Cheshire West and Chester Council

Local Flood Risk Management Strategy

Cheshire West and Chester

Review

This document has been produced solely for the purpose of how we will manage flood risk in Cheshire West and Chester. It is has an ongoing review process and will be fully revised at six year intervals in-line with the Cheshire West and Chester Preliminary Flood Risk Assessment.

Document Control

Version	Prepared By	Checked By	Date	Comment
Draft	M Young ……	R Brooks ……	August 2015	Draft Version – issued for public consultation.
Version 1	M Young ……	R Brooks ……	February 2016	First issue.

Local Government Regulation

defra Department for Environment Food and Rural Affairs

Environment Agency

Cheshire West and Chester

Foreword

This is the first Local Flood Risk Management Strategy for Cheshire West and Chester. The Local Strategy will help to ensure that the Council, the Environment Agency, Welsh Water, Dee Valley Water, United Utilities and other partners work together to help protect homes, businesses and other infrastructure across West Cheshire from flooding, whilst ensuring all other relevant considerations are taken into account.

This Local Strategy will consider how we can help to manage the risk of flooding. This is not something that any one organisation can do on its own. It requires co-operation from all public agencies, businesses and households. It is vital that organisations work better, not just with each other but also crucially with the public.

Consequently, the roles and responsibilities of all major stakeholders, including households and community groups, are identified in this Local Strategy so that there is clarity and a good understanding about when different stakeholders should be involved. We have a strong and long tradition of partnership working in Cheshire West and Chester and we intend to extend this to managing flood risk.

Taking effective steps to reduce flood risk, especially at a time when budgets are limited, requires an evidence based assessment to ensure that efforts and resources are appropriately focused. The floods of 2007 and 2012 highlighted the problems we face across the Borough. The probability of such events happening again is only likely to grow as climate change increases the frequency of extreme weather. Homes and businesses that have never been flooded in living memory may be at risk.

Measures we have already taken to reduce flood risk are identified in the Local Strategy as well as work that we are planning to undertake in the future. We can never prevent all areas from flooding but we can take practical steps to reduce both the likelihood of severe rainfall leading to flooding and also the 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 strategy is our statement of intent as to how we will manage flood risk in Cheshire West and Chester. The actions detailed in this strategy will ensure that if and when flooding occurs, we are as prepared as we reasonably can be.

Brian Clarke
Portfolio Holder for Economic Development and Infrastructure

Cheshire West and Chester

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1 Introduction

This Local Flood Risk Management Strategy (the Local Strategy) sets out a framework for managing the risk of local flooding. Local Flooding is defined by the Flood and Water Management Act 2010 as flooding from:

- Surface Water
- Groundwater
- Ordinary Watercourses
- Canals

Other authorities also have a role in managing these local flood risks (see Section 3 for details). There are other sources of flood risk but these are managed through other strategies and plans.

1.1 What is flood and coastal erosion risk management?

Managing flood risk and coastal erosion involves:

- knowing when and where local flooding and coastal erosion is likely to happen;
- taking reasonable steps to reduce the likelihood of it happening;
- forecasting and providing warnings of floods so that people, businesses, infrastructure providers and public services can take effective action to minimise the consequences of floods, and
- adapting to coastal change and acting to reduce the risk to life, damage and disruption caused by flooding.

Local flooding is generally caused by short duration localised rainstorms so effective forecasting can be difficult. For this reason adaption and preparedness in advance of an event are key factors in local flood risk management.

There are a number of assets that may reduce the likelihood of floods or coastal erosion. Examples are:

- maintained river channels;
- raised embankments;
- floodwalls and seawalls;
- culverts and sustainable drainage systems (SuDS).

Normally a number of assets will be used together to manage the risk in a particular area, working in combination within a risk management system.

Examples of the steps that may be taken to reduce the damage and disruption when floods or coastal erosion do happen include:

- controlling inappropriate development to avoid increasing risk;
- adapting buildings to minimise damage;
- moving items such as household goods, treasured possessions or vehicles away from floodwater;

- making sure that an emergency response plan is in place and can be implemented when needed as set out in the Local Multi-Agency Emergency Response Plan.

Other steps that may be taken to manage risk include:

- transferring risk to other areas where the consequences are low, for example by allowing land to flood and contain floodwater to prevent flooding elsewhere;
- by sharing part of the risk with others with their agreement, for example by sharing the cost of flood damage through insurance;
- tolerating a residual level of risk, for example by accepting that a flood may cause some disruption that is prepared for or is dealt with when it occurs.

1.2 Why has a strategy been produced?

The local strategy is a requirement of The Flood and Water Management Act 2010 (the Act).

The Act addressed many of the issues identified following the floods in the summer of 2007 and the subsequent review by Sir Michael Pitt and earlier studies such as the Foresight 'Future Flooding' report, the Institution of Civil Engineers (ICE) Ministerial Commission's 'Learning To Live With Rivers', and Government's 'Making Space For Water'. Previous legislation was limited to giving authorities narrow powers to drain land, build defences and provide flood warning without providing for wider approaches to managing risks.

In response to the development of thinking on flood risk management, the 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). This strategy will contribute to the implementation of the Act by managing local flood risk in a co-ordinated way.

1.3 Who is the strategy aimed at?

This strategy is aimed at the main flood risk management authorities operating in the Borough and will clearly set out the Borough's links with them (se Section 3). The role of these authorities is identified in the Act.

The strategy will also be of interest 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.

1.4 Reviewing and reporting on the local strategy

As a lead local flood authority, Cheshire West and Chester must always have a local strategy and it should be monitored and reviewed regularly to ensure that the objectives are being delivered and they are still relevant.

This is the first local strategy that we have produced since the Flood and Water Management Act 2010 and since being made a lead local flood authority. As such there are a number of new roles that have to be undertaken in order for us to discharge the Acts' new legislative requirements. These are set out in Section 6, and are important for the strategic delivery of local flood risk management. Therefore, this first local strategy will be reviewed in three years time to assess the establishment of this new role. Future local strategies will have longer review periods, according to the measures identified in each.

The flood risk management actions identified to be delivered will be reviewed annually and new actions that have been identified will be added to the action plan. This means newly identified actions can be delivered according to their relative priority, without having to wait until the next version of the local strategy. These are set out in Section 11.

The Council is also expected to provide information on development and implementation of local strategies to inform reporting to Government. It is expected that the national understanding of risk will be developed and maintained through the provision of local information to the Environment Agency.

1.5 Historic context – recent experience

Cheshire West and Chester Council are well placed to co-ordinate flood risk management through its other statutory functions such as Local Highway Authority, Local Planning Authority and Civil Contingencies Act Category 1 Responder.

We have a well-developed network of partners by virtue of our historical operational and strategic practices. This strategy formalises and develops our partnerships in respect of flood risk and progresses the high level screening which was introduced in the Preliminary Flood Risk Assessment (PFRA) in June 2011. The PFRA showed that Cheshire West and Chester had no flooding issues that were nationally significant.

Local flooding is however on the increase. In the years 2010 and 2011 we experienced one of the most prolonged dry periods since 1953. 2012 was the second wettest on record in the UK and the wettest year on record for England according to data released by the Met Office. This has resulted in repeated flood events within the Borough at locations that have not experienced flooding before. Analysis based upon the UK's official climate record undertaken by the Met Office shows that the frequency of extreme rainfall in the UK may be increasing. Four out of the top five wettest years in the UK have occurred since 2000.

We are facing a future of erratic, unseasonable and extreme weather with flooding now one of the highest risks facing the Borough. The recent (September 2013) much-anticipated UN report by the International Panel on Climate Change (IPCC) says that with 95% certainty, humans are the dominant cause of global warming since the 1950s. The report says the period from 1983 – 2012 in the Northern Hemisphere was likely to be the warmest 30-year period of the last 1,400 years. Each of the last three decades has got successively warmer, and these decades have all been warmer than any of the preceding decades since 1850.

1.6 Legal context

Following the 2007 Floods, the Pitt Review (2008) led to the overhaul of flood risk legislation within England and Wales, which emphasised greater responsibility, particularly for surface water issues, to upper tier Authorities such as Cheshire West and Chester Council. These responsibilities were brought about with the Flood and Water Management Act (2010). Summaries of these documents are as follows:

Legislation	Details
The Flood Risk Regulations (2009) (1) Preliminary Flood Risk Assessment (PFRA), June 2011 (2) Flood Hazard and Flood Risk Maps (3) Flood Risk Management Plans	The Flood Risk Regulations transposes the EU Floods Directive into law for England and Wales. The Flood Risk Regulations require three main pieces of work: The collecting of information on past and future floods from surface water, groundwater and small watercourses, assembling the information into a PFRA report and identifying Indicative Flood Risk Areas. The PFRA for Cheshire West and Chester Council has been completed and available on the Council website. Following the identification of Flood Risk Areas, the Environment Agency and Cheshire West and Chester Council were required to produce flood risk maps for the 2011 PFRA. LLFAs are to produce a Flood Risk Management Plan for the Indicative Flood Risk Areas – there are none within our administrative boundary so this does not apply to The Council.
The Flood and Water Management Act (2010)	The Flood & Water Management Act (FWMA) provides legislation for the management of risks associated with flooding and coastal erosion. Many of the recommendations contained in the Pitt Review have been enacted through the Flood and Water Management Act. The Act places a number of roles and responsibilities on councils such as Cheshire West and Chester Council, designating it a Lead Local Flood Authority.
National Planning Policy Framework (2012)	The National Planning Policy Framework is a new document developed by the Department for Communities and Local Government (CLG). It is designed to streamline planning policy by substantially reducing the amount of planning guidance and bringing it all together in one coherent document.

The Flood and Water Management Act 2010 places a number of new duties on the Council through either amendments to existing Acts (such as the Land Drainage Act 1991) or through the FWMA itself. The key powers and duties in the Act are summarised in Section 6.

2 Assessment of flood risks in Cheshire West and Chester

This section describes the various forms of flooding that are experienced in Cheshire West and Chester. Different risk management authorities have powers and duties for the various forms of flooding that can occur. Due to the interaction of different forms of flooding, the solution to many flooding problems may be very complex and involve many forms of flooding and several risk management authorities.

Individuals also have responsibilities for managing flood risk. Those who own properties that are adjacent to watercourses or have watercourses running through them are known as riparian owners. Riparian owners have responsibility for maintaining watercourses and rivers but we are all responsible for protecting our own properties from the risks of flooding. Whatever steps an individual takes to protect property from flooding it must be carried out

with due care. Property owners must ensure that they do not cause harm to neighbours or their properties.

2.1 The Area

The area for this strategy is defined by the boundary of Cheshire West and Chester Council - see Figure 1.

The Council has a population of 327,500 and an area of 91,664 hectares. Much of the council area is rural, with over 75% of land classed as agricultural. In addition to Cheshire East Council to the east, The Council is bounded to the west by the Welsh border, to the north by the Mersey Valley, and to the south by Shropshire.

The main urban areas include the historic town of Chester with a population of 77,000, the industrial towns of Ellesmere Port (61,000), Northwich (20,000), and Winsford (30,000), together with the smaller settlements of Neston, Frodsham, Helsby and Malpas. The principal rivers within The Council are the River Weaver, River Gowy, River Dee, River Dane, and the River Croco. The River Mersey also flows along part of the northern border of The Council. The Shropshire Union Canal, the Trent and Mersey Canal, and the Weaver Navigation are present within the Borough; these are managed by The Canal and River Trust. The Mersey Ship Canal also passes through the Borough; this is managed by The Manchester Ship Canal Company. The Council is served by three water companies: Welsh Water and Dee Valley Water in the west; and United Utilities in eastern areas.

The Mersey and Dee Estuaries are both tidal and interact with the watercourses and drainage infrastructure flowing out into them. The tidal limits are as follows:

- Bridge Trafford, a hamlet north east of Chester on the River Gowy
- Frodsham on the River Weaver
- Chester weir on the River Dee (and during high astronomical tides as far as Shocklach Green, 15km upstream of Chester Weir)

The area is covered by parts of two catchments, the Dee and Weaver Gowy. Within the area, the Dee catchment can be split into 3 sub areas, the middle Dee, the lower Dee and Chester. The Weaver Gowy catchment can be split into Stanlow, Frodsham, Winsford, Northwich and rural areas.

The Middle Dee sub area includes the communities of Tattenhall and Malpas. The main flood risk here is from the River Dee, but there are local areas of surface water and sewer flooding, for example in Tattenhall. The lower Dee is mainly a rural area downstream of Worthenbury. It contains much of the Dee Meanders, and several settlements including Holt, Farndon, Aldford and Eccleston. The Chester sub area includes the city of Chester and its immediate suburbs. It is a densely populated urban area interspersed with open spaces and parks and is a major commercial area in West Cheshire.

The Weaver Gowy catchment is predominantly rural and low lying in nature. The Cheshire Plain forms the majority of the catchment. Most rivers flow northwards into the Manchester Ship Canal which discharges into the River Mersey, however, some watercourses flow directly into the Mersey Estuary. The Stanlow sub area of the Weaver Gowy catchment contains the Stanlow oil refinery, a strategically important economic asset located within the flood plain of this sub area. Northwich is located on the confluence of the Weaver Navigation

(part of the River Weaver) and River Dane. The greatest flood risk is from the fast flowing River Dane. Northwich has developed across the floodplain which means a high number of properties and critical infrastructure is at risk of flooding. Approximately 630 properties are at risk from the 1% annual probability event in this sub-area.

There is history of flooding in the Weaver Gowy catchment area. The most significant recorded event was in 1946 when snowmelt and heavy rain across the catchment caused Northwich to flood affecting over 300 properties. In 1977, 2000 and 2012, Northwich flooded again after heavy rainfall, affecting 15, 14 and 12 properties respectively.

The Preliminary Flood Risk Assessment (PFRA) produced in June 2011 concluded that compared to the National defined threshold there have been no flooding events from local sources that are deemed to have had 'significant harmful consequences'.

2.2 Sources of flood risk

2.2.1 Flooding from Watercourses (Fluvial)

Risk management authorities:

Main River	-	Environment Agency
Ordinary Watercourses	-	Cheshire West and Chester Council

Ordinary Watercourses are any watercourses that are not designated as 'Main River' by the Environment Agency come under the powers of Cheshire West and Chester Council. These watercourses can vary in size considerably and can range from drains and open ditches, to streams, brooks and small rivers. Information is lacking on ordinary watercourses; like many urban watercourse systems, the network through the Borough has many culverts. Some of these are not recorded, but we are working to improve this. Flooding from ordinary watercourses can occur without warning when main rivers back up at times of flash storm events.

Past Flooding from Ordinary Watercourses (Fluvial)

Data collected by The Council in producing the PFRA showed there had been 29 recorded instances of flooding relating to ordinary watercourses. These are shown on Figure 2.

Past Flooding from Main River

The main sources of flood risk associated with fluvial flooding from Main River sources in the Borough are the Dee, Weaver, Gowy, Dane and Croco rivers. Data collected by The Council in producing the PFRA showed there had been 4 recorded instances of flooding relating to main rivers. These are shown on Figure 2. Although flooding from Main River is the prime responsibility of the Environment Agency, the Council will liaise and act in partnership to solve or mitigate issues.

Future Flooding from Watercourses

The Environment Agency's National Flood Zone Map represents the probability of flooding from Main Rivers, and Ordinary Watercourses with a catchment area greater than 3km2. Figure 3 shows the Flood Zone Map with Main Rivers and Ordinary Watercourses highlighted. It shows that few ordinary watercourses within the area have been included within the Flood Zone Map. However, the majority of Ordinary Watercourses are not within high consequence locations, such as urban areas. Therefore, although future climate change is likely to increase fluvial flood risk, the majority of risk will come from Main Rivers.

2.2.2 Surface Water Flooding (Pluvial Flooding)

Risk management authority: Cheshire West and Chester Council

Surface water flooding (in this context) is surface water run-off resulting from high intensity rainfall and includes overland flows from the urban/rural fringe entering a built up area. It occurs when water is ponding or flowing over the ground surface before entering the underground drainage network or watercourse. It can also occur when surface water cannot enter the drainage network when it is already operating at capacity. Pluvial flooding from heavy rainfall can occur anywhere in the Council's area.

Past Surface Water Flooding

Surface water runoff is highly variable and often dependant on localized agricultural land management and the degree of ground saturation, which proved a particular contributing factor during the second half of 2012. Information was collected from local highways engineers when the PFRA was produced which revealed that there are a number of localised surface water flooding issues in low-lying and potentially tidally influenced areas. Information from Welsh Water also shows numerous sewer flooding incidents in these areas. This suggests that there could be tide-locking of drainage outfalls.

Data collected by The Council in producing the PFRA showed there had been 97 recorded instances of surface water flooding. These are shown on Figure 4.

Future Surface Water Flooding

The Council's PFRA uses the Environment Agency's 'Areas Susceptible to Surface Water Flooding' (AStSWF) national dataset to show the areas susceptible to surface water flooding. It is considered that the AStSWF dataset will best represent the risk in those areas of highest consequence (urban centres). However, further work is planned as part of the development of the Local Flood Risk Management Strategy to investigate surface water issues in greater detail.

Properties	Less Risk	Intermediate Risk	High Risk
All	28,900	10,000	520
Residential	22,000	7,400	475
Non-residential	6,900	2,600	45

Figures 5a, 5b & 5c show AStSWF datasets and the table below indicates the number of properties at risk from surface water flooding in the future, according to the AStSW dataset.

2.2.3 Groundwater Flooding

Risk management authority: Cheshire West and Chester Council

Groundwater flooding is caused by the emergence of water from underground, either at point or diffuse locations. The occurrence of groundwater flooding is usually very local and unlike flooding from rivers and the sea, does not generally pose a significant risk to life due to the slow rate at which the water level rises. However, groundwater flooding can cause significant damage to property, especially in urban areas, and can pose further risks to the environment and ground stability. There are several mechanisms, which produce groundwater-flooding including high in-bank river levels, artificial structures, prolonged rainfall and groundwater rebound (which occurs when abstraction, typically for drinking

water, industrial or mine dewatering purposes, stops and water levels return to pre-abstraction levels).

Past Groundwater Flooding

The Environment Agency's Catchment Flood Management Plans (CFMPs) state that groundwater flooding has occurred in some areas. These are localised issues and the risk of groundwater flooding is considered to be low at a catchment scale. There are no records of historic groundwater flooding that are considered as having significant harmful consequences.

Future Groundwater Flooding

The British Geological Survey (BGS) Groundwater Flooding Susceptibility Map has been used to show the potential future groundwater flood risk. This data does not necessarily imply flooding of properties, only that groundwater would emerge at the surface first within the indicated areas. Figure 6 indicates that areas to the south west of Chester, in Ellesmere Port, Northwich and various villages across the Borough are highly susceptible to groundwater emergence. As discussed previously, the CFMPs do not consider groundwater to be a catchment-scale issue, based on historical instances of groundwater flooding. It could be deduced that the BGS Groundwater Flooding Susceptibility Map represents a conservative (high) estimate of the level of risk.

2.2.4 Highway Drainage Networks and Sewers

Risk management authority:

Highway drains - Cheshire West and Chester Council
Sewers - United Utilities, Dwr Cymru Welsh Water

Flooding from artificial drainage systems occurs when flow entering a system, such as an urban storm water drainage system, exceeds its discharge capacity. The system becomes blocked or it cannot discharge due to a high water level in the receiving watercourse. A sewer flood is often caused in large rainfall events by surface water discharging into sewer systems when capacity is exceeded causing the backing up of floodwaters within properties or surcharging through manholes.

Past Flooding from Highway Drains and Sewers

Both United Utilities and Dwr Cymru Welsh Water have provided data on historic instances of sewer flooding across The Council which was collected over a number of years. The table below shows the towns located within the Borough that have the highest recorded incidents of sewer flooding. As it is unlikely that the same methodology has been used by both of the utilities companies the results are not directly comparable.

Town / City	Dwr Cymru Welsh Water	United Utilities
Chester	546	-
Ellesmere Port	-	20
Malpas	18	-
Northwich	-	12
Frodsham	-	3
Winsford	-	2

Figure 7 provides an overview of recorded sewer flooding incidents across the Borough. The recorded incidents of sewer flooding are mainly clustered around the large urban area of

Chester. There are smaller clusters of incidents in the towns of Ellesmere Port, Malpas, Northwich, Frodsham and Winsford.

The records indicate that there are no instances of sewer flooding that are considered as having "significant harmful consequences".

Future Flooding from Highway Drains and Sewers

The Council and other risk management authorities are targeting resources in known problem areas in order to reduce the risk of flooding from highway drains and sewers in the future.

As discussed previously, records of sewer flooding have been obtained from the water and sewerage companies. Based on information readily available on their websites in their "Strategic Direction Statements", they are proposing to address a significant number of flooding problems by 2015. This is to be achieved through investment in a number of studies and capital works construction projects.

2.2.5 Water Supply Flooding

Risk management authority: United Utilities, Dee Valley Water, Dwr Cymru Welsh Water

Properties and residential areas can be affected by flooding from the water supply network when water mains burst. Bursts can occur anywhere and the utility companies are implementing a programme of renewals in order to reduce the risk of water supply flooding.

2.2.6 Reservoir Flooding

Risk management authority: Environment Agency, Dwr Cymru Welsh Water, Dee Valley Water, United Utilities, Cheshire West and Chester Council

Large volumes of water are held above ground level in man made reservoirs formed by walls or dams. Although the safety record for reservoirs in England is excellent, it is still possible that a dam or wall could fail.

The Flood and Water Management Act 2010 (the Act) covers a number of areas addressing the threat of flooding and water scarcity. The Act updates the Reservoirs Act 1975 and reflects a more risk-based approach to reservoir regulation through:

- 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 registering their reservoirs with the Environment Agency;
- The provision of reports by Inspecting engineers within 6 months of each inspection;
- All undertakers preparing a reservoir flood plan; and
- The reporting of all incidents at reservoirs.

High-risk reservoirs will be those reservoirs 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' will still need to register, but will not need to comply with the inspection and supervision requirements of the Act. Registering the reservoirs means that clear communication lines can be set up to manage maintenance work and flood risk incidents.

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

2.2.7 Flooding from Canals

Risk management authority: Not Applicable

Canal & River Trust and Manchester Ship Canal Company Trust are navigation authorities. They inspect, maintain and operate the water control structures within their ownerships primarily to meet their statutory obligation to maintain navigation.

They are not Category 1 or 2 responders as defined by the Civil Contingencies Act 2004, and are not therefore required to undertake any specific civil protection duties under the Act.

The Canal & River Trust provided the following information during the consultation held during the preparation of this Local Strategy.

"The Trust is a navigation authority. It inspects, maintains and operates the water control structures within its ownership primarily to meet its statutory obligation to maintain navigation.

The Trust is not a Category 1 or 2 responder as defined by the Civil Contingencies Act 2004, and is not therefore required to undertake any specific civil protection duties under the Act. By local agreement, the Trust may provide specific assistance in the event of a flood incident. Typically this would be in consultation with Silver Command and/or the Environment Agency.

In terms of managing flood risk, the primary responsibility for land drainage and flood prevention rests with private parties. The Trust does not have any specific statutory responsibilities in relation to flooding and, therefore, its responsibilities are those of an owner and operator of its canals and other waterways.

The Trust (as the successor to British Waterways) is a statutory consultee under Schedule 3 of the Flood & Water Management Act 2010 in relation to SuDS Approving Bodies. None of our system (canals, feeders, reservoirs etc.) should be designated as an alternative water body to which surface water can be discharged. It should also be noted that any water discharged to our system is subject to our own approval process and a commercial agreement is typically required. Discharges into our system may require consent from the Environment Agency (EA). It must not be presumed that EA consent confers the Trust's consent."

The Canal and River Trust (C&RT) is the public body responsible for the care and enhancement of the nation's 2,200-mile network of canals, much of which dates back to the 1800s. Some canals and navigable waterways are also managed by private companies.

There are three C&RT canals in the study area:

- The Trent and Mersey Canal
- The Shropshire Union Canal
- The Weaver Navigation

The Manchester Ship Canal, a private canal owned and managed by the Manchester Ship Canal Company, also runs through the Borough.

The risk of flooding along each canal is dependent on a number of factors. As they are not natural systems and are heavily controlled, it is unlikely they will respond in the same way as a natural watercourse during a storm event. Flooding is more likely to be associated with residual risks, such as overtopping of canal banks, breaching of embankments or asset (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.

Past Canal Flooding

No information is available in Environment Agency's CFMPs regarding canal flooding in the Borough. Data collected from The Canal & River Trust (formerly British Waterways) regarding historical canal overtopping and breach incidents is summarised below with locations shown on Figure 8:

- Trent and Mersey Breach near Dutton Hall Unknown 1770
- Trent and Mersey Marbury Breach Piping / Leak failure 1907
- Trent and Mersey Little Leigh Embankment Breach Piping / Leak failure 1989
- Shropshire Union Stanthorne/ Middlewich Breach Unknown 1991
- Trent & Mersey Canal at Dutton, September 2012

Future Canal Flooding

A detailed understanding of the potential overland flow routes from the canal is needed. The Canal and River Trust is currently working on a study to better understand the future flood risk from canals, which will be available for the second cycle of the PFRA process and will be assimilated into the Local Strategy. There is currently no readily available information to assess the future flood risk from canals and no further analysis has been carried out.

2.3 Flood Warning Areas

There are three designated flood warning target areas across Northwich:

- **Target area A** is the most vulnerable to flooding and covers 104 properties including those on Watling Street, the lower part of Dane Street, London Road, High Street, Weaver Way, and the lower part of Castle Street.
- **Target area B** covers 448 properties including the Market Halls, Chester Way, Percy Street, Witton Church Walk Primary School, Heber Walk, Queen Street and properties off Weir Street and Yarwood Close.
- **Target Area C** covers 189 properties across the Water Street and Whalley Road area.

The Chester Area flood warning areas are:

- Lower Dee Valley from Llangollen to Chester (at Chester Weir)
- Chester tidal flood warning service (extends from Grosvenor Bridge to Finchetts Gutter on the right bank of the River Dee and includes Roodee race course).
- North Wales Coast (from the Dee Estuary to the East Coast of Anglesey) flood warning area. This covers the tidal Dee.

Cheshire West and Chester flood warning areas (as provided by the Environment Agency January 2015)

Flood Warning Area	Locations affected	Properties in the Borough
Irish Sea and Mersey Estuary from the Head of the Wirral to Runcorn	Areas at risk include parts of Hoylake, Meols, Moreton and Wallasey. Also parts of Liverpool waterfront from Queens Dock to Armstrong Quay. Additional areas at risk include parts of Monks Ferry, Stanlow and Widnes at Ditton Marsh	34 3365 for the whole Flood Warning Area
English Dee from Shocklach to Chester	Properties and farmland on the English Dee from Frog Lane, Shocklach to Chester, including locations at Farndon, Poulton, Aldford, Eccleston and Huntingdon	8
Dee Estuary at Parkgate and Little Neston	Properties at risk include the areas along the coast from Parkgate to Burton. This includes North Parade, The Parade, Quayside, Marshland Road, Denhall Lane.	42
Chester	The flood risk area extends from Grosvenor Bridge to Finchett's Gutter on the right Bank of the River Dee. This includes Roodee race course.	466
Tidal River Dee from Grosvenor Bridge to the Groves	Areas at risk include riverside properties from Grosvenor Bridge to the Groves including parts of River Lane, Greenway Street and the Groves.	37
River Dee in England at Northern Embankment	Properties in the Chester area including Chester retail park, Greyhound retail park, Chester Way employment park, Sealand Industrial Estate, Sewage Works, properties off Sealand Road and New Crane Street to Watergate Square and Roodee Racecourse.	774
River Dee in England at Hawarden Embankment	Areas affected include properties In Lache including Green Lane, Courtney Road, Avonlea Close, and Elder Drive. Areas in Saltney along Boundary Lane, Thurston Road, and Stanley Park Drive. Also Chester Golf Club, Junction and Lache Eyes.	288
Rivacre Brook at Great Sutton	Areas at risk include some properties on Farmers Heath road, Spinney Drive, Ascot Drive and Chase Way. Some properties on Regal Close and Oliver Lane.	52
River Weaver at Northwich Marina	Areas at risk include Northwich Marina and Butcher & Barlow Solicitors	2
River Weaver at Weaver Way	Areas at risk include London Road, Watling Street, Dane Street, High Street, Witton Street and Weaver Way	92
River Weaver at Marine Approach and Chester Way	the Market Hall, Chester Way, Percy Street, Witton Church Walk Primary School, Heber Walk, Queen Street, properties off Weir Street and Yarwood Close.	113
River Weaver and Dane at Northwich	Areas of risk include additional areas of London Road, Queens Street, Water Street, Drillfield Road, Whalley Road, and Percy Street; also the Court House and Dane Nurseries will now be affected	925
River Weaver at Anderton	Areas at risk include Properties in the Cosgrove Business Park area	29

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Cheshire West and Chester flood warning areas (Continued)

Flood Warning Area	Locations affected	Properties in the Borough
River Weaver at Acton Bridge and Weaverham	Areas at risk include Properties along Warrington Road at Acton Bridge and Sandy Lane in Weaverham	30
River Weaver at Little Leigh and Higher properties in Acton Bridge and Weaverham	Areas at risk include higher level Properties along Acton Lane and Warrington Road at Acton Bridge and Sandy Lane in Weaverham and Martins Fields In Little Leigh	12
River Weaver at Pickerings Bridge	Areas at risk include Primrose Cottage, Pickerings Bridge Cottage, The Bungalow and Pickerings Lock Caravan Park.	3
Weaver Navigation at Winsford	Areas at risk include Properties along New Road, Winsford Bridge and the Marina	1
Weaver Navigation at Sutton Dock	Areas at risk include some property on Sutton Quays Business park, and property at the junction of the A56 and A557	10 for the whole Flood Warning Area, 9 of which are within CWaC

2.4 Future Changes to Flood Risk

This section aims to identify the future flood risks for the Borough. This includes looking at current flood modelling data that has been created for Cheshire West and Chester Council by the Environment Agency, both locally and nationally and considering the known historic events. In summary flood modelling suggest the following potential risks:

2.4.1 Climate change and sea level change

Over the last few years the frequency of flooding incidents from unseasonable erratic weather patterns has increased across the Borough. Climate change is likely to cause changes to our weather that will increase flood risk and our approach to flood risk management reflects this. There is clear scientific evidence that global climate change is happening. Greenhouse gas (GHG) levels in the atmosphere are likely to cause higher rainfall in future. By the 2050s, if emissions follow a medium future scenario, the projected climate changes relative to the recent past are:

- Winter precipitation increases of around 14% (very likely to be between 4 and 28%);
- Precipitation on the wettest day in winter up by around 11% (very unlikely to be more than 25%);
- Relative sea level at Morecambe very likely to be up between 6 and 36cm from 1990 levels (not including extra potential rises from polar ice sheet loss); and
- Peak River flows in a typical catchment likely to increase between 11 and 18%. Increases in rain are projected to be greater near the coast than inland.

Climate changes can affect local flood risk in several ways. Impacts will depend on local conditions and vulnerability. Wetter winters and high intensity rain falling in wet spells may increase river flooding especially in steep, rapidly responding catchments. More intense rainfall causes more surface run-off, increasing localised flooding and erosion. In turn, this may increase pressure on drains, sewers and water quality.

Storm intensity in summer has increased in recent years, so we need to be prepared for the unexpected. Cheshire West and Chester Council will prepare by understanding our 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 key to achieving long-term, sustainable benefits. We will continue to monitor and correlate weather patterns to increase our understanding.

The table below illustrates the changes that climate change is predicted to have on the numbers of properties at risk from river flooding:

Flooding Type	Estimated number of Properties currently at risk	Estimated number of properties predicted to be at risk in 2100	Data Source
Main River	~ 600	~ 1,800	River Dee Catchment Flood Management Plan 2010
Main River	~ 750	~ 850	Weaver Gowy Catchment Flood Management Plan 2009

Defra and the Environment Agency have assessed the impact of climate change on rainfall and flood flows. This advice replaces Defra's Supplementary Note to Operating Authorities – Climate Change Impacts, October 2006. It is provided as supplementary information to Defra's policy statement on Appraisal of Flood and Coastal Erosion Risk Management (2009) and the Environment Agency's Flood and Coastal Erosion Risk Management Appraisal Guidance (FCERM-G), as well as supporting the FECRM National Strategy for England. This advice is based on Government's policy for climate adaptation, and is specifically intended for projects or strategies seeking Government Flood Defence Grant in Aid (FDGiA).

The purpose of the advice is to ensure that an economically credible appraisal, taking account of the uncertainties associated with climate change, can be made to support Government investment decisions. This is necessary to ensure that a fair comparison can be made between investment in projects in different locations that compete for central government grant, as well as ensuring that the most appropriate means of reducing risk is investigated in any one place.

Rainfall changes are summarised in the table below:

Changes to extreme rainfall intensity compared to a 1961 – 90 baseline applied to:	**Total potential change anticipated for the 2020s**	**Total potential change anticipated for the 2050s**	**Total potential change anticipated for the 2080s**
Dee			
Upper end estimate	20%	30%	45%
Change factor	10%	15%	20%
Lower end estimate	0%	0%	5%
NW England			
Upper end estimate	25%	35%	65%
Change factor	15%	20%	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%	5%	10%

2.4.2 Population change, development and land management

Providing for the housing, business and associated needs of an increasing population may increase the consequences of a flood or coastal erosion incident. As a result it is essential that spatial planning ensures that new developments take flood and coastal erosion risk fully into account. New developments should be safe from these risks, cause no increased risk elsewhere, and where possible reduce risk over their lifetimes.

Land management and development can have significant effects on the movement of water within a catchment. Development or changes in land use in areas that themselves may not be at risk of flooding can reduce or prevent rainwater infiltration into the ground. This increases quantities of surface water run off and as a result increase the risk of flooding downstream. This can also apply to rural and agricultural land use where changes in vegetation may cause similar impacts.

The cost of damages caused when properties are flooded is also likely to increase. With inflation and general increases in wealth over time the value of goods and fittings in households and businesses increases. As a result, even if the likelihood of flooding were to decrease over time, the consequences may still increase as the value of property and contents continues to rise.

Spatial planning is the fundamental starting point in reducing flood risk in Cheshire West and Chester. The NPPF and the Cheshire West and Chester Local Plan 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. Through the application of these strategic policies and through the development management process, opportunities will be provided to:

- Adopt a catchment-wide approach in developing integrated sustainable developments to 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; and
- Ensure that these 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.

2.4.3 Asset condition

The existing public and private network of assets that contribute to the management of flood risk is significant and there are two major issues to consider. First, the standard of protection provided by existing structures will decline as the climate changes and the probability of events that could cause floods or erosion increase. Second, assets will ultimately reach the end of their design life and need replacing, refurbishment or greater levels of maintenance. While this gives an opportunity to upgrade assets and systems to meet future challenges, it also means that the costs of maintenance and replacement are likely to rise.

3 Risk Management Authorities and Responsibilities

The Flood and Water Management Act identified certain organisations as 'risk management authorities', which have responsibilities around flooding, both new ones from the Flood and Water Management Act and longstanding ones from previous legislation.

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	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). It is also responsible for regulating reservoir safety, and working in partnership with the Met Office to provide flood forecasts and warnings. • Main rivers • Reservoirs over 10,000m³	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. 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). 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. 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. 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.
Cheshire West and Chester Council (LLFA)	As local coordinators, the Flood and Water Management Act directs responsibility for the following types of flooding to LLFA's to: • Surface Water; • Groundwater; and • Ordinary Watercourses. Planning policy. Providing and managing highway drainage and roadside ditches under the Highways Act 1980. Coastal erosion functions	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. Establish approval bodies for design, building and operation of (SuDS). Play a lead role in emergency planning and recovery after a flood event. Set land use policy and manage development in relation to policy. 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. 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
United Utilities, Welsh Water and Dee Valley Water	Work with flood authorities to co-ordinate the management of water supply and sewage systems. Sharing information	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. 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.
Private Sewer Ownership	Since the 1st October 2011, property owners have been no longer responsible for certain sewer pipes that connect their homes to public sewers	New legislation will transfer responsibility for these pipes, called private sewers and lateral drains, to United Utilities and Welsh Water. After the private sewer transfer there will be public sewers owned and maintained by United Utilities and Welsh Water and private drains. This will remove confusion for responsibility and aid flood management. Private pumping stations will not be transferred until 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.	

There is also wide range of other relevant legislation 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& 1998);
- The Water Framework Directive (2007);
- 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;
- Defra: Co-operation and requesting information in flood and coastal erosion risk management;
- Defra: Making Space for Water;
- Defra: Understanding the risks, empowering communities, building resistance;
- Local Government Association: Framework to assist the development of the Local Strategy for Flood Risk Management;
- National Planning Policy Framework (March 2012) and accompanying Planning Practice Guidance.

4 Links to the National Strategy

4.1 National Flood and Coastal Erosion Risk Management Strategy

The Environment Agency and the Department for Environment, Food and Rural Affairs (Defra) have published a National Flood and Coastal Erosion Risk Management Strategy for England to ensure that the government, Environment Agency, Local Authorities, water companies, internal drainage boards and other organizations that have a role in Flood and Coastal Erosion Risk Management (FCERM) understand each others' roles and co-ordinate how they manage these risks. This fulfils a requirement in the Flood and Water Management Act 2010.

The Act gives the Environment Agency a 'strategic overview' of Flood and Coastal Erosion Risk Management, and in turn takes forward recommendations from Sir Michael Pitt's inquiry into the 2007 floods.

The National Strategy sets out what needs to be done to manage these risks by improving our understanding of them, reducing the likelihood of incidents happening, as well as managing the potential consequences to people businesses, infrastructure and services. The National Strategy aims to share these goals at a local level to:

- Respond better to flood incidents and recovery;
- Encourage local innovations and solutions;

- Help households, businesses and communities better understand and manage the flood risks they face;
- Manage the risk of flooding to people and their property and where possible, to improve standards of protection;
- Invest in actions that benefit members of the public who face the greatest risk, but who are least able to afford to help themselves;
- Put sustainability at the heart of the actions we take, work with nature to benefit the environment, people and economy; and
- Move the focus from national government-funded activities towards an approach that gives more power to local people, at individual, community or local authority level.

4.2 Guiding Principles for the local strategy

Flood and coastal erosion management may mean that difficult decisions have to be taken on where risk management activities can and can't be carried out at both national and local levels. These decisions, and the processes by which they are taken, will be guided by a number of high-level principles. These are outlined below.

4.2.1 Community focus and partnership working

Risk management authorities should work with communities to understand flood risk from the community perspective. They should help communities understand and actively prepare for the risks, as well as encourage them to have direct involvement in decision-making and risk management actions. Giving communities a bigger say in decisions on local funding priorities and the actions taken will give them greater responsibility for managing their own risks. It will also result in greater accountability for the level of safety and protection achieved and the way in which the risks are managed. Decision making and ownership of risk management measures should be as local as possible but within a catchment or cell.

Partnership working is essential to ensure that cross-boundary risks are managed in a co-ordinated way, for example across catchments, with lead local flood authorities working together collectively. A key aim is to maximise and promote the benefits of sharing information and expertise.

4.2.2 A catchment and coastal "cell" based approach

In understanding and managing flood risks locally, it is essential to consider the impacts on other parts of the catchment or coast. Activities must seek to avoid passing risk on to others within the catchment or along the coast without prior agreement. The catchment or coastal cell approach is also key to managing risks at source and achieving wider benefits through more integrated water management. It also increases opportunities for developing new sources of funding as well as pooling resources and expertise.

4.2.3 Sustainability

Risk management solutions should be forward looking, taking account of potential risks that may arise in the future and being adaptable to climate change. They should also work with natural processes where possible and enhance the environment. More sustainable

approaches generally work with natural process. They are often more resilient to extreme events and provide better value for money over the long-term than more traditional approaches based on structural or engineered interventions.

Flooding is a natural phenomenon that can have positive benefits. The relatively high proportion of Grade One agricultural land at risk of flooding is no coincidence, as the flooding of land with nutrient-rich sediment creates fertile soil. Adopting more sustainable approaches to the management of flood and coastal erosion risks can greatly improve the environmental condition of rivers, wetlands, coastal areas and the social and economic circumstances around and within settlements.

4.2.4 Proportionate, risk-based approaches

It is not technically, economically or environmentally feasible to prevent flooding and coastal erosion altogether. A risk-based management approach targets resources to those areas where they have greatest effect. Risk management measures consider both the probability over time of flooding or coastal erosion happening and the consequences that might arise if it did, for example by assessing the average annual damages that could arise. All aspects of risk management need to be understood and applied to the factors that combine to create flood and coastal erosion risk. It should be carried out in a proportionate way that reflects the size and complexity of the risk and society's ability to manage it. Investment in managing risk, and who pays for it, should reflect the benefits that result.

4.2.5 Multiple benefits

As well as reducing the risks to people and property, flood risk management can bring significant economic, environmental and social benefits. It can enhance and protect the built, rural and natural environments, cultural heritage and biodiversity, by preventing loss and damage to habitats and heritage assets and reducing pollution. An example of this would be the use of Sustainable Drainage Systems (SuDS). Flood and coastal risk management can also contribute to regeneration and income generation, protect infrastructure and transport links, and contribute to economic growth

In all instances, flood and coastal risk management should avoid damaging the environment, including the historic environment, and wherever possible work with natural processes. It should always seek to provide environmental benefit, as required by the Habitats, Birds and Water Framework Directives. This may include providing new habitats, which may not be directly linked to FCERM schemes, to compensate for those that are lost as a result of actions to protect people and property.

4.2.6 Beneficiaries should be encouraged to invest in risk management

The benefits achieved when flood and coastal erosion risks are managed are in many cases localised, and lead to personal or private gain through the protection of specific individuals, communities and businesses. They can also be public, through the reduction of future costs to society arising from incident recovery. The private as well as public nature of the benefits suggests that costs should not fall to the general taxpayer alone. Overall, there is the opportunity for significantly more risk management activity to take place if alternative sources of funding can be secured in each area to reflect the local benefits that would be

delivered. Any funding found locally can supplement the amounts available nationally and mean as many communities as possible can be protected.

5 Local Flood Risk Management Objectives

The overall aim of the strategy is to ensure that the risk of flooding and coastal erosion is properly managed by using the full range of options in a co-ordinated way. Communities, individuals, voluntary groups and private and public sector organisations will work together to:

- manage the risk to people and their property;
- facilitate decision-making and action at the appropriate level - individual, community, or local authority, river catchment, coastal cell or national;
- achieve environmental, social and economic benefits, consistent with the principles of sustainable development.

The Council has adopted the following objectives to manage the various forms of flooding in the Borough and to be consistent with the Environment Agency's National Flood and Coastal Erosion Risk Management Strategy:

1. **Understand the risks of flooding and coastal erosion and work towards putting long-term plans into place to manage the risks and make sure that other plans take account of them.**

   Flood and coastal erosion risks can only be managed effectively if they are properly understood. Key to this is estimating the risks through assessing data, information and modelling and understanding the uncertainty in the predicted levels of risk.

   We will develop and maintain information on flooding from ordinary watercourses, surface water and groundwater in the Borough. Effective mapping of flood risk, utilising improved mapping of surface water and related flood risks will help us to make effective risk-based planning decisions. This will contribute to national information maintained by the Environment Agency and promote understanding of these risks enabling them to be taken into account in planning wider management activities.

There are many sources that we can use to gather data on historic flooding and predicted risks as follows:

Authority	Dataset	Description
Environment Agency	Flood Map (Rivers and the Sea), Flood Map for Surface Water	Shows the extent of flooding from rivers with a Catchment of more than 3km² and from the sea. Includes two flood events (with a 1 in 30 and a 1 in 200 chance of occurring) and two depth bandings (greater than 0.1m and greater than 0.3m). (Makes allowance for some drainage).
	Areas Susceptible to Surface Water Flooding Areas Susceptible to Groundwater Flooding	The first generation national mapping, outlining areas at risk from surface water flooding across the country with three susceptibility bandings (less, intermediate and more). (Makes no allowance for drainage) Coarse scale national mapping showing which areas are susceptible to groundwater flooding.
	National Receptors Dataset (NRD)	A national dataset of social, economic, environment and cultural receptors including residential properties, schools, hospitals, transport infrastructure and electricity substations.
	Indicative Flood Risk Areas	Nationally identified Flood Risk Areas, based on the definition of 'significant' flood risk described by Defra and Welsh Assembly Government (WAG).
	Historic Flood Map	Attributed spatial flood extent data for flooding from all sources.
	River Dee and Weaver Gowy Catchment Flood Management Plans	CFMPs consider all types of inland flooding, from rivers, groundwater, and surface water and tidal flooding and are used to plan and agree the most effective way to manage flood risk in the future.
Cheshire West and Chester Council	Strategic Flood Risk Assessment (SFRA)	SFRA contain useful information on historic flooding, including local sources of flooding from surface water, groundwater and flooding from canals. SFRA applies a sequential analysis in respect of development.
	Preliminary Flood Risk Assessment PFRA	Preliminary Flood Risk Assessment (PFRA) details on historical past flooding records and possible future flooding areas. The document also contains the level of significant flooding.
	Historical flooding records	Historical records of flooding from surface water, groundwater and ordinary watercourses.
	Anecdotal information relating to local flood history and risk.	Anecdotal information from authority members regarding areas known to be susceptible to flooding from excessive surface water, groundwater or flooding from Ordinary Watercourses.
	Highways Flooding Reports	Highways Flooding Reports for a number of locations within Cheshire West and Chester, including analysis of the flood risk at each location.
	Structures / Defence / Parks Sewer flooding register	Anecdotal information on structures and open spaces relating directly / indirectly to flooding protection and incidents. Record of all sewer flooding incidents.
	Cheshire West and Chester Water Cycle Study	Strategy on the Water Cycle for the Cheshire West and Chester area.
	Area Flood Risk Assessments (AFRAS)	AFRAs have been carried out for large scale developments at Northwich (2009)and Winsford (2013).
	Culvert Survey Study	Information from a survey of culverts across the Borough.
Police / Fire & Rescue	Police / Fire & Rescue Anecdotal information	Anecdotal information regarding local flood risk hotspots are reported / logged to the Council on an on-going basis. (Data to be collected for the next review).
United Utilities and Welsh Water	Sewer flood data for United Utilities and Welsh Water Areas	Sewer flood logs and records of sewer flooding incidents due to hydraulic incapacity in each area.

2. **Avoid inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks.**

   The best way to avoid flood risk with new development is to ensure that it avoids areas of existing flood risk where possible. Developments should be designed in a flood sensitive way using sustainable development principles. We will ensure that risks are effectively identified and policies produced to help avoid inappropriate development in areas of risk. The policies of the Adopted Cheshire West and Chester Local Plan (Part One) Strategic Policies seek to reduce flood risk. Policy ENV1 states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere.

3. **Build, maintain and improve flood and coastal erosion management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society.**

   Flooding causes disruption and damage to property and business and a range of measures can be taken to reduce the likelihood of these effects occurring. We will aim to reduce the impact of flooding by:

   - Maximising funding and support from central government and other partners to invest in projects and provide local solutions.
   - Considering alternatives and using good design practice and an asset management cycle approach to understand the whole life costs of schemes and assets.
   - Using Sustainable Drainage Systems (SuDS) to manage surface water in new developments and encouraging developers to consider their use from the early design stage ensures that the best possible systems are built.

   Development also gives an opportunity to provide social benefits such as biodiversity benefits to the local environment and local amenity improvements.

4. **Increase 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.**

   People who live and work in flood and coastal erosion risk areas have a critical role in managing the risks they and their communities face. They will be supported in this role by us as Lead Local Flood Authority.

   Communities should plan for the future and take appropriate steps to adapt to changing flood and coastal erosion risks. We will support communities by working with them to:

   - develop an understanding of how they can adapt to change;
   - develop an understanding of the costs and benefits of different approaches;
   - provide practical approaches and examples that can be shared

   In particular, these should focus on community adaptation planning and engagement and implementing innovative adaptive solutions such as land use management change.

We will support householders and businesses at risk of flooding in taking the appropriate steps to better protect their properties through property level resistance and resilience measures. Defra, the Department for Communities and Local Government (DCLG), and the Environment Agency will also support this work by raising awareness and understanding and assisting the wider take up of flood resistance and resilience measures to reduce damage to buildings. These measures seek to prevent water from entering a property and/or seek to reduce the damage that may happen if water does get in.

5. **Preparing for and dealing with local flood incidents and ensuring that the multi-agency emergency response plan is properly deployed in response to flood emergencies.**

Flooding can never be prevented entirely. An important part of managing these risks is ensuring an effective response to incidents when they do happen. Prompt action to minimise the consequences is the most effective way of limiting the immediate and longer term impact on individuals' well-being and the affected areas' economic prosperity. Preparation plays a major part in this. The Environment Agency and the Met Office make a big contribution by working together to develop and improve flood detection and forecasting services. Their overall aim is to provide people at risk of flooding with effective flood information, forecasts and warnings that prompt the right actions and reduce the impacts and consequences of floods. Flood and other weather warnings allow us to prepare and direct the available resources more effectively when incidents occur.

6 Flood Risk Management Functions

This section sets out how we will exercise the powers and duties that we have under the Flood and Water Management Act 2010 and how we will undertake risk management activities that will help to deliver the objectives of this strategy and perform the role of providing a strategic overview of local flooding.

6.1 Proposed LLFA Flood Incident Investigation and Reporting Policy

Section 19 of the FWMA requires LLFAs to decide when "*it considers it necessary or appropriate, to investigate"* a flood incident. It would not be an efficient and reasonable use of resources to initiate an investigation for every flood, so it is essential that the threshold for triggering a formal investigation should recognise the actual significance of the flooding incident.

Cheshire West and Chester will, on becoming aware of a flood in its area, carry out 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 flooding during the incident. If a flood event is deemed to have had locally significant consequences, then a Formal Investigation of the flooding incident will be undertaken.

A flood event with locally significant consequences is one that has had, or could have had if action had not been taken, one or more of the following impacts:

- Caused internal flooding to a property used for residential or commercial purposes;
- 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.

Local Investigation Targets

Ascertaining responsibility	:	One week following event
Agree with responsible actions and timescales	:	One month
Final report	:	Two months

Timescales are subject to the scale of incidents being investigated.

Reporting

Flooding incidences meeting the criteria will be investigated by the Council and recorded internally. A published Formal Investigation will be initiated for every flood event captured and reported to the Flood Officer that meets the criteria. Repeated events would be recorded but not published. All events will be reviewed at the quarterly local flood group meetings. Continual mapping of flood incidents and the results of investigation will inform future work programmes and maintenance regimes.

6.2 Regulation of Ordinary Watercourses: Enforcement and Consenting

'Regulation' is the management of activities that create obstructions to flow in watercourses to ensure that flood risk is managed appropriately. It involves giving consent for acceptable work to be carried out and taking enforcement action if work is unacceptable. If riparian owners wish to culvert an ordinary watercourse or insert any obstructions, Section 21 of the FWMA requires that they obtain consent from The Council as LLFA.

Work that is carried out without consent has the potential to increase flood risk to people and property, including those unconnected with the works. Activities on ordinary watercourses that require consent are those likely to cause an obstruction to flow or restrict storage and include culverting, bridges, weirs etc.

Regulatory powers will be used in deciding whether to permit works by third parties that may affect water flows on ordinary watercourses. Cheshire West and Chester is required to ensure that all works on watercourses we are responsible for have the appropriate consent and that the consented works are constructed according to the agreed design.

Procedure

Formal consents will be approved and issued by the Flood Risk Management Team. Typical conditions will be used to ensure that works are carried out responsibly and within a given time frame. We 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.

Any enforcement on ordinary watercourses will be by the Council as LLFA although the Environment Agency will retain an overview role. Lead Local Flood Authorities must consult with the Environment Agency when they are proposing to undertakes work in ordinary watercourses that require consent. This is to minimise the potential for conflict of interest.

6.3 Local Byelaws

Cheshire West and Chester will be introducing a set of Land Drainage Byelaws based on the Defra recommended template. The purpose of these is to strengthen the enforcement and consenting powers within the Land Drainage Act 1991 to provide effective flood risk action at the local level.

6.4 Power to Carry out Works

FWMA amends Section 14 of the Land Drainage Act 1991 to give LLFAs powers to undertake works to manage flood risk from surface run-off and groundwater as follows:

- Powers of entry to gain access to Land;
- Compensatory powers where 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 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.

6.5 Powers to acquire land and Compulsory Purchase

Powers to acquire and dispose of land, including compulsorily, are provided at section 62 of the Land Drainage Act 1991. These powers are not altered by the FWMA and the powers in section 62 are available for use with the new flood risk management works powers, as section 14A is inserted into the Land Drainage Act 1991. Where such powers may be needed, for example in section 39, they are provided for within the Act. Section 39 (12) requires the Minister to apply compensation provisions, together with powers of entry and compulsory purchase provisions, to the incidental flooding or coastal erosion powers, section 39 of the Act. 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.

6.6 Produce and maintain an Asset Register

Section 21 of the FWMA places a duty on LLFAs to maintain a register of structures or features which are considered to have an effect on flood risk within its boundaries. Creation of the register is expected to be achieved over an extended period, with continual development expected. Cheshire West and Chester Council will initially make the register available by appointment at any reasonable time, but in the longer term the aspiration is to make this available on the Council's web site.

The register will include information about ownership, state of repair and where appropriate, maintenance regimes. These features could be natural or man-made structures or features of the environment, e.g. sluices, channels, culverts, walls, embankments, bridges, highway gullies, SuDS and screens. By collating information and mapping flood risk assets, the Council will eventually be able to:

- Develop informed maintenance regimes to 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 a maintenance schedule for the assets as well as providing guidance to riparian owners as to how they should maintain their assets.

Collating all asset information is an enormous undertaking that would require considerable resources. We envisage that initial data collection exercises to populate the register and record will be risk-based and related to the requirement to record structures, which have a significant effect on flood risk management and are not part of the main river system.

The registers will therefore be populated with those structures or features, which are most significant first and related to ordinary watercourses and surface water flooding. It is intended that the information contained within the registers will build up over time as we respond to flood incidents, conduct investigations, carry out maintenance works and adopt third party developments. A substantial amount of information is readily available from a variety of sources such as:

- Current inventory of highway gullies;
- Records held by the Council's Bridges and Structures Section;
- Collected field information with the Council's Drainage Engineers;
- Contemporary records held by the Council's Parks and Open Spaces Manager;
- A register of watercourses and drainage assets created by the Council;
- A survey of culvert locations.

The details recorded will be proportionate and relate to how the register and record will be used to support the wider LLFA role. Where existing good practice approaches to recording state of repair or other information are available, these will be applied otherwise the record will be developed over time as inspections or investigations are undertaken. Records will be held on GIS and on the Council's asset management system. Any inspections undertaken will follow the established Environment Agency assessment template.

Main River assets are recorded by the Environment Agency, but it is important that the Council's local system has a relationship with the Environment Agency's National Flood and Coastal Defence Database (NFCDD). This contains details of Main River, Non Main River and coastal flood risk assets, including current condition. This data is continuously updated following review or inspection of assets. This information will be utilised in developing the Cheshire West and Chester register, which will include main river assets (particularly where the Council is riparian land owner) for completeness and the efficient management of investigations. The Environment Agency has started a project called Creating Asset Management Capacity (CAMC) to replace NFCDD with an upgraded and improved database.

List of major flood defences from the West Cheshire SFRA Report for Chester City Council in 2008

River Catchment	Watercourse/location	Type	Description	Design SOP	Maintainer
Dee	Northern and Hawarden	Tidal	Earth embankments. Height ranges from 7.8 to 7.1m AOD	~ 200	EA
Dee	Curzon Park Golf Course	Fluvial/Tidal	Canalised section of the Dee with berm and earth embankment	200	EA
Dee	Countess Way Culvert - A540	Fluvial	Earth embankment	100	EA
Dee	Behind Vauxhall garage	Fluvial	Earth embankment	Unknown	EA
Dee	Clifton Drive	Fluvial	Finchetts Gutter Reservoir - Spillway	100	EA
Dee	Clifton Drive - Ind. Estate	Fluvial	Earth embankment	100	EA
Dee	Greyhound Park Rd & Stendall Rd	Fluvial	Concrete brick wall and embankment	100	EA
Dee	Stadium Way (Finchett's Gutter)	Fluvial	Earth embankment	100	EA
Dee	Chester Race Course	Fluvial/Tidal	Earth embankment with concrete retaining wall	100	LA
Dee	New Crane Street to Railway Bridge	Fluvial/Tidal	Stone and concrete wall	200	LA
Dee	Park area up stream of Finchetts Gutter Outfall	Fluvial/Tidal	Earth embankment	200	LA
Dee	Timber Groyne	Fluvial/Tidal	Embankment	200	EA
Dee	Sealand Road Bridge	Fluvial	Cantilever floodwall	100	EA
Dee	Iron Bridge to Black and White Cottages	Fluvial	Natural channel with earth embankment	10	Private
Dee	Iron Bridge to Alford	Fluvial	Natural Channel with earth agricultural embankment	10	Private
Dee	A55 Road Culvert to Ch. 4023m	Fluvial	Embanked channel	20	EA
Dee	Alford Sluice	Fluvial	Earth embankment	100	EA
Dee	Crook of Dee	Fluvial	Natural Channel with raised earth embankment - Agricultural Protection	20	Private
Dee	Caldecott Drain to Wern y Davy Drain	Fluvial	Natural Channel with Earth Embankments	10	EA
Gowy	River Gowy	Tidal	Raised earth embankment	50 – 150	EA
Gowy	River Gowy	Fluvial	Raised earth embankment	80	EA

6.7 Designation of Features

Schedule 1 of the FWMA gives LLFAs powers to designate structures and features owned by third parties that affect flooding or coastal erosion. Designation safeguards assets that are relied upon for flood or coastal erosion risk management by giving the LLFA powers to undertake appropriate maintenance work on them. Once a feature is designated, the owner must seek consent from the LLFA to alter, remove, or replace it. If a person contravenes this requirement, the LLFA may take enforcement action. An individual may appeal against a designation notice, refusal of consent, conditions placed on consent or an enforcement notice. Features such as garden walls (or other structures) and sustainable drainage systems (SUDS) can be designated by issuing a Provisional Designation Notice in accordance with set procedure. The provisional designation notice must provide important information about the provisional designation. As a minimum the notice will set out:

- 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;
- 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 for consideration before a decision is made on whether or not to confirm a designation. Designation would be confirmed by the LLFA issuing a designation notice. The LLFA may also decide to 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 come on-line that negates the need for the designation.

Although there is no obligation on the riparian owner 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. An owner may appeal if their request for a cancellation is denied. The Council will act with due diligence before designating any features and taking on maintenance liabilities. We anticipate that features considered for Designation will identified as work to develop the Asset Register progresses.

6.8 Sustainable Drainage Systems (SUDS)

Introducing SUDS

New legislation came into effect in April 2015 concerning the use of Sustainable Drainage Systems (SUDS) in new developments. It set out changes to planning that will apply for major development from 06 April 2015 giving Planning Authorities a leading role in the management of surface water.

In considering planning applications, it requires that local Planning Authorities should:

- Consult the relevant Lead Local Flood Authority 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.

The changes seek to strengthen existing planning policy to ensure that sustainable drainage systems will be provided in new major developments where appropriate. The planning practice guidance has been updated to reflect these changes and non-statutory technical standards for the design, maintenance and operation of sustainable drainage systems have been published on-line by Defra.

7 Working together to protect people and property

Cheshire West and Chester Council as the Lead Local Flood Risk Authority will coordinate and manage flood risk through a range of activities, across internal departments and external partners.

7.1 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. Cheshire West and Chester Council and other risk management authorities will support this role.

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 of transmit flows downstream without putting other properties at risk. Further details are available in the Environment Agency publication 'Living on the Edge'.

Partnering

The Council will work with partners to make communities and individuals more aware of flood risks. The aim of this work is to help communities to participate as far as possible in Local Flood Risk Management. To do this, we 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.

Communities

Communities at risk, led by the Council, will plan for the future and take appropriate steps to adapt to changing flood risks. Defra, the Environment Agency, the Council and others will support communities by working with them to develop an understanding of how they can adapt to change, the costs and benefits of different approaches, and by 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.

Householders

Householders and businesses at flood risk should take appropriate steps to better protect their properties through property-level resistance and resilience measures. The 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, we will advise liaison with specialist groups such as the National Flood Forum to aid recovery.

Publicity

Cheshire West and Chester 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 local risk. This should take account of any actions taken at a property or community level to reduce it.

7.2 Localism Act 2010

The Localism Act will give communities and local government greater powers and freedom from Whitehall. It 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. These planning areas could encompass land for or in connection with strategic infrastructure, sites of special scientific interests and Green Belt land. Linking with the Flood and Water Management Act 2010, it brings the possibility or discretion to share data and cooperate stated by the Act to become a defined legal duty.

7.3 Surface Water Mapping and Land Use Considerations

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

The Environment Agency has produced the updated Flood Map for Surface Water (uFMfSW). This was made available to LLFAs as part of a consultation exercise to receive feedback on the new maps. These comments are under review and the next version of the updated map will be made available by April 2015. The previous map was reviewed against a local scoping study, local historic data and local knowledge as it had not been appropriate for use as the sole evidence for specific planning decisions. This knowledge base will continue to develop through studies and the newly established arrangements that will capture and record surface water flood information to validate assumptions made.

Surface water data may be different for different purposes, even within one location. The locally agreed surface water flood risk information will be taken into account and used as part of the evidence base for the preparation of Local Development Plans and may be material to decisions on individual planning applications. In land use planning, locally agreed surface water flood risk information can be used to highlight where a more detailed study of surface water flooding may be necessary, for example, within a strategic flood risk assessment.

The locally agreed surface water flood risk information is most appropriate for use at this level of the development planning system where it will provide the greatest benefit in terms of the identification, management and avoidance of surface water flooding. This surface water flood risk information will act as a starting point to highlight areas where the potential for surface water flooding needs particular assessment and review within Strategic Flood Risk Assessments and in Surface Water Management Plans.

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 Local Planning Authority 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 National Planning Policy Framework Guidance Document is used by Cheshire West and Chester Council in allocating sites for development, or determining planning applications. 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, and location of future development, all of which can contribute to reducing the risk of flooding, including:

- Application of SuDS techniques with new developments (adoption subject to national legislation);
- Application of property and location-specific flood protection measures;
- Reference to the Local Flood Risk Authority developments affecting ordinary watercourses;
- Planning enforcement in respect of unauthorised development undertaken in liaison with the Local Flood Risk Authority;
- Identifying river corridors and the natural flood plain to provide potential riverside storage and urban river corridors in built up areas; and

7.4 Communications and Public Engagement

A high level of engagement with good communications between internal partners, external partners and our community will be essential if local flood risk is to be managed effectively. It will enable us to:

- Ensure understanding of the roles and responsibilities of the partner organisations (Cheshire West and Chester Council, Regional Flood and Coastal Committee, EA, UU, WW, DVW);
- Manage expectations and be clear about what we 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.
- Managing risks together - we can provide practical solutions but there are ways the community can help too.

The chart below shows the cross reference of flood management working groups and internal and external links.

Group		Internal								Other Authorities							
	Remit	Meeting Frequency	Lead Flood Officer	Green Spaces Manager	Development Control Manager	Building Control Manager	Environment Team Leader	Planning Policy Department	Emergency Planning	United Utilities	Dwr Cymru Welsh Water	Environment Agency	Warrington Council	Staffordshire Council	Halton Council	Cheshire East Council	St Helens Council
Internal Strategic Group *	To provide a forum to share information on flood risk issues, planning liaison and development between internal partners	**Quarterly**	√	√	√	√	√	√	√								
External Partner Group *	To provide a forum to share information on flood risk issues and current projects between external partners within the Council's area	**Quarterly**	√				√			√	√	√					
Sub Regional Flood Task Group Cheshire	To share knowledge between Local Authorities and develop partnership working arrangements to deliver efficiency savings	**Monthly**	√									√	√	√	√	√	√
Consents	To approve applications	**Referral**	√		√												
Sustainable Drainage Approval **	To approve applications, monitor process adopt and maintain	**TBA**	√	√	√	√	√			Consult							

* To date quarterly meetings have been attended by both internal and external partners.
** There is still uncertainty about the processes for approving, adopting and maintaining SuDS.

The following potential stakeholders could be consulted in relation individual schemes to reduce flood or erosion risk, or on other activities from this reports Action List.

Political stakeholders	MPs and MEPs, Portfolio holders, Ward members, Parish councillors, neighbouring authorities
Transport and infrastructure	Highways Agency, Planning, Other utility companies, transport operators
Environmental stakeholders	RSPB, NFU
Emergency services	Fire service, all other “blue light” services, Police Community Support Officers, Resilience forum
Business and industry	Chamber of Commerce, local businesses, Business forums, Employees, Landowners where known
Communities and individuals	Resident association groups, Faith centres, Doctors and community services, landlords and housing associations, Recreation groups – e.g. Cycling groups, Ramblers Association, Hospitals, Schools, Local press, Anglers.

8 LLFA Structure (including governance & local partnerships)

Much of the local knowledge and technical expertise necessary for Cheshire West and Chester Council to fulfil duties as a LLFA lies with the Council and other partner organisations. The Localism Act and NPPF of 2012 impose a duty on local planning authorities and other bodies to cooperate with each other to address issues relevant to their areas. This requires ongoing constructive and active engagement on the preparation of development plan documents and other activities relating to the sustainable development and use of land, in particular in connection with strategic infrastructure. It is, therefore, crucial that the Council work alongside these partners to ensure effective and consistent management of local flood risk.

Working arrangements have been formalised with partners to ensure clear lines of communication. In assuming its new statutory responsibilities as the Lead Local Flood Authority, Cheshire West and Chester 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. The Council has a centralised network of partners by virtue of its historical operational and strategic innovative practices.

The Council's internal governance of LLFA functions ensures that responsibility for delivery is clearly defined and managed by involving Members and Senior Officers at the appropriate levels. The structure ensures that there is a clear 'owner' at a political level with the means to guide Council policies and make decisions with an awareness of flood risk and the needs of the community.

- **Executive Management** – The Executive Board makes key decisions that could have a significant impact on the community and finances of the Council. The Board comprises Executive Member Councillors and Senior Officers.
- **Portfolio Holder** – This is the elected Member with overall responsibility to ensure that policies and decisions made by The Executive are implemented with regard to the Council's role as LLFA.
- **Service Delivery** – Senior Officers are tasked with service delivery reporting back to the Portfolio Holder.

Regional Flood and Coastal Committees (RFCCs) have a key role in the co-ordination of flood risk management by advising on and approving the implementation of programmes of work for their areas, and supporting the development of funding for local priority projects and works. RFCCs also provide for local democratic input through the majority membership of representatives from Lead Local Flood Authorities. The Borough sits within the Northwest RFCC and is represented through membership of the Cheshire and Mid Mersey Flood Group. The Group comprises the following LLFAs:

- Cheshire West and Chester Council
- Cheshire East Council
- Halton Borough Council
- St Helens Borough Council
- Warrington Borough Council

The purpose of the group is to effectively represent to member authorities at the RFCC. It also facilitates partnership working as a forum for sharing knowledge, experience and resources in delivering LLFA duties. The group operates at a Strategic level involving one elected Member (Portfolio Holder) from each Council and Senior Officers. Two of the elected Members represent the group on the Northwest RFCC.

The Regional Flood and Coastal Committee:

- Ensures there are coherent plans for identifying, communicating and managing flood and coastal erosion risks across catchments and shorelines
- Promotes efficient, targeted and risk-based investment in flood and coastal erosion risk management that optimises value for money and benefits for local communities
- Provides a link between the Environment Agency, LLFAs, other risk management authorities, and other relevant bodies to engender mutual understanding of flood and coastal erosion risks in its area.

The operation of the Cheshire and Mid Mersey Flood Group is described below:

Cheshire and Mid Mersey Flood Group

Strategic Level	**Flood and Water Management Steering Group**
The aim at a Strategic Level is to coordinate the various aspects of local flood risk through a task group and to coordinate risk management and set direction	To provide a forum to share information on flood risk issues and current projects between both internal and external partners within the Council's area. Participants: Managers of teams, with a direct role in flood risk management such as Lead Flood Officer, Planning Officers, Environment Agency Representatives and Utilities Companies. Meeting Frequency: Quarterly
Tactical Level	**Cheshire and Mid-Mersey Flood Task Group**
The aim at a Tactical Level is allow the Council to develop working arrangements with other authorities and to share information and knowledge and help steer the teams responsible for implementing the Duties under the Act.	• To share knowledge between Local Authorities and develop partnership working arrangements to deliver efficiency savings. • Participants: Lead Flood Officers from Local Authority partners and Environment Agency representatives (as part of its strategic role in managing local flood risk). Key Delivery Team Members. Meeting Frequency: Monthly

Operational Level	**Asset Identification and Management**	**Flood & Water Management Act Delivery Personnel**
The Operational Level is where day to- day Flood Risk Management activities take place.	• Sustainable Drainage Systems (SuDS). • Reservoirs. • Identification and preparation of flood plans Flood Risk Management Studies (Feasibility Studies etc) • Flood Incident Investigation and Reporting • Planning Liaison, Flood Risk Assessments. • Consenting for Works affecting Ordinary Watercourses	• To deliver flood risk projects and carry out the day-to-day Duties under the Act. • Flood Officers, Emergency Planners, Project Managers, Civil Engineers, Spatial Planners, Assistant Engineers, Technical Specialists

9 Preparedness and Emergency Response

9.1 Preparedness

Flooding is a part of nature. It is neither technically feasible nor economically affordable to prevent all properties from flooding. Cheshire West and Chester Council's aim is to reduce flood risk and minimise the harm caused by flooding. We take a risk-based approach to achieve the best results possible using the budget and resources available. We will continue working to reduce both the likelihood of flooding and the impacts of a flood when it happens. Informing people a flood is about to happen is vital, as it gives them time to prepare. We also encourage those in risk areas to make a flood plan, so that they are ready when the warning comes. Preparedness can manage the effects of flooding as follows:

Prevention	Where it is justified measures can be put in place to prevent properties from flooding.
Protection	Where a property cannot be prevented from flooding it may be possible to protect the property from the effects of flooding.
Preparedness	When a flood warning is issued a pre-prepared plan can be implemented to reduce the impact of flooding.
Emergency response	When a flood occurs the relevant authorities implement their actions plans – these will be appropriate to the scale of the event.
Recovery and lessons learnt	After a flood it will be necessary to work with those affected by flooding to deal with the aftermath of flooding and return to normality. The effectiveness of the above measures can be reviewed with a view to identifying and implementing measures to improve resilience or recovery.

Those whose homes or businesses are at risk of flooding can register with the EA's Floodline Warnings Direct service. Details can be found on the EA web site by clicking the following link, or registration can be done over the phone by calling **0845 988 1188.**
https://fwd.environment-agency.gov.uk/app/olr/home

The following EA website also has a wealth of information, from informing you if you are in an area at risk from flooding, what to do in the event of flooding – before, during and after and explains the new Flood Warning Codes. Please note the EA do not supply sandbags.
http://www.environment-agency.gov.uk/homeandleisure/default.aspx

The Flood Forum website below is a forum for those people who have been directly affected by flooding. This site includes the National Flood Forum Blue Pages Directory. Products to aid Flood Risk Mitigation and Resilience can be found here, with some products available to order through local builder's merchants, including sandbags. Contact tel. no. 01299 403055
http://www.floodforum.org.uk/

9.2 Flood Risk Mitigation Policy

Flood Advice for Residents and Businesses

Cheshire West and Chester Council is promoting a new way forward in Flood Risk Mitigation and Resilience measures and now strongly advises all residents and businesses in flood risk areas to be pro-active in making their own flood risk mitigation plans. Please see the web site links above.

Cheshire West and Chester will assist wherever possible during times of flooding. Sandbags will be issued by the Council as far as our available resources permit, even though the Council does not have a legal duty to do so. The provision of sandbags will be on the basis of vulnerability and an assessment of risk, where there is an immediate, serious flooding threat to the property. Calls requesting assistance will be prioritised accordingly, based on all the details provided by the customer. Sandbags will divert some of the flood waters, but in reality they are not as effective in preventing water ingress, as flood boards or flood gates.

(Note that the Council reserves the right to amend its Flood Risk Mitigation Policy, depending upon the scale of the flood event).

For assistance during normal business hours please contact **Streetscene on 0300 123 7026,** or **Highways on 0300 123 7036**. The contact centre is open between 8am and 7pm, Monday to Friday, excluding Bank Holidays

Outside of these hours a service is provided on behalf of Cheshire West and Chester by an external company, as a result you may be required to provide more details than normal. To contact us in an emergency (between 7pm and 8am, Monday to Friday and weekends) call **0300 123 7035**.

9.3 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. Amongst these are contingency planning and risk assessment for emergencies at local level, including flooding. The Environment Agency is the Lead Responder for the 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 consequent management phase), the Council (recovery phase), etc.

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

Emergency Plans provide a framework for 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.

If serious flooding involves people having to be evacuated, the Council may be able to offer temporary shelter centres with food and bedding. 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 homes or other properties from flooding. The responsibility to do that lies with the property owner.

Flooding can range in severity from localised ponding to disruptive floods and dangerous floods. The latter will trigger the implementation of the Council's multi agency response plan with partners as described above. We will deal with the other floods by working with our Streetscene department acting in response to flood warnings and flood forecasts to mobilise the resources we have at our disposal to the best effect. We can also target resources to known problem areas and put measures in place in advance to try to reduce the impact of flooding.

The Council will respond and advise on the following:

- Surface water, groundwater flooding, flooding from non main rivers and coordinate the response with the EA for main river;
- Work with the other Category 1 and 2 responders as part of the multi-agency response to floods;
- Coordinate emergency support from the voluntary sector;
- Liaise with Government departments and with essential service providers;
- Manage the local transport and traffic networks initially on safety grounds followed by signing and diversionary routes;
- Mobilise trained emergency social workers and emergency assistance;
- Deal with environmental health issues, such as contamination and pollution;
- Coordinate the recovery process.

9.4 Communications

Good communications are vital on the build up to, and during an emergency. This is an area we will continually refine as forecasting techniques and information technology develops, particularly in the use of social media networks. The Council's web pages have proved to be a most effective and easily accessed source of information at times of flooding. Information will therefore be published on a regular basis as well as through traditional news media channels.

We 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.

10 Resource Management

10.1 Funding

The way Flood and Coastal Erosion Risk Management (FCERM) projects will be run and funded has changed, and Local Authorities and Internal Drainage Boards (IDBs) now play a bigger role. Since April 2012 projects have been assessed under the new Government policy of Flood and Coastal Resilience Partnership Funding (partnership funding). Under the new approach every worthwhile project has the potential to be supported by national funding over time. Projects can now be either fully-funded or part-funded based on the benefits the scheme provides. These benefits will include the protection of households, commercial properties, public buildings, infrastructure and agricultural land, and the creation or improvement of water or tidal dependant habitat.

Defra, the EA and LLFAs, other Risk Management Authorities (RMAs) and Regional Flood and Coastal Committees (RFCCs) have specific roles and responsibilities in relation to managing flooding and coastal risks. They work together in various ways from developing policy and high level plans through to strategic investment programming and delivering individual projects. Their role is to provide as much protection as possible to communities, businesses and other interests on the flood plain or around the coast, and deliver the greatest overall benefit in terms of flood and coastal erosion risk management with the funding and other resources at their disposal.

Partnership funding now applies to all FCERM projects seeking national Flood Defence Grant in Aid (FDGiA) funding in England. The objective is to allow more schemes to go ahead and give each community more say in how flood and coastal risk is managed. FCERM partnerships will be closely aligned to strategies and development plans produced by local authorities, in consultation with communities or local flood action groups. As long as minimum criteria are met, all new defences and capital maintenance projects are eligible for partnership funding, as are those protecting individual properties and managing risks from surface water and groundwater.

The EA develops six year capital programmes which comprise all schemes awarded funding through FDGiA. The indicative programme for 2015/2016 to 2021/21 gives the annual allocations for successful schemes.

Under partnership funding arrangements, the central government funds available will be calculated based on the outcomes a project is expected to achieve. This amount, together with other sources of funding, is the "Partnership Funding Score". It is expressed as the

percentage of project costs and all projects must score a minimum of 100% to be eligible for central funding. 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.

The new system allows local authorities to calculate the cost of achieving the outcomes they want. More information about the funding process is available on the EAs website, and specifically trained EA staff can also help. The new approach means government could potentially support a greater number of worthwhile schemes over time, rather than fully funding some and others not at all. 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 and IDBs can decide what to do. For example, a project qualifying for 90% funding can still go ahead if costs are reduced by10%, or a 10% contribution is found, or a combination of the two. FCERM 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.

10.2 Addressing the skills gap

It is acknowledged that LLFAs will need to increase their flood risk management capacity and skills in order to deliver their new responsibilities as conferred under the Flood and Water Management Act 2010. Central to this will be the ability for lead local flood authorities to become "intelligent clients", capable of commissioning and challenging expert external advice and of potentially producing work in house if it turns out to be better value. Local Authority officers will need to understand both the technical and local issues under consideration.

Assessing capacity

Defra's strategy for capacity building in local authorities identifies the following areas of key knowledge to be increased:

- Risk management approaches to local flooding
- Delivering the legislative requirements
- Surface water management plans
- Geographical information systems and mapping skills
- Sustainable drainage systems (SuDS) knowledge
- Hydromorphology skills and knowledge

It is also important that skills which are currently found in LLFAs are maintained. These include:

- Planning knowledge (of the National Planning Policy Framework and Planning Practice Guidance
- Highways drainage
- Emergency/resilience planning
- Landscape design
- Delivery skills (e.g. project management, policy analysis)

Improving the capacity of the lead local flood authority

Key Council personnel have attended a series of workshops provided by Defra covering the following topics:

- Understanding the New FCERM Legislation
- Preliminary Flood Risk Assessments
- Collaborative Working Skills
- Local Flood Risk Strategies
- Sustainable Drainage
- Understanding the new funding regime and securing contributions through alternative funding
- Development of Local Strategies
- Consenting of changes to ordinary watercourses

The Council also makes use of valuable information on best practice and discussing issues on Flownet, the National Flood Risk and Water Management Community on the LGA Groups Communities of Practice website (http://www.communities.idea.gov.uk/c/2050378/home.do). The community includes officers from Lead Local Flood Authorities, the Environment Agency and DEFRA as well as consultants and academics.

The Cheshire and Mid Mersey Flood Group gives the Council the opportunity to share best practice and practical experience with other Lead Local Flood Authorities in the local area.

Valuable input is brought to the group by Environment Agency officers who specialise in a wide range of flood risk management areas including asset management and inspection, regulation and enforcement, flood investigation, funding mechanisms.

We have also established a working relationship with Shropshire Council through jointly procuring our Highways and Environment Term Contracts. Although we cover different river catchment areas and the relationship is in its infancy, we believe there may be opportunities to work in ways to the mutual benefit of both authorities.

Recruiting new staff

All resourcing needs are assessed in line with the Council's 'make or buy' policy which aims to source resources via the most beneficial means. To date we have benefitted from our involvement with the Cheshire and Mid Mersey group through an Environment Agency secondee as a shared resource for the group. This proved invaluable in the early stages of the new duties coming into force. We have also been able to share skills etc between the various officers employed by the member authorities. Some elements of work have been carried out by specialist consultants where expertise or resources were lacking within the group.

We envisage that the combination of staff development, resource sharing and the occasional use of external consultants could well be the way we continue as the outcome of 'make or buy' assessments will vary from case to case.

The Cheshire and Mid Mersey group intends to make another temporary shared appointment in the near future. There is currently estimated to be a 10% shortage in qualified drainage engineers in the public sector and we recognise that finding the right person to fill the role may prove difficult. Nonetheless, recruiting from the market may be the most effective way of getting high quality skills and knowledge into the organisation.

Retraining current staff

Particularly in the current climate, redeployment and succession planning may become crucial elements in building a larger team to increase capacity. There are numerous methods of providing training for staff and the Defra strategy for skills and capacity will be a key reference for training needs.

11 Action Plan

These are the steps we intend taking to satisfy the objectives set out in the strategy.

Strategy Objectives:

1. Understand the risks of flooding and coastal erosion and work towards putting long-term plans into place to manage the risks and make sure that other plans take account of them
2. Avoid inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks
3. Build, maintain and improve 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. Increase 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. Preparing for and dealing with local flood incidents and ensuring that the multi-agency emergency response plan is properly deployed in response to flood emergencies

Action No.	Action	Local strategy objective	Promoter / Leader	Supporting Bodies	Funding Source	Date added	Timeframe for delivery
1	Develop and maintain information on flooding from ordinary watercourses	1	Us (LLFA)	EA		2013	Ongoing
2	Develop and maintain information on flooding from surface water	1	Us (LLFA)	EA		2013	Ongoing
3	Develop and maintain information on flooding from groundwater	1	Us (LLFA)	EA		2013	Ongoing
4	Identify or encourage the formation of local flood groups to share data with	1, 4	Us (LLFA)	Community groups		2013	2016
5	Contact Parish Councils for data collections – what are their issues?	1, 4	Us (LLFA)	Community groups		2013	2016
6	Adopt a catchment based approach to risk management with local flood groups	1, 4	Us (LLFA)			2013	2016
7	Produce policies to help avoid inappropriate development in risk areas. To continue through the Local Plan (Part Two) Site Allocations and Detailed Policies	2	Planning Policy dept	Us (LLFA)		2013	Ongoing
8	Consider alternatives and use good design practice and an asset management cycle approach to understand the whole life costs of schemes and assets	2, 3	Us (LLFA)	Planning department, Developers		2013	Ongoing

Strategy Objectives:

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Action No.	Action	Local strategy objective	Promoter / Leader	Supporting Bodies	Funding Source	Date added	Timeframe for delivery
9	Encourage developers to consider SuDS in schemes from the early design stage in order to ensure that best possible systems are built	3, 4	Planning department	Us (LLFA), Developers		2013	2016
10	Produce SuDS design and adoption guidance for developers	2, 3	Us (LLFA), Planning department	Green Spaces & Environment departments		2014	2016
11	Plan for the future and take appropriate steps to adapt to changing flood and coastal erosion risks	4, 5	Us (LLFA)	Community groups		2015	2016
12	Work with communities to understand flood risk from the community perspective	1, 4	Us (LLFA)	Community groups		2015	2016
13	Help communities understand and actively prepare for the risks	4, 5	Us (LLFA)	Community groups		2015	2016
14	Encourage communities to have direct involvement in decision-making and risk management actions	3, 4	Us (LLFA)	Community groups		2015	2016
15	Review flood incident support procedures	1, 4	Us (LLFA)	All other risk management authorities		2014	Ongoing
16	Operate a flood investigation procedure	1, 4	Us (LLFA)	All other risk management authorities		2014	Ongoing

Strategy Objectives:

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Action No.	Action	Local strategy objective	Promoter / Leader	Supporting Bodies	Funding Source	Date added	Timeframe for delivery
17	Regulate work activities on ordinary watercourses	2	Us (LLFA)	Legal department		2014	Ongoing
18	Introduce local byelaws to strengthen the Council's regulatory powers	2	Us (LLFA)	Legal department		2014	2016
19	Produce and maintain a register of assets which are likely to have an effect on flood risk	1, 3	Us (LLFA)	Green Spaces department		2014	Ongoing
20	Develop a risk based maintenance schedule for the registered flood management assets	1, 3	Us (LLFA)	Green Spaces department		2014	2016
21	Identify and Designate third party assets which are likely to have an effect on flood risk	1, 3	Us (LLFA)	Legal department		2014	Ongoing
22	Raise awareness of property level protection measure available to owners of property	4	Us (LLFA)	Community groups			2016
23	Quarterly meetings with other risk management authorities to understand their problems and planned solutions	1, 2, 3	Us (LLFA)	All other risk management authorities		2014	Ongoing
24	Report progress on enacting new powers to the RFCC	1, 2, 3, 4, 5	Us (LLFA)	C&MM Group members, EA		2014	Ongoing
25	Maximise FDGiA funding for proposed works	1, 3	Us (LLFA)	EA	Defra	2014	Ongoing
26	Maximise local levy funding for proposed works	1, 3	Us (LLFA)	EA	RFCC	2014	Ongoing

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Action No.	Action	Local strategy objective	Promoter / Leader	Supporting Bodies	Funding Source	Date added	Timeframe for delivery
27	Maximise OTHER SOURCES OF FUNDING for proposed works	1, 3	Us (LLFA)	Community & other groups, EA	Third party groups	2014	Ongoing
28	Maximising funding and support from other partners to invest in projects and provide local solutions.	1, 3	Us (LLFA)	Community groups, EA	Third party groups	2014	Ongoing
29	Review the multi agency emergency response plan	4, 5	Emergency Planning dept	Us, Community groups, others??		2014	Ongoing
30	Communications – briefings for the call centre in advance of (and up-dates during) flood events	4, 5	Us (LLFA)	Call centre		2014	Ongoing
31	Undertake staff training and/or attend workshops to improve knowledge / skills	1, 2, 3, 4, 5	Us (LLFA)	C&MM Group members, EA, Defra		2014	Ongoing
32	Share skills, knowledge and resources via Cheshire and Mid Mersey Flood Group	1, 2, 3, 4, 5	C&MM Group members	C&MM Group members, EA, Defra		2014	Ongoing
33	Pursue mutually beneficial working practices with Shropshire Council	1, 2, 3, 4, 5	Us (LLFA), Shropshire Council	Us, Shropshire Council		2014	Ongoing

Strategy Objectives:

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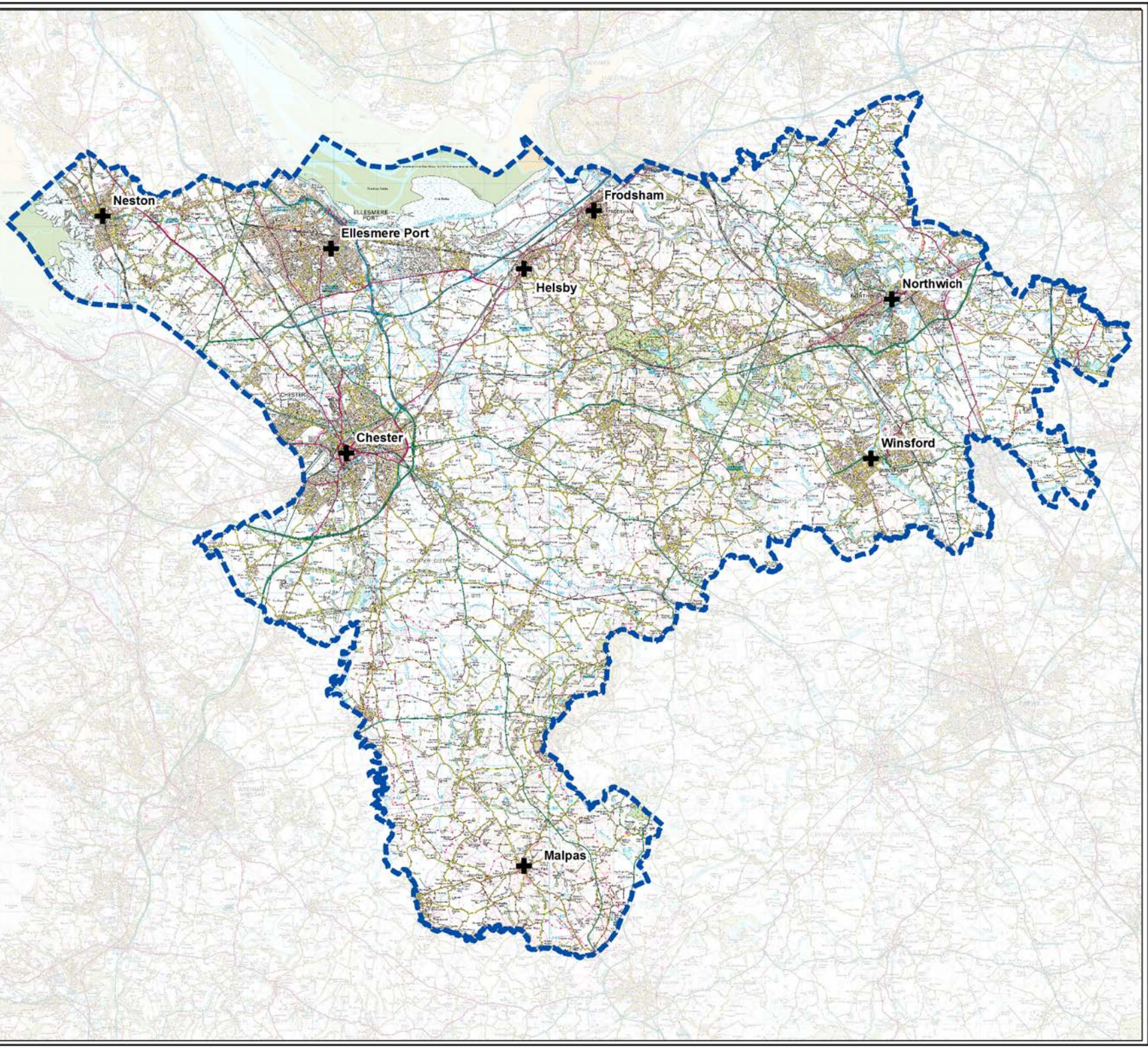
Action No.	Action	Local strategy objective	Promoter / Leader	Supporting Bodies	Funding Source	Date added	Timeframe for delivery
	List of proposed schemes/studies.						
	List of schemes to be confirmed						

APPENDICES:

Figure 1	Cheshire West and Chester – Administrative Boundary
Figure	Historic Fluvial & Tidal Flooding Incidents
Figure 3	Environment Agency Flood Zone Map
Figure 4	Historic Surface Water Flooding Incidents (Pluvial Flooding)
Figures 5a -5c	Areas Susceptible to Surface Water Flooding (AStSWF)
Figure 6	Future Risk of Flooding From Groundwater
Figure 7	Historic Sewer Flooding Incidents
Figure 8	Historic Canal Flooding Incidents



Legend

Cheshire West & Chester Boundary

Major Places/Settlements

Notes:

N

Scale @ A3: 1:165,000

0 2.5 5 Kilometers

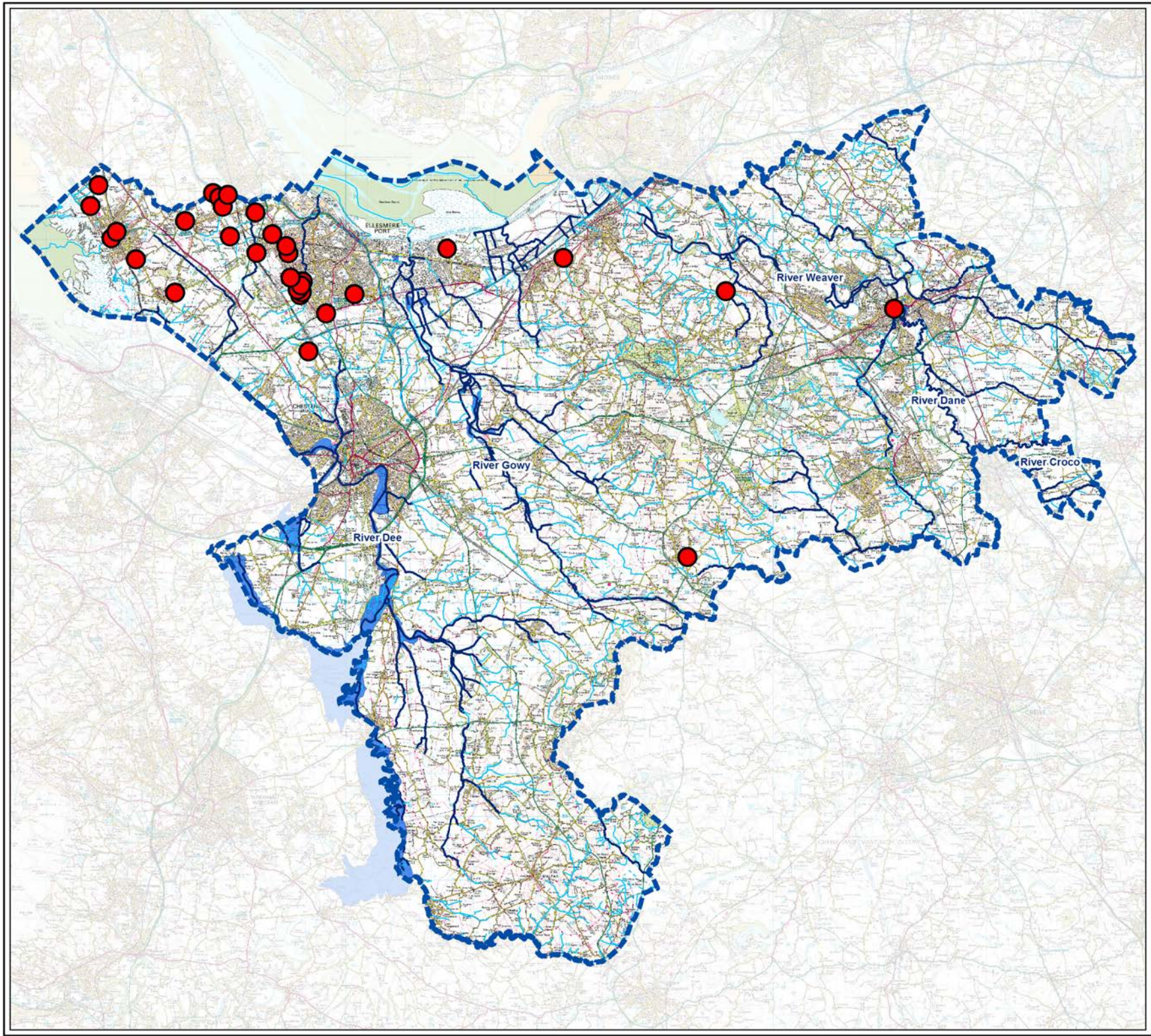
Office: Cheshire West and Chester

Project: **Local Flood Risk Management Strategy**

Drawing Title: Figure 1 - Administrative Boundary

Revision Information

Issue	Date	Orig	Chck	Rev	



Legend

- Cheshire West & Chester Boundary
- Historic fluvial flooding incidents obtained from Cheshire West & Chester internal consultation
- Environment Agency Main River
- Ordinary Watercourse
- Environment Agency Flood Event Outlines

Notes:
Fluvial flooding is defined as flooding relating to either Main Rivers or Ordinary Watercourses.

N

Scale @ A3:
1:165,000

0 2.5 5 Kilometers

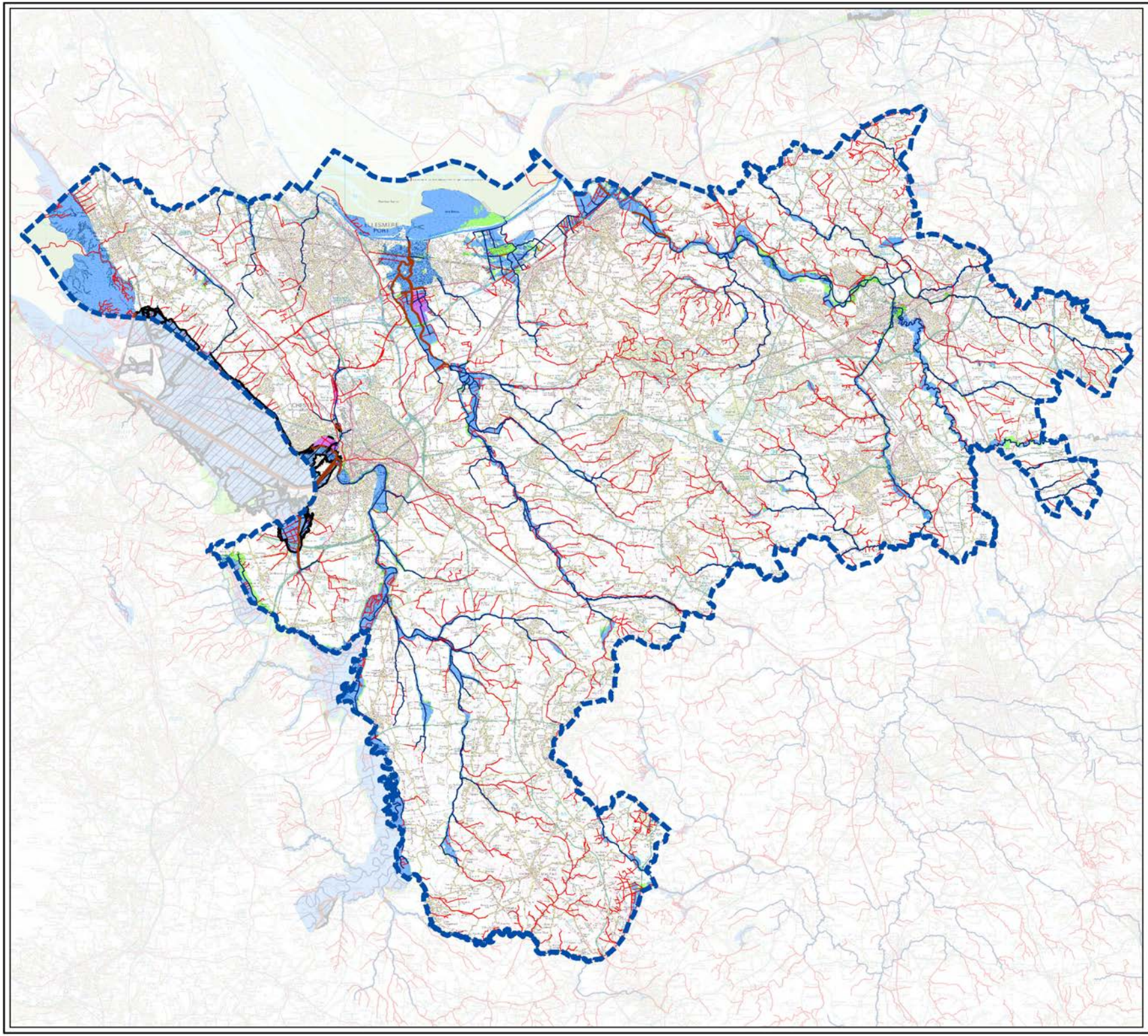
Office:
Cheshire West and Chester

Project:
Local Flood Risk Management Strategy

Drawing Title:
Figure 2 - Historic Fluvial & Tidal Flooding Incidents

Revision Information

Issue	Date	Orig	Chck	Rev	



Legend

- Cheshire West & Chester Boundary
- Environment Agency Main River
- Ordinary Watercourse
- National Defences
- Areas Benefitting from Defences
- Flood Storage Area
- National Flood Zone 3
- National Flood Zone 2

Notes:

N

Scale @ A3: 1:165,000

0 2.5 5 Kilometers

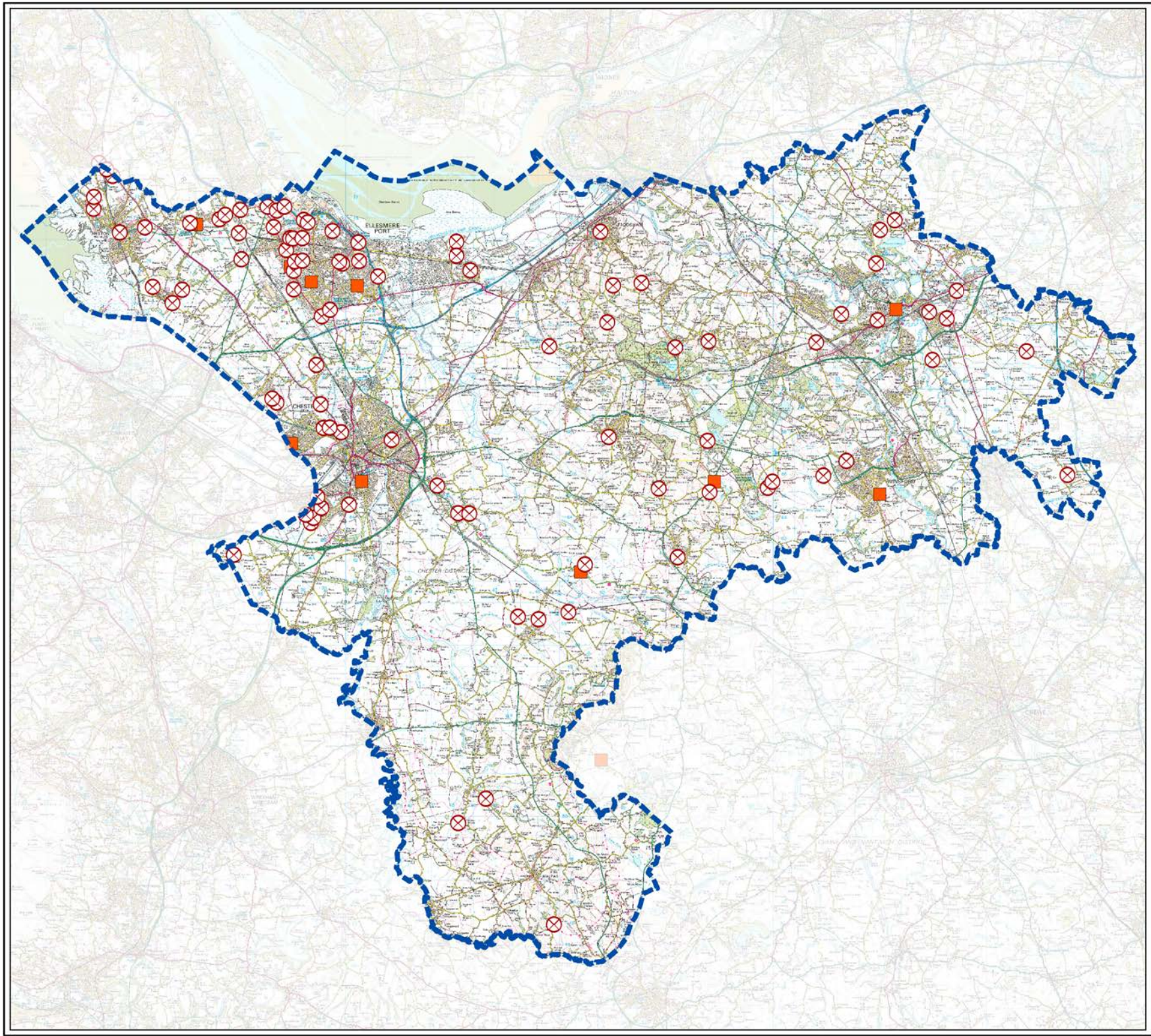
Office: Cheshire West and Chester

Project: **Local Flood Risk Management Strategy**

Drawing Title: Figure 3 - Environment Agency Flood Zone Map

Revision Information

Issue	Date	Orig	Chck	Rev	



Legend

- Cheshire West & Chester Boundary
- Historic surface water flooding incidents obtained from Cheshire West & Chester internal consultation
- Local flooding incidents recorded by Cheshire Fire & Rescue Service

Notes:
Historic Surface Water Flooding Incidents are instances of flooding, relating to surface water and minor watercourses, recorded by Cheshire West & Chester Council.
Fire & Rescue flooding data has been filtered to remove 'household' flooding incidents, for example frozen pipes.

N

Scale @ A3:
1:165,000

0 2.5 5 Kilometers

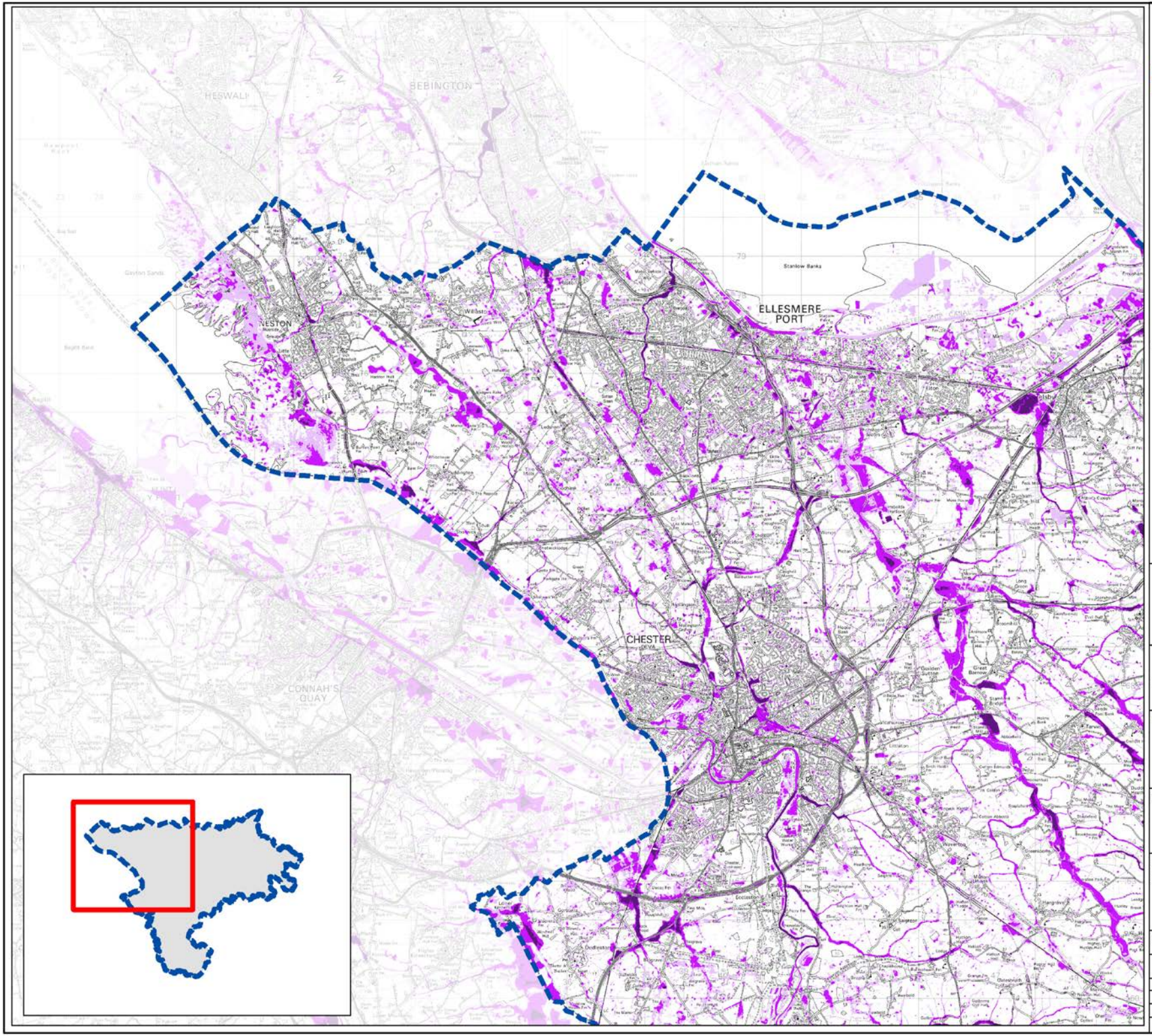
Office:
Cheshire West and Chester

Project:
Local Flood Risk Management Strategy

Drawing Title:
Figure 4 - Historic Surface Water Flooding Incidents

Revision Information

Issue	Date	Orig	Chck	Rev	



Legend

Cheshire West & Chester Boundary

Areas Suceptible to Surface Water Flooding

More risk

Intermediate Risk

Less Risk

Notes:

N

Scale @ A3: 1:90,000

0 1 2 Kilometers

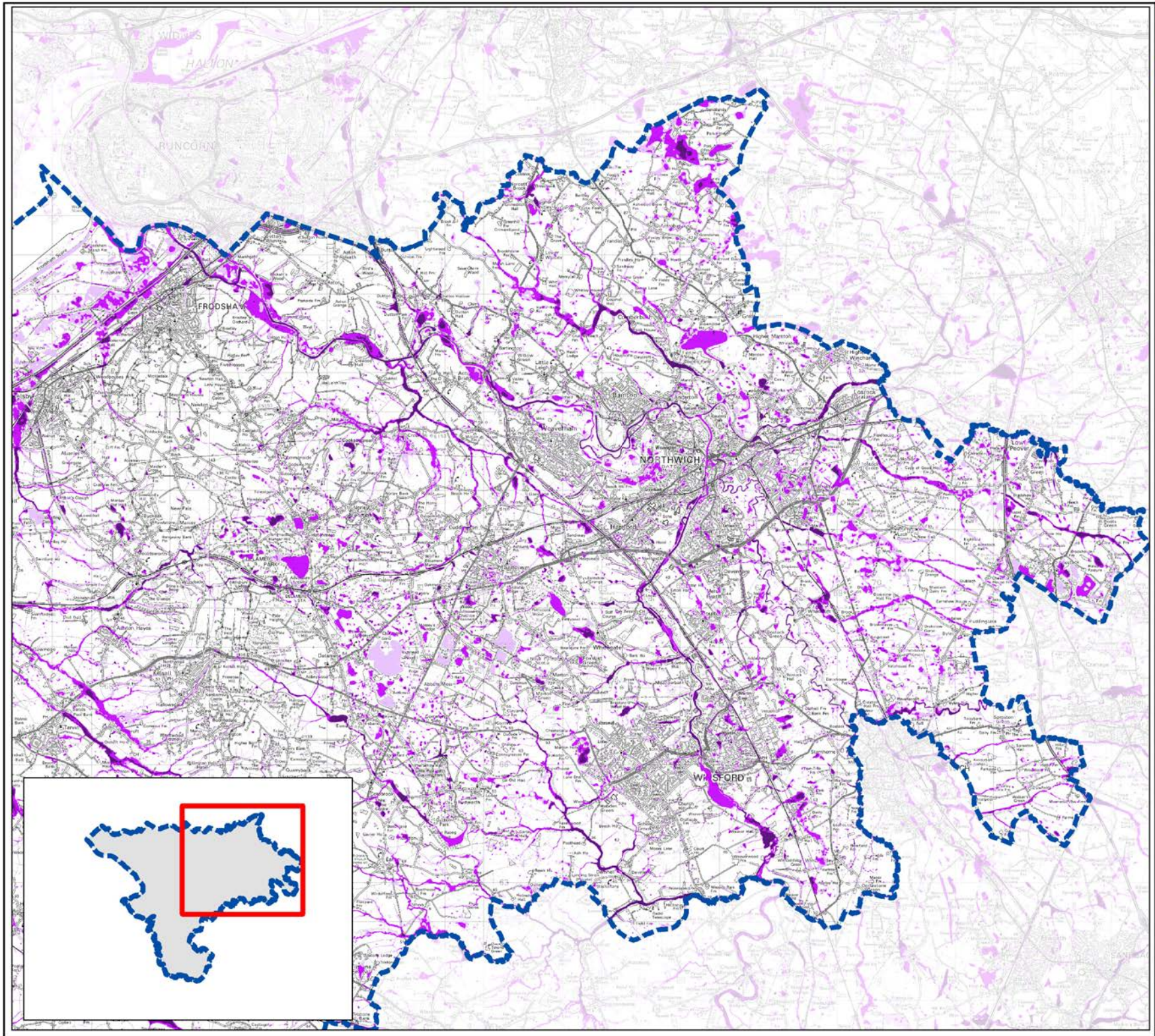
Office: Cheshire West and Chester

Project: **Local Flood Risk Management Strategy**

Drawing Title:
Figure 5a - Locally Agreed Surface Water Flooding Information (Environment Agency AStSWF)
CWAC West

Revision Information

Issue	Date	Orig	Chck	Rev	



Legend

Cheshire West & Chester Boundary

Areas Suceptible to Surface Water Flooding

More risk

Intermediate Risk

Less Risk

Notes:

N

Scale @ A3:
1:90,000

0 1 2 Kilometers

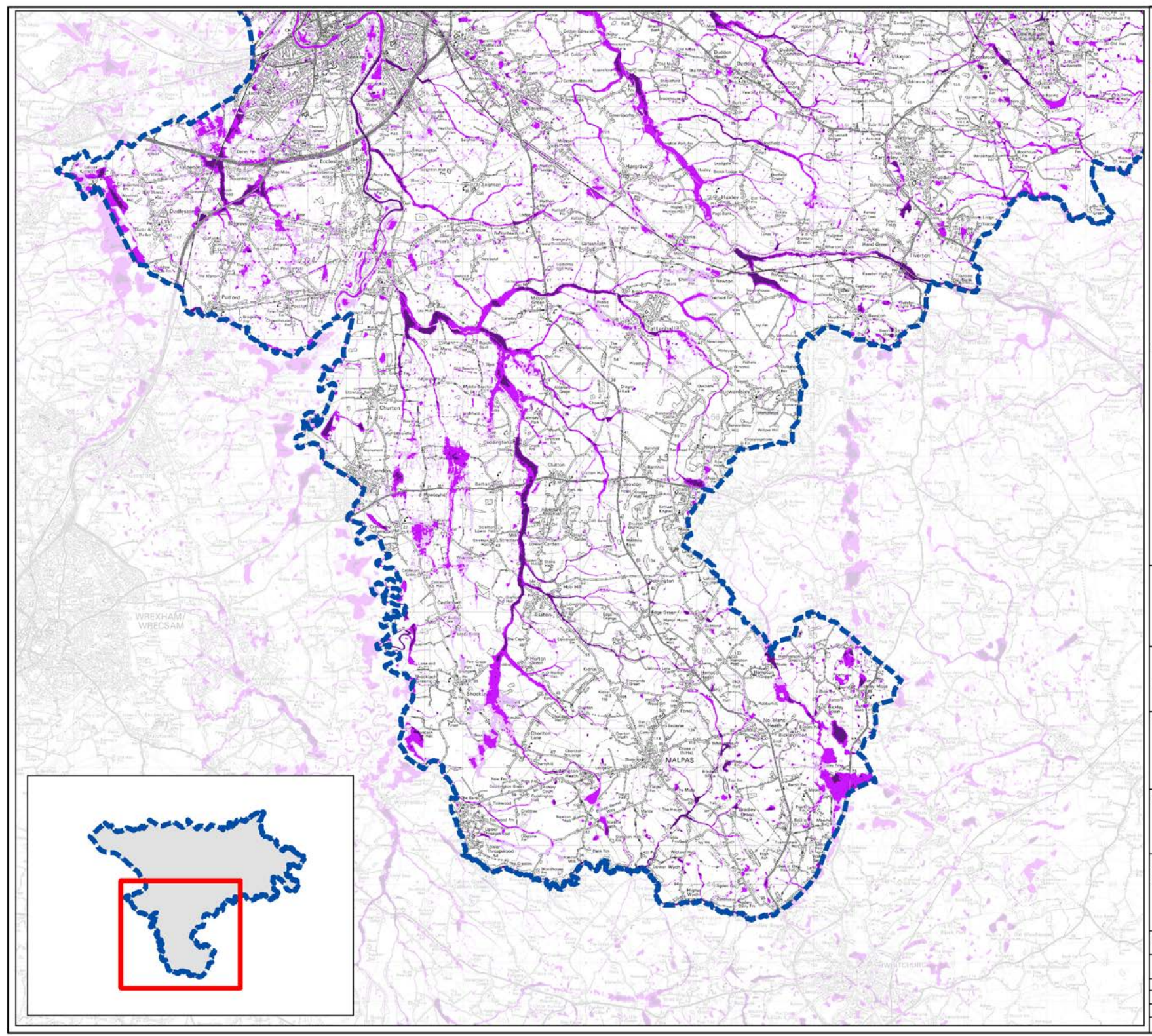
Office:
Cheshire West and Chester

Project:
Local Flood Risk Management Strategy

Drawing Title:
Figure 5b - Locally Agreed Surface Water Flooding Information (Environment Agency AStSWF)
CWAC East

Revision Information

Issue	Date	Orig	Chck	Rev	



Legend

Cheshire West & Chester Boundary

Areas Suceptible to Surface Water Flooding

More risk

Intermediate Risk

Less Risk

Notes:

N

Scale @ A3:
1:90,000

0 1 2 Kilometers

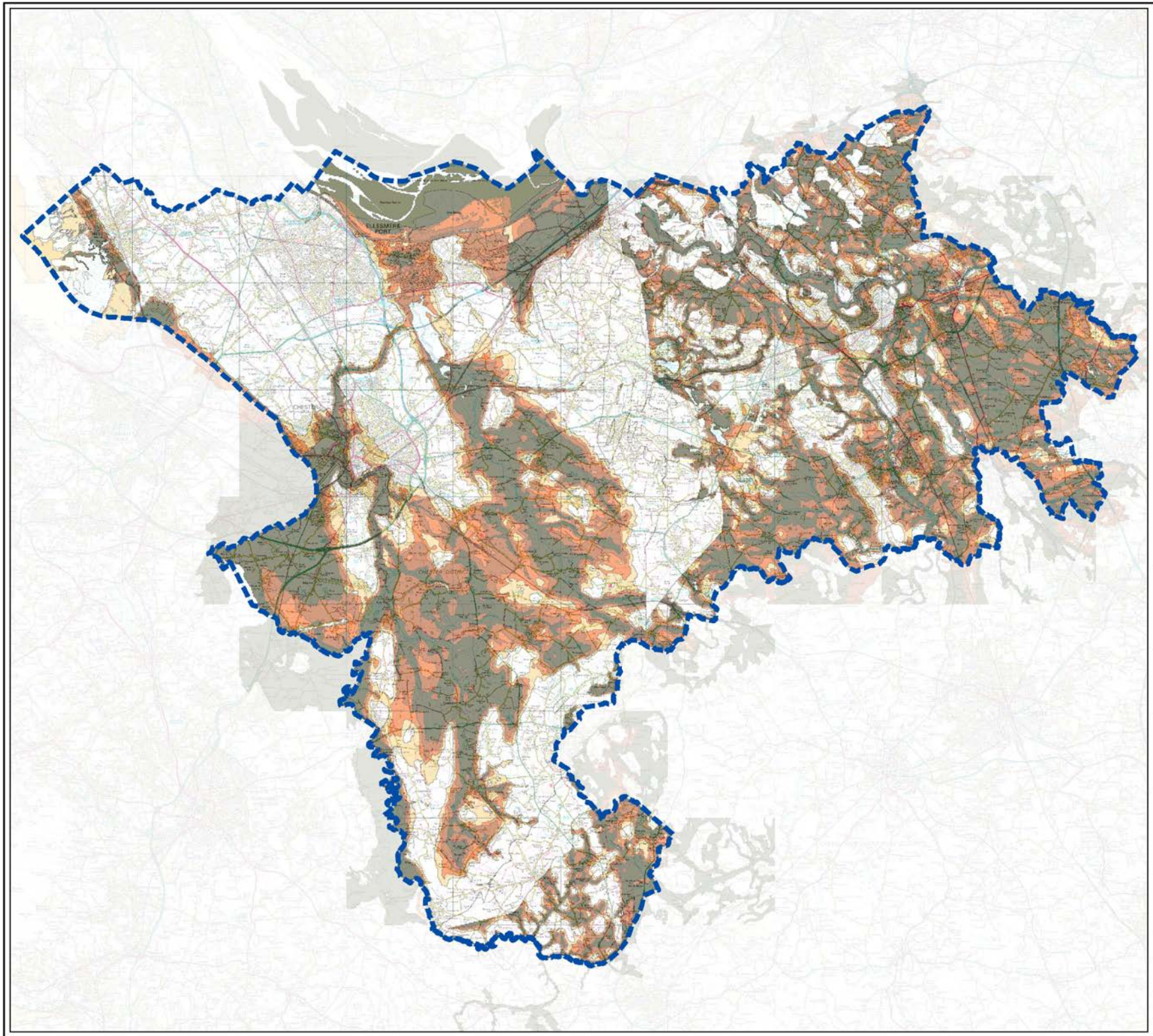
Office:
Cheshire West and Chester

Project:
Local Flood Risk Management Strategy

Drawing Title:
Figure 5c - Locally Agreed Surface Water Flooding Information (Environment Agency AStSWF)
CWAC South

Revision Information

Issue	Date	Orig	Chck	Rev	



Legend

Cheshire West & Chester Boundary

British Geological Survey Groundwater Susceptibility Map

Susceptibility to Flooding

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

N

Scale @ A3: 1:165,000

0 2.5 5 Kilometers

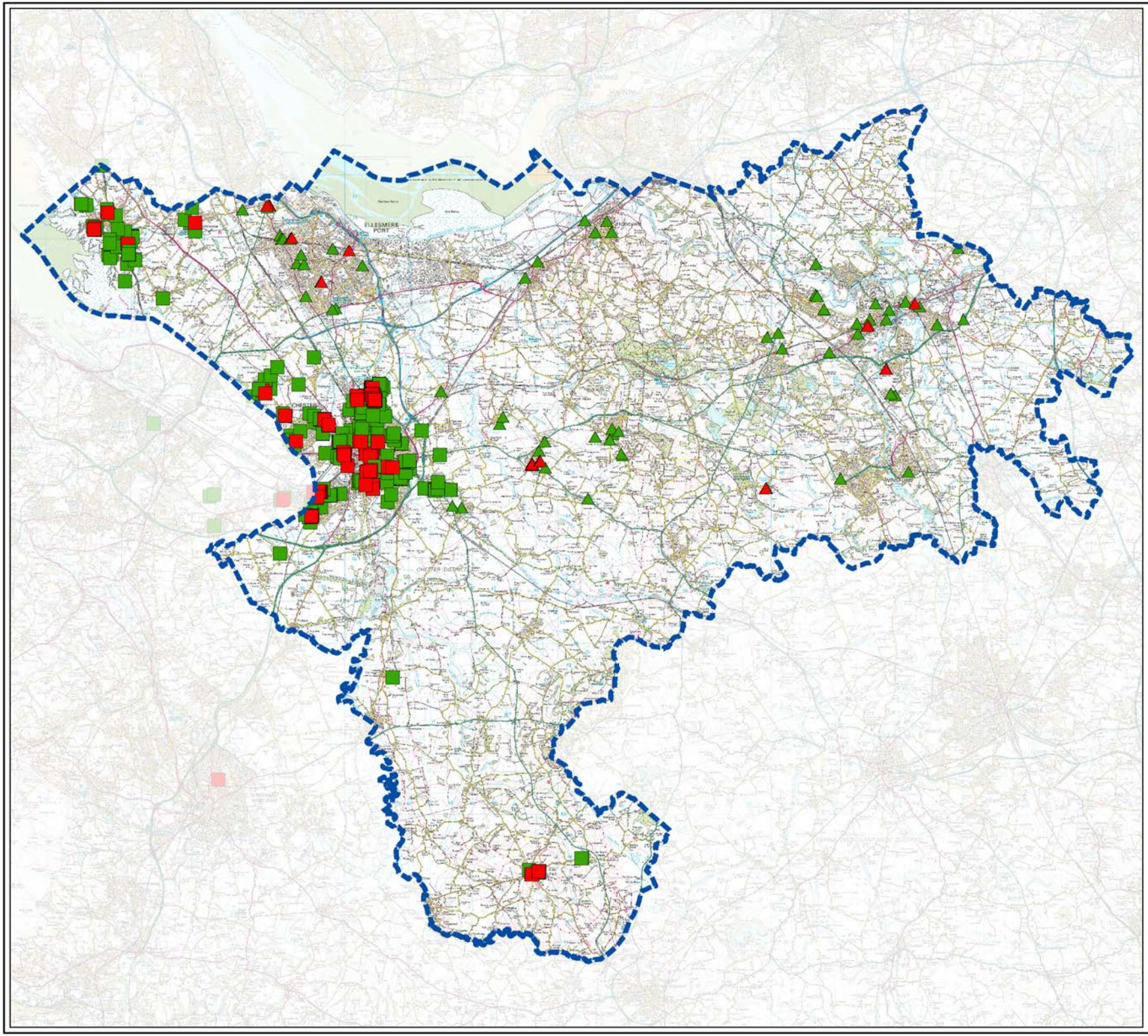
Office: Cheshire West and Chester

Project: **Local Flood Risk Management Strategy**

Drawing Title: Figure 6 - Future Risk of Flooding from Groundwater

Revision Information

Issue	Date	Orig	Chck	Rev



Legend

- CWAC_Boundary
- Welsh Water Flooding Records (Internal)
- Welsh Water Flooding Records (External)
- United Utilities DG5 Records (External)
- United Utilities DG5 Records (Internal)

N

Scale @ A3: 1:165,000

0 2.5 5 Kilometers

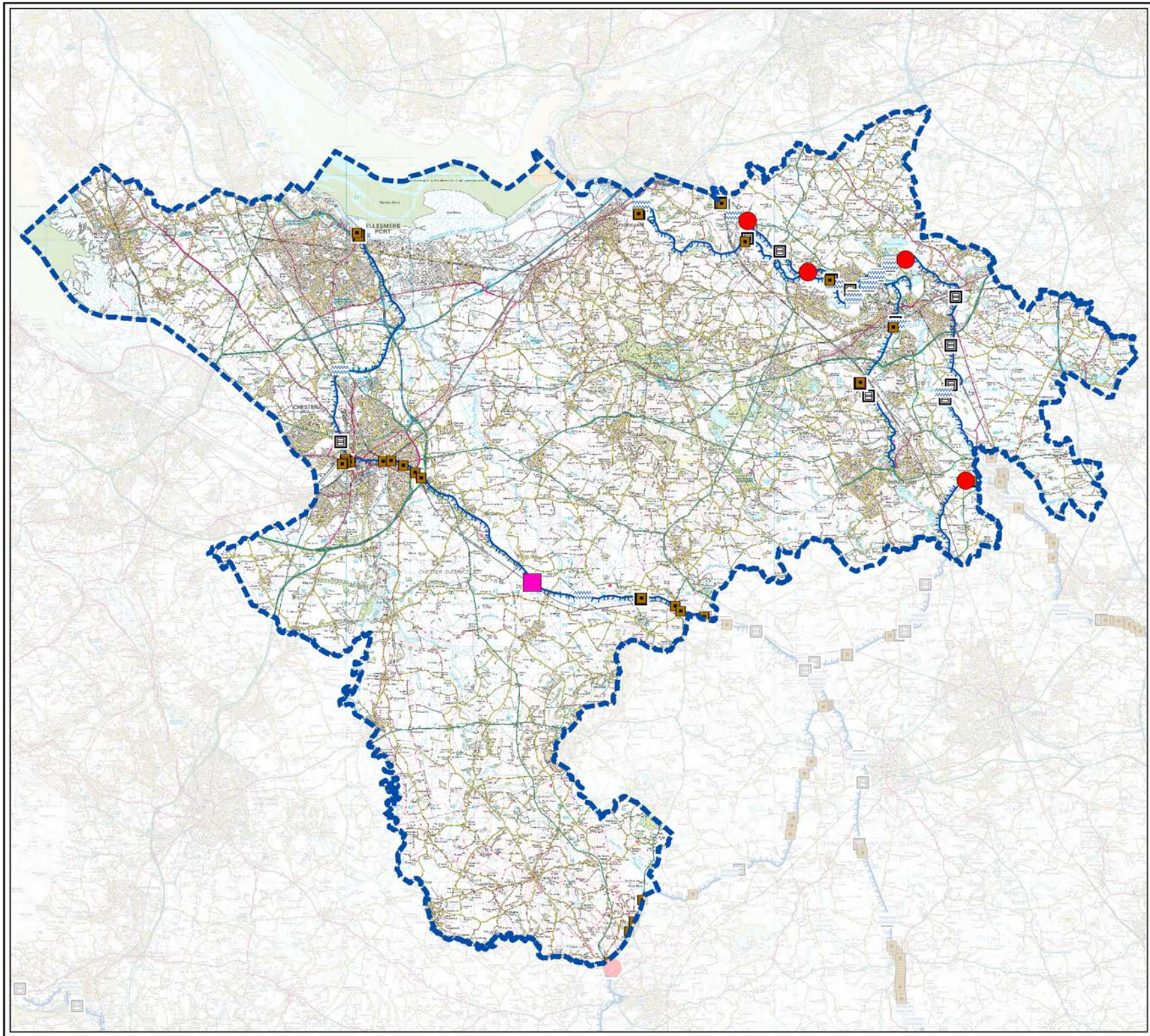
Office: Cheshire West and Chester

Project: **Local Flood Risk Management Strategy**

Drawing Title: Figure 7 - Historic Sewer Flooding Incidents

Revision Information

Issue	Date	Orig	Chck	Rev	



Legend

- Cheshire West & Chester Boundary
- Historic Canal Breaching Incident
- Canal Overtopping Incident
- Canal
- Canal Sluice
- Canal Weir
- Canal Lock

N

Scale @ A3: 1:165,000

0 2.5 5 Kilometers

Office: Cheshire West and Chester

Project: **Local Flood Risk Management Strategy**

Drawing Title: Figure 8 - Historic Canal Flooding Incidents

Revision Information

Issue	Date	Orig	Chck	Rev	