described as those measures that prevent water from entering the property.</p>	<p>In addition the properties could include property protection schemes, such as demountable flood defences and airbrick covers.</p>				

Appendix I – References

Table I.1: Warrington Borough Council References

Document/Website	Link
Asset Register	http://www.jbamap.co.uk/map/la/warringtonassetregister/
Climate Change Strategy	https://www.warrington.gov.uk/download/downloads/id/8675/climate_change_strategy.pdf
Consent form application	https://www.warrington.gov.uk/download/downloads/id/11026/consent_form_application.pdf
Consent form application guidance notes	https://www.warrington.gov.uk/download/downloads/id/11027/consent_form_application_guidance_notes.pdf
Emergencies	https://www.warrington.gov.uk/info/201107/emergencies
Facebook	https://www.facebook.com/warringtonbc
Flooding Advice for Residents	https://www.warrington.gov.uk/downloads/download/494/flooding_advice_for_residents
Local Plan Core Strategy 2014	https://www.warrington.gov.uk/info/200564/planning_policy/1903/local_plan
Section 19 Report - Previous Investigations	https://www.warrington.gov.uk/downloads/download/2472/investigating_after_a_flood
Strategic Flood Risk Assessment 2011	https://www.warrington.gov.uk/info/200564/planning_policy/1905/evidence_base/8
Sustainable Drainage Systems (SuDS) Guidance	https://www.warrington.gov.uk/info/201080/streets_and_transport/2037/flooding
Twitter	https://twitter.com/warringtonbc
Warrington Town Centre Master Plan Vision 2030 (2012)	http://sys.warrington.gov.uk/content_documents/documents/warringtonandco/Images/Vision%202030%20Presentation%20AF%20LR_tcm37-57105.pdf
Warrington Town Centre South Masterplan Framework (2008)	https://www.warrington.gov.uk/download/downloads/id/1917/bridge_street_quarter_final_report_-_introduction.pdf
Website	https://www.warrington.gov.uk/floods

Table I.2: References to Other Documents

Document/Website	Link
Association of British Insurers - Flooding	https://www.abi.org.uk/products-and-issues/topics-and-issues/flooding/
Catchment Flood Management Plans	https://www.gov.uk/government/collections/catchment-flood-management-plans
Cheshire Resilience Forum Multi – Agency Emergency Response Manual	http://cheshireresilience.org.uk/recovery-issues/
Civil Contingencies Act 2004	www.legislation.gov.uk/ukpga/2004/36/contents
Climate Change Act 2008	http://www.legislation.gov.uk/ukpga/2008/27/contents
Conservation of Habitats and Species Regulations 2010	http://www.legislation.gov.uk/uksi/2010/490/contents
Defra's policy statement	https://www.gov.uk/government/publications/appraisal-of-flood-and-coastal-erosion-risk-management-a-defra-policy-statement-june-2009
Environment Agency National Strategy	https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england

Document/Website	Link
Environment Agency project appraisal	https://www.gov.uk/guidance/flood-and-coastal-defence-appraisal-of-projects
Emergency response and recovery	https://www.gov.uk/guidance/emergency-response-and-recovery
Environment Act 1995	www.legislation.gov.uk/ukpga/1995/25/contents
Environment Agency – Consent Information	https://www.gov.uk/permission-work-on-river-flood-sea-defence
Environment Agency: Asset Performance Tools – Asset Inspection Guidance	http://evidence.environment-agency.gov.uk/FCERM/Libraries/FCERM_Project_Documents/APT_2_report.sflb.ashx
Environment Agency: Living on the Edge	https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities
Flood and Coastal Defence Funding - Risk Management Authorities	https://www.gov.uk/government/collections/flood-and-coastal-defence-funding-for-risk-management-authorities
Flood and Coastal Erosion Risk Management - Appraisal Guidance	https://www.gov.uk/government/publications/flood-and-coastal-erosion-risk-management-appraisal-guidance
Flood and Water Management Act 2010	www.legislation.gov.uk/ukpga/2010/29/contents
Flood RE	http://www.floodre.co.uk/
Flood risk and coastal change	https://www.gov.uk/guidance/flood-risk-and-coastal-change
Flood risk management: information for flood risk management authorities, asset owners and local authorities	https://www.gov.uk/guidance/flood-risk-management-information-for-flood-risk-management-authorities-asset-owners-and-local-authorities
Flood Risk Regulations 2009	www.legislation.gov.uk/uksi/2009/3042/contents
Guidance – Local Government Legislation: Byelaws	https://www.gov.uk/guidance/local-government-legislation-byelaws
Land Drainage Act 1991	www.legislation.gov.uk/ukpga/1991/59/contents
Local Authority Network on Drainage and Flood Risk Management (LANDFoRM)	http://www.ciria.org/Membership/LANDFoRM/Memberships/LANDFoRM.aspx
Local Government Association - Data Handling Requirements	http://www.lemosandcrane.co.uk/dev/resources/LGA%20-%20local%20government%20data%20handling%20guidelines.pdf
Local Government Association - Framework to assist the development of the Local Strategy for Flood Risk Management: 'A Living Document'	https://www.local.gov.uk/sites/default/files/documents/lgas-framework-assist-dev-3bc.pdf
Local Government Association - Paying for Flood and Coastal Erosion Risk	https://www.local.gov.uk/topics/civil-emergencies/flooding/paying-flood-and-coastal-erosion-risk
Localism Act 2011	http://www.legislation.gov.uk/ukpga/2011/20/contents/enacted
Mersey Estuary Catchment Flood Management Plan (CFMP) 2009	https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/293769/Mersey_Estuary_Catchment_Flood_Management_Plan.pdf

Document/Website	Link
National flood and coastal erosion risk management strategy for England	https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england
National Flood and Coastal Risk Management Strategy for England 2011	https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england
National Flood Forum	www.nationalfloodforum.org.uk
National Planning Policy Framework	https://www.gov.uk/government/publications/national-planning-policy-framework--2
Pitt Review 2008	http://webarchive.nationalarchives.gov.uk/20100702214846/http://archive.cabinetoffice.gov.uk/pittreview/thepittreview.html
Planning Practice Guidance: Flood Risk and Coastal Change (2014)	https://www.gov.uk/guidance/flood-risk-and-coastal-change
Scrutiny of flooding toolkit	https://khub.net/c/document_library/get_file?uuid=b9bbb434-4c37-45a5-9022-a6be94598719&groupId=6084608
Strategic Environmental Assessment Directive - Guidance	https://www.gov.uk/government/publications/strategic-environmental-assessment-directive-guidance
The Green Book - Appraisal and Evaluation in Central Government	https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government
UK Climate Projections	http://ukclimateprojections.metoffice.gov.uk/
Water Industry Act 1991	http://www.legislation.gov.uk/ukpga/1991/56/contents
Water Resources Act 1991	www.legislation.gov.uk/ukpga/1991/57/contents