PRELIMINARY FLOOD RISK ASSESSMENT REPORT



JUNE 2011

Knowsl@y Council

Executive Summary

The council, as the Lead Local Flood Authority under the provisions of the Flood and Water Management Act 2010 (FWMA), has prepared this Preliminary Flood Risk Assessment in order to meet the requirements of the Flood Risk Regulations (FRR) 2009.

The FRR placed a duty on the council to consider local sources of potential flood risk in relation to surface water, groundwater and ordinary watercourses and to produce a subsequent Preliminary Flood Risk Assessment report. The PFRA report should be submitted for review to the Environment Agency by the end of June 2011, with the final approved report published on the council's website by December 2011.

In order to develop an understanding of the overall flood risk, Knowsley officers met with the Environment Agency and United Utilities to produce locally agreed surface water information which considered past, current and potential future flooding incidents. Using the information collected and applying the Environment Agency criteria, it was established that none of the flooding events would have been assessed as being significant or would have had any significant harmful consequences on the population. In terms of the risk of future flooding, the national surface water modelling results provided by the Environment Agency estimated that in the Knowsley area, approximately 3000 properties (2400 residential, 600 non-residential) are at risk from flooding to a depth of 0.3m during a rainfall event with a 1 in 200 annual chance of occurring.

In conclusion, this means that, according to Defra guidelines, (where "significant" = an area of flood risk with a minimum of 30,000 people being affected) Knowsley does not have a nationally significant flood risk.

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1. INTRODUCTION

1.1 Scope of the Preliminary Flood Risk Assessment

This Preliminary Flood Risk Assessment (PFRA) report has been prepared to allow Knowsley MBC to meet its duties to deliver the requirements of the Flood Risk Regulations 2009. Further legislation, the Flood and Water Management Act 2010 (FWMA) designates Knowsley MBC as a Lead Local Flood Authority (LLFA) with responsibility to manage local flood risk.

The purpose of the Flood Risk Regulations is to transpose the EC Floods Directive on the assessment and management of flood risk into domestic law and to implement its provisions. The overall aim being to provide a consistent approach to managing flood risk across Europe within a six year flood risk management cycle. It places a duty on both the Environment Agency and the LLFA to prepare a number of documents including:

- Preliminary Flood Risk Assessments
- Flood hazard and flood risk maps
- Flood Risk Management Plans

The deadline for submission of this report to the Environment Agency is 22^{nd} June 2011. For areas of significant risk, flood hazard and flood risk maps have then to be submitted by 22^{nd} June 2013, followed by Flood Risk Management Plans by 22^{nd} June 2015. As Knowsley does not have a significant flood risk, maps and plans will not be required.



Figure 1-1: Responsibilities for Lead Local Flood Authorities and the

The purpose of the PFRA is to record and review past flooding and possible future flooding from local flood sources. To enable effective delivery of the report, individual areas of responsibility

Environment Agency

have been clarified through partnership working arrangements between the LLFA and the Environment Agency.

1.2 Aims and Objectives

The PFRA is a high level screening exercise to locate areas in which the risk of surface water and groundwater flooding is significant ¹ and requires further investigation through the production of maps and management plans. The main aim of the PFRA is to gather and review available information on past flooding incidents and their consequences and also assess the potential consequences of future flooding.

The key objectives are as follows:

- set up governance arrangements and develop partnerships
- establish a methodology and develop partnerships for collation and sharing of data relating to past and future floods and their consequences
- assess historical local flood events and their impact and consequences
- assess potential future flood events and their impact and consequences
- review the "indicative" Flood Risk areas provided by the Environment Agency
- explain any amendments to the "indicative" Flood Risk areas and justify the creation of any new areas.

1.3 The PFRA Study Area

The study area for this report is defined by the administrative boundary of Knowsley MBC. Knowsley has a population of approximately 150,000, mainly residing in the towns of Kirkby, Huyton, Prescot, Whiston and Halewood. The Borough of Knowsley covers an area of around 86sq km. The area is about 50% urban, with the remaining rural areas of various agricultural quality.

The Borough contains the River Alt and Prescot, Netherley and Ditton Brooks. The Alt drains the north west of the Borough. Prescot Brook drains Prescot, Whiston and parts of the Huyton

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¹ For Defra, significant means an area of flood risk with a minimum of 30,000 people being affected.

Netherley, Dog Clog, Fox's Bank and Ditton urban areas. Brooks drain the rural southern parts of the Borough. geological terms, the Knowsley area is underlain predominantly by Triassic sandstone and mudstone. There are, however, some areas of Upper Westphalian (coal measures) and Westphalian. Overlying drift geology consists mainly of sand and other course sediments, with some areas of composite solid rock. Across the UK and Wales, areas of Triassic sandstone create aguifers and these are used to supply approximately 25% of the country's abstractions licensed groundwater (see section Groundwater Flooding).

2. LEAD LOCAL FLOOD AUTHORITY RESPONSIBILITIES

2.1 Introduction

LLFA's are responsible for managing local flood risk in particular from ordinary watercourses, surface run-off and groundwater and any interaction these have with drainage systems and other sources of flooding including sewers. An example of this interaction might be where a surface water sewer cannot flow and so "backs-up" due to high water levels in a watercourse.

2.2 Coordination of Flood Risk Management

Knowsley had already recognised the benefits of partnership working by setting up an internal flooding sub-group under the Risk and Resilience Group. This was in response to the need to make local communities and individuals much more resilient following the water mains bursts in December 2007 and February 2008 and flash flooding in 2008. In 2008, following publication of the findings of the Pitt Review, the Safer Stronger Communities Group took on the responsibility for improving the local community's resilience to flood risk. The 2009 Scrutiny Review report recommended "That a forum and meetings be arranged by the local authority (who will act as the lead body) with relevant partners to discuss joint working and the coordination of efforts to prevent incidents/minimise flooding impacts".

To deliver this action, the Knowsley Joint Flood Risk group was established, with the following membership:

- KMBC Directorate of Regeneration, Economy and Skills
- KMBC Directorate of Corporate Resources
- United Utilities

The Environment Agency

The Flood and Water Management Act 2010 formalised Knowsley's role as the LLFA, with responsibility for engaging partners and the public, coordinating and leading on local flood management.

xecutive Director Climate Change & Neighbourhood Corporate Risk & Head of Risk & People &Business Cabinet Manager **Chief Executive** Member Regeneration Service Director Knowsley Solutions **Group Manager** Highways & Drainage **Deputy Chief** Head of Planning & Transportation **Group Manager** Planning & **Building Control** Head of Policy & **Group Manager** Policy & Strategy

Figure 2-1: Knowsley's internal structure for the management of flood risk.

Knowsley provides advice on flooding and flood risk to its residents and businesses through:

- the Council webpage;
- the Knowsley News (a free magazine delivered to all residents and available in the One Stop Shops),
- Environment Agency flood leaflets (available in One stop Shops and libraries)

Further developments to the way communication with the public is undertaken are being developed in partnership with neighbouring authorities through the Merseyside Emergency Planning group.

3. METHODOLOGY AND DATA REVIEW

3.1 Introduction

The PFRA is a high level screening exercise which involves collecting information on past (historic) and future (potential) floods, assembling it into a preliminary assessment report, and

using it to identify areas where the risk of flooding is an issue². To assist LLFAs in identifying flood risk areas, the Environment Agency has produced "indicative flood risk areas" based on an assessment of national information.

3.2 Data Collection

The following were identified as points of contact for provision of data for the production of the PRFA:

- LLFA Knowsley MBC
- The Environment Agency
- United Utilities PLC
- Merseyside Fire and Rescue Service
- Residents of Knowsley
- Neighbouring Authorities

LLFA

Historical flooding records from surface water, ordinary watercourses and groundwater are kept within the council's "Confirm (Pitney Bowes)" database. Members of staff were also able to provide anecdotal information regarding areas known to be susceptible to flooding from excessive surface water, groundwater or flooding from ordinary watercourses.

The Environment Agency

The following datasets, plans and documents were provided by the Environment Agency:

- Areas Susceptible to Surface Water Flooding
- Flood Map for Surface Water
- Flood Map (Rivers and the Sea)
- Areas Susceptible to Groundwater Flooding
- National Receptors Dataset
- Indicative Flood Risk Areas
- Historic Flood Map
- Alt Crossens CFMP
- Mersey Estuary CFMP
- Mersey and North Merseyside Water Resources Study

² The Environment Agency has produced indicative flood risk areas based on 1km grid squares where at least 200 people or 20 businesses or 1 critical service might be flooded to a depth of 0.3m by a 1 in 200 year return period rainfall event.

United Utilities

The following datasets were provided by United Utilities:

- Manhole location
- Sewers
- Rising Mains
- Combined sewer overflow (CSO) location
- Pumping Station location
- Detention Tank location
- Waste Water Treatment Works (WWtW) location
- Drainage Areas
- Sewer modelling data
- DG5 (internal and external) Register
- Historical sewer incident record data (SIRS & WIRS)

Merseyside Fire and Rescue Service

The Fire and Rescue service was approached for locations where they were called out to attend flooding incidents. However their local data is stored on a "call-out address" basis and not "type of incident" and they did not have an available resource to search through their records for attendance due to flooding.

Residents of Knowsley

In areas of known flooding, residents were contacted for anecdotal information on flooding incidents.

Neighbouring Authorities

A meeting was held with representatives of Liverpool and Sefton councils to review the Indicative Flood Risk Area and to discuss potential cross-border flooding issues.

3.3 Data Limitations

The council's Confirm database was created on the basis of collation and response to "service requests" and not the collection of detailed flooding information. Incidents of historic flooding have been recorded however the records contain inconsistencies and depend on what level of information was provided by the initial caller, and any follow-up notes added by the responding officer.

The amount of available anecdotal information on historical flooding has also been reduced over the last few years due to

loss of staff through departmental restructuring and officer retirement.

3.4 Data Storage and Security

The storage of new flooding data will remain within the council's Confirm database as the initial notification of an incident will normally be recorded as a "service request". The resulting records will be stored securely on council servers which are password protected and regularly backed-up. The future content of the individual records is currently being considered to comply with the duty to investigate / data collection requirements within the Flood and Water Management Act 2010 and Flood Risk Regulations 2009. Associated GIS based workspaces and tables will also be stored securely within the council servers.

The use of some of the data supplied to produce the PFRA report is restricted. In particular this refers to sections of data provided by the Environment Agency and United Utilities. Data supplied by United Utilities is subject to a licence agreement between them and Knowsley MBC dated 2nd February 2011. Under the terms of the licence, all the United Utilities data is to be treated as confidential and not used for any purpose other than that stated in the agreement.

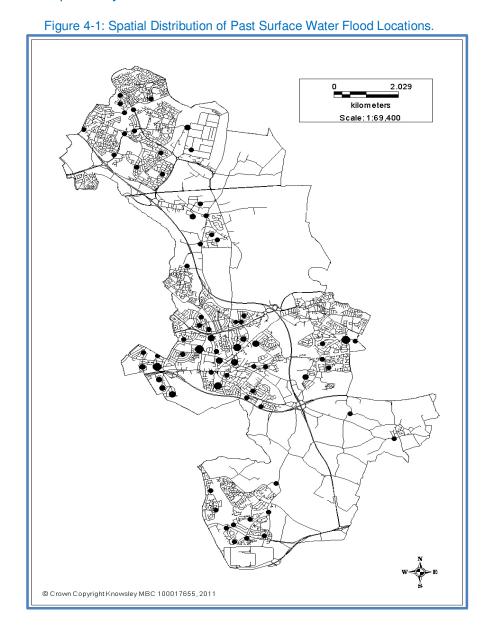
3.5 Review of data

To ensure that the PFRA report complied with the requirements of the regulations, it was reviewed as follows:



4. FLOOD RISK IN THE PAST

The PFRA requires significant historic flood events to be recorded and reported to Europe through this report. There has been no formal guidance on what 'significant' means in terms of historic local flooding; Defra has left it to LLFAs to determine their own definition. For the recording of past local flood risk, the "indicative flood risk" criteria of 200 people in a 1km grid square was reduced to 20 people (or approximately 8 houses) in a 1km grid. To ensure a consistent Merseyside approach, this method for establishing past local flood risk was discussed at the Merseyside Drainage Group meeting on 17th January 2011 and on 21st February 2011 adopted across the region as the accepted way forward.



The flooding record data collected does not have enough detail included to allow full assessment of the impact and consequences on the residents of the properties flooded. The limited available evidence suggests that none of the past flooding events are considered to be significant, with associated harmful consequences. As such, none have been recorded in Annex 1 of the PFRA spreadsheet. An estimated 1% rainfall event (an event that has a 1 in 100 chance of happening in any one year) occurred on 20 July 2011 and the records from both United Utilities and Knowsley only show internal flooding to 12 residential properties and 3 non-residential properties (shops). It should be noted that these flooded properties are dispersed throughout the borough and do not form any significant cluster.

Data provided by United Utilities covering recorded surface water flooding incidents from 2008 to date was reviewed and Table 4-1 shows the location of surface water and combined sewers that have been identified to be hydraulically inadequate.

Table 4-1 – Location of surface water flooding incidents due to lack of capacity in the sewer. *Source: United Utilities. 2011*

Date flooding reported	Location	Sewer Type	Chance of rainfall happening in any year	Consequence	No of properties affected
11/05/2008	Huyton	Surface Water	1 in 20	External Flooding	3
11/05/2008	Huyton	Surface Water	1 in 20	Internal Flooding	3
10/07/2008	Huyton	Combined Sewer	Not known	Cellar Flooding	1
29/07/2008	Huyton	Combined Sewer	Not known	Cellar Flooding	1
29/07/2008	Roby	Combined Sewer	Not known	External Flooding	1
05/09/2008	Huyton	Surface Water	Not known	Highway Flooding	1
06/09/2008	Huyton	Combined Sewer	Not known	Highway Flooding	1
20/07/2010	Roby	Combined Sewer	Not known	External Flooding	5
20/07/2010	Roby	Surface Water	1 in 20	Internal Flooding	3
20/07/2010	Roby	Surface Water	1 in 20	External Flooding	2
20/07/2010	Roby	Surface Water	1 in 20	Highway Flooding	1
03/10/2010	Whiston	Surface Water	Not known	External Flooding	6

The records of all existing past flooding locations will be retained within the "Confirm" database and used to support the local flood risk management strategy.

5. FUTURE FLOOD RISK

5.1 Locally Agreed Surface Water Information

The Environment Agency has produced two national datasets showing predicted surface water flooding:

- Areas Susceptible to Surface Water Flooding (AStSWF)
- Flood Map for Surface Water (FMfSW)

The data shown on both the AStSWF and FMfSW maps for the Knowsley area was reviewed by representatives of the Environment Agency, United Utilities and Knowsley Council on 24th January 2011. It was compared to known, locally agreed surface water data including the effects of an estimated 1% rainfall event (an event that has a 1 in 100 chance of happening in any one year) that occurred on 20 July 2011 and it was agreed that the FMfSW was more representative of the flood risk. As such, the FMfSW was adopted for use as the map identifying "locally agreed surface water information".

The Environment Agency has used the information within the National Receptor dataset to count the number of properties at risk of flooding identified on the FMfSW. The data is based on the assumption that a rainfall event with a 1 in 200 chance of happening in any one year is equivalent to the chance of flooding on the ground in the order of a 1 in 100 chance in any given year.

Table 5-1 – Properties in Knowsley identified to be at risk of surface water flooding. Source: Environment Agency, 2011

1 in 200 Rainfall - Flooding Greater than 0.3m depth							
All properties	Residential properties	Non-residential properties					
3000	2400	600					

5.2 Local Drainage Capacity

Data provided by United Utilities covering recorded incidents from 2008 to date was reviewed and Table 4-1 shows the location of surface water and combined sewers that have been identified to be hydraulically inadequate. These locations tie in to the areas of predicted surface flood risk identified on the FMfSW.

5.3 Ordinary Watercourses

The Environment Agency dataset "Detailed River Network" and United Utilities sewer records have been used to establish the location of ordinary, non-main river watercourses. Currently, there is only one known issue of flood risk associated with these watercourses.

Table 5.2 Area in Knowsley Identified to be at Risk of Flooding from Ordinary Watercourses

Date flooding reported	Location	Sewer Type	Outfall	Chance of rainfall happening in any year	Consequence
Nov 2000	Kirkby	Culverted Watercourse	River Alt	Not Known	Highway Flooding
Feb 2005	Kirkby	Culverted Watercourse	River Alt	Not Known	Highway Flooding
Jan 2008	Kirkby	Culverted Watercourse	River Alt	Not Known	Highway Flooding
Oct 2010	Kirkby	Culverted Watercourse	River Alt	Not Known	Highway Flooding
Jan 2011	Kirkby	Culverted Watercourse	River Alt	Not Known	Highway Flooding
Feb 2011	Kirkby	Culverted Watercourse	River Alt	Not Known	Internal flooding to one property

5.4 Groundwater Flooding

Groundwater is water that has drained through surface layers of soil and rock until it reaches a layer of rock material that it cannot pass through, or can only pass through very slowly. This results in the storage of water in the rock layers above this impermeable layer. The water is stored in gaps in the rock, or between the particles of which the rock is composed.

There are four national datasets providing information on groundwater flooding. Due to the lack of local information in relation to groundwater flooding, the Environment Agency's "Areas Susceptible to Groundwater Flooding" dataset has been used for this report. This dataset only identifies wider areas that may be at risk from groundwater flooding. It covers large areas and only isolated locations within the overall susceptible area are likely to suffer the consequences of groundwater flooding.

Information within the Mersey and North Merseyside Water Resources Study suggests that the computer models covering the Knowsley area only indicate minimal groundwater level rise over the next few years.

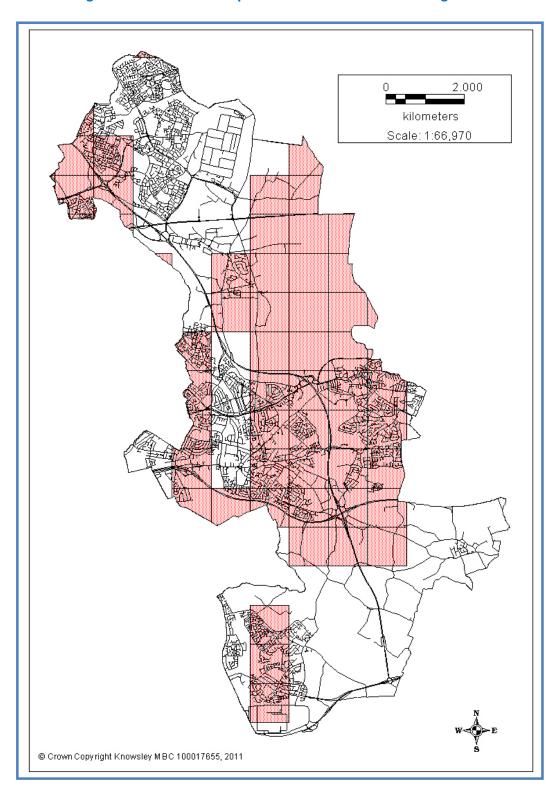


Figure 5-1 – Areas Susceptible to Ground Water Flooding

5.5 Climate Change

Evidence

There is clear scientific evidence that global climate change is happening now. It cannot be ignored.

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

Greenhouse gas (GHG) levels in the atmosphere are likely to cause higher winter rainfall in future. Past GHG emissions mean some climate change is inevitable in the next 20-30 years. Lower emissions could reduce the amount of climate change further into the future, but changes are still projected at least as far ahead as the 2080s.

We have enough confidence in large scale climate models to say that we must plan for change. There is more uncertainty at a local scale but model results can still help us plan to adapt. For example we understand rain storms may become more intense, even if we can't be sure about exactly where or when. By the 2080s, the latest UK climate projections (UKCP09) are that there could be around three times as many days in winter with heavy rainfall (defined as more than 25mm in a day). It is plausible that the amount of rain in extreme storms (with a 1 in 5 annual chance or rarer) could increase locally by 40%.

Key Projections for North West River Basin District

If emissions follow a medium future scenario, UKCP09 projected changes by the 2050s 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);

 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.

Implications for Flood Risk

Climate changes can affect local flood risk in several ways. Impacts will depend on local conditions and vulnerability.

Wetter winters and more of this rain falling in wet spells may increase river flooding especially in steep, rapidly responding catchments. More intense rainfall causes more surface runoff, increasing localised flooding and erosion. In turn, this may increase pressure on drains, sewers and water quality. Storm intensity in summer could increase even in drier summers, so we need to be prepared for the unexpected.

Drainage systems in the district have been modified to manage water levels and could help in adapting locally to some impacts of future climate on flooding, but may also need to be managed differently. Rising sea or river levels may also increase local flood risk inland or away from major rivers because of interactions with drains, sewers and smaller watercourses.

Where appropriate, we need local studies to understand climate impacts in detail, including effects from other factors like land use. Sustainable development and drainage will help us adapt to climate change and manage the risk of damaging floods in future.

5.6 Adapting to Change

Past emission means some climate change is inevitable. It is essential we respond by planning ahead. We can 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.

Although the broad climate change picture is clear, we have to make local decisions against deeper uncertainty. We will therefore consider a range of measures and retain flexibility to adapt. This approach, embodied within flood risk appraisal guidance, will help to ensure that we do not increase our vulnerability to flooding.

5.7 Long Term Developments

It is possible that long term developments will affect the occurrence and significance of flooding. However current planning policy aims to prevent new development from increasing flood risk.

In England, Planning Policy Statement 25 (PPS25) on development and flood risk aims to "ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall."

Adherence to Government policy ensures that new development does not increase local flood risk. However, in exceptional circumstances the Local Planning Authority may accept that flood risk can be increased contrary to Government policy, usually because of the wider benefits of a new or proposed major development. Any exceptions would not be expected to increase risk to levels which are "significant" (in terms of the Government's criteria).

In terms of local development, the Knowsley Replacement Unitary Development Plan (UDP), adopted June 2006, provides guidance for the period up to 2016. There are three large sites available for development that may have an impact on flood risk.

- Bridgefield Forum, Cartbridge Lane, Halewood originally occupied by a major indoor sports centre (UDP reference H1). This is a proposed residential development site of approx 8.3Ha for 250 dwellings;
- land at Thingwall Lane, Huyton, a brownfield site of approx 18
 Ha with potential for 350 residential dwellings;
- Pirelli Plant and adjacent industrial land, South Prescot a brownfield site formally occupied by BICC Ltd in connection with the manufacture of copper cables and similar products. The site has been identified as possible mixed used development.

6 Review of Indicative Flood Risk Areas

The indicative Flood Risk Area has been reviewed. Cross-border flooding issues between Knowsley and Liverpool are not significant. The Flood Risk Area has been split along the administrative boundary. Flood risk within the administrative boundary of Knowsley council does not meet the Government

threshold of 30,000 and is therefore not a Flood Risk Area under the Flood Risk Regulations.

7. Identification of Flood Risk Areas

The Flood Map for Surface Water has been adopted as the indicator for local flood risk. No amendments have been made to it.

Knowsley does not form a nationally significant Flood Risk Area under the Defra criteria (where significant means an area of flood risk with a minimum of 30,000 people being affected).

8. Next Steps

Develop the local flood risk strategy

In the development of local strategy, Knowsley will consider the needs of communities, the economy and the environment. The strategy will form the framework to enable people, communities, businesses and the public sector to work together to establish a clear understanding of the risks of flooding, so that investment in risk management can be prioritised and communities can be helped to recover more quickly and effectively after incidents.

- Develop arrangements for suitable data storage and protection (GIS and the Council's Confirm incident database).
- Publish the PFRA report on the Council's website by 22/12/11.
- Develop arrangements to undertake the responsibilities created by the Flood & Water Management Act 2010 e.g. Duty to investigate flooding incidents, duty to maintain a register of structures or features which may have an effect on flood risk, acting as consenting authority for works to ordinary watercourses and acting as the SUDS Approving Body.
- Commence the PFRA review in 2015 in line with the FRR 2009, for the submission of any required Flood Risk Management Plans by 22/06/2015.

References

Knowsley and Sefton MBCs, Strategic Flood Risk Assessment (Final report) June 2009

http://www.knowsley.gov.uk/pdf/SFRA%20Main%20Report.pdf

EA geostore – National datasets http://www.geostore.com/environment-agency/

Knowsley Replacement Unitary Development Plan – June 2006 http://www.knowsley.gov.uk/pdf/unitary_development_plan.pdf

Mersey and North Merseyside Water Resources Study

Knowsley Council webpage – Flood advice <u>http://www.knowsley.gov.uk/residents/preparing-for-emergencies/flood-advice.aspx</u>

Environment Agency Flood Advice – webpage http://www.environment-agency.gov.uk/homeandleisure/floods/default.aspx