

APPENDIX 1



Borough of Poole
Unitary Authority

Preliminary Flood Risk Assessment

Draft Final Report v3

June 2011

1. Executive Summary

This report has been prepared to assist Borough of Poole in meeting their duties to manage local flood risk and deliver the requirements of the Flood Risk Regulations (2009). The Borough of Poole, as a unitary authority, is defined as a lead local flood authority (LLFA) within the regulations. This report represents the first stage of the requirements set out in the regulations.

The Preliminary Flood Risk Assessment (PFRA) process is aimed at providing a high level overview of flood risk from local sources, primarily flooding from surface water, groundwater and ordinary watercourses. Flooding associated with the sea, main rivers and reservoirs is the responsibility of the Environment Agency and does not need to be considered as part of this report. The completed PFRA report must be submitted by Borough of Poole to the Environment Agency for review by 22 June 2011. The PFRA has been produced based on the Environment Agency's Final PFRA Guidance and Defra's Guidance on selecting Flood Risk Areas, both published in December 2010.

Using the national methodology set by Defra, the Environment Agency identified indicative Flood Risk Areas across England. Of the ten areas identified, none of these fall within the Borough of Poole. This simply means that parts of the PFRA mandatory documentation is not applicable to Poole and therefore will not require completion.

In order to gain a clearer understanding of the flood risk across the Borough of Poole, flood risk data and historic flood events were collected from local and national sources, the Environment Agency, water companies, emergency services and other risk management authorities.

Quality and comprehensive records on flood extents and consequences were largely unavailable or considered of poor quality. No records of events that have occurred in Poole can be deemed to have significant harmful consequences as defined by the criteria set by the UK government Secretary of State and guidance provided by the Environment Agency.

However, it may be noted that there is a risk of future flooding from local sources to areas across the Borough of Poole. Data from the Environment Agency has been used to calculate the number of properties that are at risk from flooding.

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3. Introduction

3.1 Scope

The Preliminary Flood Risk Assessment is an initial, high level, exercise aiming to review historical and potential, future flood risk and the determination of Flood Risk Areas. This report is to assess the local flood risk in Poole. Local flood risk includes flooding from surface water, groundwater, canals, lakes and small reservoirs. Flood risk from the sea, main rivers and large reservoirs is the responsibility of the Environment Agency and so is not considered in this report. This is unless it is considered that it may affect flooding from one of the sources above.

The PFRA brings together existing and available information to determine the level of flood risk throughout the borough of Poole. Floods with significant harmful affects are only to be considered.

3.2 Aims and Objectives

Under the Flood Risk Regulations (2009) Borough of Poole, as a Lead Local Flood Authority (LLFA), has a duty to prepare a Preliminary Flood Risk Assessment (PFRA). The assessment is an important step in understanding flooding within the borough of Poole. The work will also form a foundation for future studies, investment and action plans for flood risk management. The Flood Risk Regulations adopt a new institutional structure for the understanding and management of flood risk.

The Preliminary Flood Risk Assessment involves an assessment of local flood risk, the preparation of a preliminary assessment report and the identification of any Flood Risk Areas, those areas at significant risk.

The aim of the Flood Risk Regulations is to reduce the likelihood and consequences of flooding. The regulations came about in response to extreme flooding across Europe and came into force in England and Wales on 10 December 2009. Within the flood risk management cycle there are four stages:

- the Preliminary Assessment Report
- identification of Flood Risk Areas
- Flood Hazard maps and Flood Risk Maps
- Flood Risk Management Plans

As there are no flood risk areas within the borough of Poole the subsequent stages are not required. These stages bring into domestic law the European Commission Floods Directive (Directive 2007/60/EC) on the assessment and management of flood risk across the European Union Member States.

The aim of the PFRA is to provide an assessment of local flood risk across the borough, covering past flood events and the potential consequences of future floods.

3.3 The Study Area

Poole lies in the south east of the South West River Basin District as shown in Fig 1.1. The borough of Poole has an administrative area of approximately 65Km² with land stretching from sea level on the south coast to a height of 67m A.O.D, (Above Ordnance Datum). The borough of Poole supports a population of approximately 138,000 as of 2001. The area of Poole may have inflated values for population size to varying degrees throughout the year due to tourists.

Bordering the north of Poole the river Stour flows from west to east and into Bournemouth. Some small streams flow from their source within the borough into this main river and other water sources flow from the land in a generally southerly direction to the sea. Most of the watercourses have been piped and many now are classified as surface water sewers.

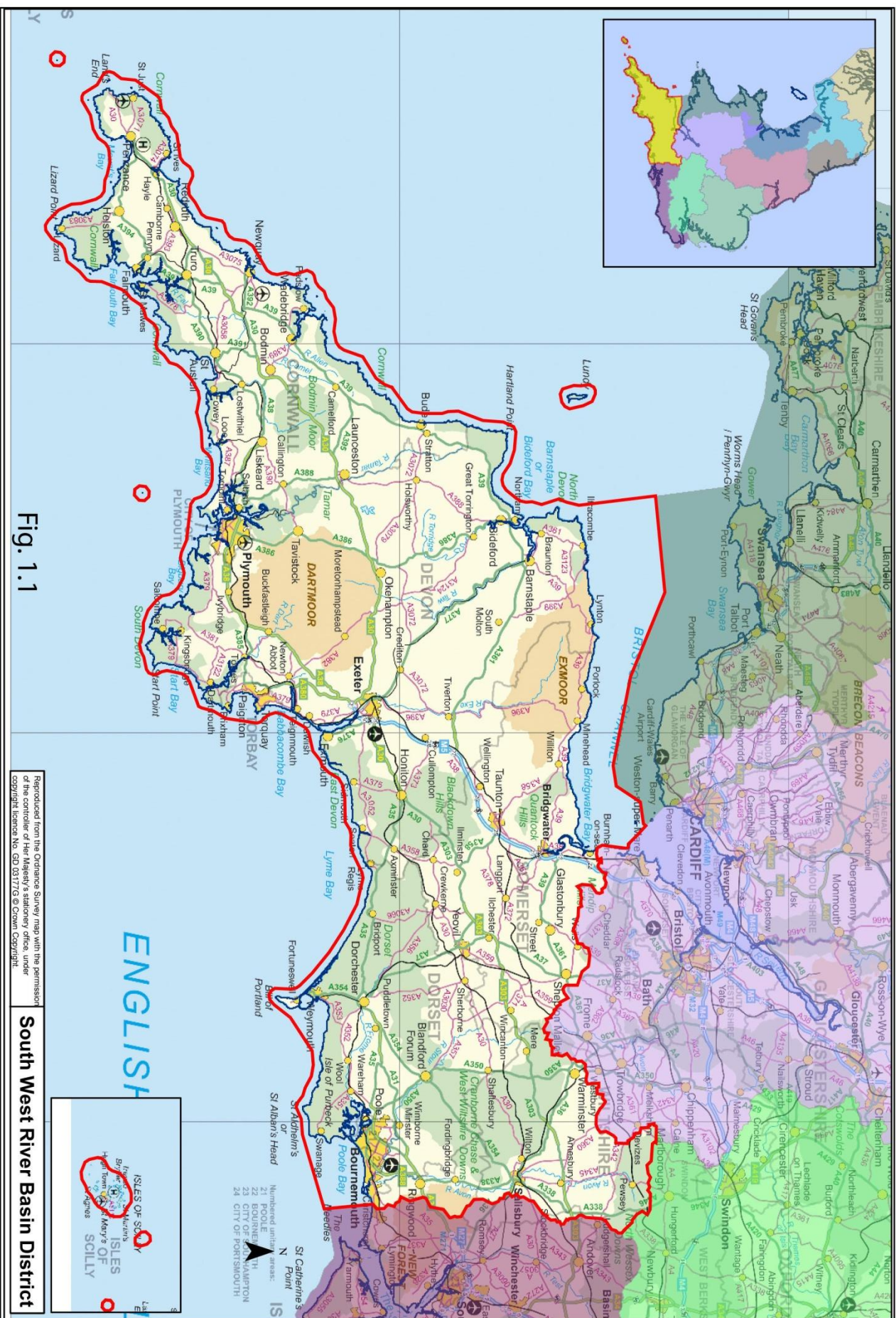
Previous studies have included the Borough of Poole Strategic Flood Risk Assessment (SFRAs). This is a planning tool. It is an assessment of all types of flood risk, including tidal, that is to inform the spatial planning process. It is a strategic level study on a local authority planning scale. The Environment Agency Catchment Flood Management Plans (CFMPs) identify areas at risk from flooding from main rivers.

The SFRA has identified the areas at risk of flooding as Creekmoor, Hamworthy and Canford Magna, where 201-500 properties are at risk of flooding and also the larger area of Poole Town Centre where 501-1000 properties are at risk of future flooding, including tidal. Through other studies the potential effect of climate change and sea level rise have also been investigated within certain areas. Poole Town Centre area and Poole Harbour and the coast have been investigated to determine the extent of future flood extents based on the topography of the land and the potential sea level rise. The Borough of Poole has an adopted Core Strategy (February 2009) which is a development plan document with a policy therein, PCS 34 entitled Flood Risk. This Core Strategy steers flood risk in the Borough of Poole.

Surface water (including groundwater) flooding was also considered within the SFRA with sustainable management of rainfall essential to reducing the future flood risk on development sites as well as on the surroundings.

Tidal and coastal flood risk are set to increase with the drivers for flooding (surges, waves and relative sea level rise) affecting the probability of future developments in low-lying areas such as Poole town centre, as given in floodzone mapping.

The main river catchment is the River Stour. The Stour lies to the north of the borough creating part of the boundary with East Dorset. On the South-West corner of the borough the Rock Lea River discharges into Lychett Bay following the landline curve of Turlin Moor and then out on into the Wareham Channel.



4. Lead Local Flood Authority Responsibilities

4.1 Introduction

The preparation of a PFRA is just one of several responsibilities of the LLFAs under the new legislation. This section provides a brief overview of other responsibilities the Borough of Poole are obliged to fulfil under their role as a LLFA.

4.2 Co-ordination of Flood Risk Management

In the review of the summer 2007 flooding, Sir Michael Pitt stated that ‘the role of local authorities should be enhanced so that they take on responsibility for leading the co-ordination of flood risk management in their areas’. This recommendation was taken forward into the Flood Risk Regulations and the Flood and Water Management Act. As the designated LLFA, the Borough of Poole is therefore responsible for leading local flood risk management across the borough.

Much of the local knowledge and technical expertise necessary for the Borough of Poole to fulfil their duties as a LLFA lies both within the borough and with other external partner organisations. The execution of the PFRA will promote collaborative working with external groups and organisations as they undertake their responsibilities to ensure effective and consistent management of local flood risk throughout the country and to contribute to the provision of a co-ordinated and holistic approach to flood risk management across the borough.

Being a Lead Local Flood Authority, the Borough of Poole has a role to play in forging effective partnerships with the Environment Agency and Wessex Water, as well as other key stakeholders and other Risk Management Authorities.

The statutory documents produced by the Council (PFRA, Flood Hazard Maps, Flood Risk Maps and the Surface Water Management Plan) will be considered by the Environment Overview and Scrutiny Committee and approved by Cabinet.

Ongoing monitoring of plans and other duties associated with the role of the LLFA will be reported to the Environment Overview and Scrutiny Committee by Leisure Services.

4.3 Stakeholder Engagement

As part of the PFRA, Borough of Poole as well as consulting its own internal service units, has sought to engage stakeholders representing the following organisations:

- Wessex Water
- Environment Agency
- Bournemouth Borough Council
- Dorset County Council
- Dorset Fire and Rescue
- Dorset Police

4.4 Further Responsibilities

Aside from leading on local flood management, there are a number of other key responsibilities that have arisen for Lead Local Flood Authorities from the Flood and Water Management Act and the Flood Risk Regulations. These responsibilities include:

- Investigating flood incidents – LLFAs have a duty to investigate and record details of significant flood events within their area. This duty includes identifying which authorities have flood risk management functions and what they have done or intend to do with respect to the incident, notifying risk management authorities where necessary and publishing the results of any investigations that were carried out.
- Asset Register - LLFAs also have a duty to maintain a register of structures or features which are considered to have a significant effect on flood management risk, including details on ownership and condition as a minimum. The register must be available for inspection and the Secretary of State will be able to make regulations about the content of the register and records.
- SuDS Approving Body – LLFAs are designated as the SuDS approving Body (SAB) for any new drainage system, and therefore must approve, adopt and maintain any new sustainable urban drainage system (SuDS) within their area.
- Local Strategy for Flood Risk Management – LLFAs are required to develop, maintain, apply and monitor a local strategy for flood risk management in its area. The local strategy will build upon information such as national risk assessments and will use consistent risk based approaches across different local authority areas and catchments.
- Works powers – LLFAs have powers to undertake works to manage flood risk from surface water run-off and groundwater, consistent with the local flood risk management strategy for the area.

- Designation powers – LLFAs, as well as district councils and the Environment Agency, have powers to designate structures and features that affect flooding or coastal erosion in order to safeguard assets that are relied upon for flood or coastal erosion risk management.

5. Methodology and Data Review

5.1 Approach and Methodology

This PFRA has been prepared by Borough of Poole and the main consultation being with Wessex Water and the Environment Agency. The approach taken was to collate records of known past flood events, in order to build up a geographical representation of the flood risk in the borough. No new analysis or modelling has been undertaken within the scope of the PFRA in accordance with the published guidelines and the requirements of the regulations.

The aim of the initial stages within the PFRA is to identify what existing and readily available local data can be used to improve the national understanding of flood risk. Many of the records of past flood events are inaccessible as they are buried in paper files or logged only with specific people.

Some information, although digital, was stored in a format that made it difficult to analyse. This included the flood extents and consequences not being recorded, therefore making it impossible to distinguish between minor and significant floods. This highlights the need for careful thought when considering how to record data in the future for use in the next PFRA cycle. Poole will endeavour to save flooding records on the internal GIS system.

5.2 Information held by Borough of Poole

Some information on historic flooding is available internally. These are records of flooding incidents that have occurred throughout the borough as reported by councillors, council officers and members of the public. The quality of this information can vary considerably. Records of highway flooding also exist. However, as this data was recorded for highway maintenance reasons, the records do not contain the information needed to identify significant harmful consequences and sometimes only refer to relatively minor floods that are not as a result of surface water flooding, such as a blocked gully or a burst water main.

As a Planning Authority, Poole has undertaken a borough wide Strategic Flood Risk Assessment, (SFRA). As a strategic planning document it concentrated on the major flood risks, which in Poole's case is mainly pluvial and coastal flooding as shown by the Environment Agency's Flood Zones.

5.3 Information held by partner organisations

Data available from Borough of Poole included:

- Strategic Flood Risk Assessment Level 1 and Level 2
- Records of flood incidents
- Studies relating to the provision of flood defence schemes

Dorset Fire and Rescue Service hold records of callouts to 'flooding' incidents. However, often the source of the flooding is not listed and can include flooding due to a burst water supply pipe.

Wessex Water holds a register of incidents of flooding from public sewers, the DG5 register. This data is supplied in a format that does not allow individual properties to be identified.

Local data available from the Environment Agency includes the Flood Reconnaissance Information System (FRIS) and Catchment Flood Management Plans (CFMP).

5.4 National Data

The data provided by the Environment Agency consisted of the following GIS layers:

- Flood Map (Rivers and the Sea)
This shows the extent of flooding from rivers with a catchment of more than 3km² and from the sea. Flood Zone 2 shows areas at risk of flooding greater than 0.1% and Flood Zone 3 shows areas at risk of fluvial flooding greater than 1% and 0.5% from the sea.
- Areas Susceptible to Surface Water Flooding (ASStWF)
The first generation national mapping, outlining areas of risk from surface water flooding across the country with three susceptibility bandings (less, intermediate and more).
- Flood Map for Surface Water (FMfSW)
The updated (second generation) national surface water flood mapping which was released at the end of 2010. This dataset includes two flood events (with a 3.3% annual probability (1 in 30 year) and a 0.5% annual probability (1 in 200 year) of occurring) and two depth bandings (greater than 0.1m and greater than 0.3m).
- Areas Susceptible to Groundwater Flooding (ASStGWF)
Coarse scale national mapping showing areas susceptible to groundwater flooding.
- Historic Flood Map
Attributed spatial flood extent data from flooding from all sources.
- National Receptor Database
A national dataset of social, economic, environmental 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.

- PFRA CD of supporting information
Information on property counts in flood risk clusters and designated sites at risk of flooding.

5.5 Public Data

No new data was collected from the public as part of this process. Past council records of flooding reported by the public were used.

5.6 Data Limitations

- Inconsistent Recording Systems
The lack of a consistent flood data recording system across the Borough of Poole has led to major inconsistencies in the recording of flood event data. This has resulted in incomplete or sometimes non-existent flood record datasets. Only data that was adequately geo-referenced was used.
- Incomplete Datasets
As a results of the lack of consistent flood data recording arrangements (as described above), many areas within the council have kept flood records that do not contain all the required information for this study. Some of the datasets collated are not exhaustive and it is felt that they are unlikely to accurately represent the complete flood risk issues in a particular area.
- Records of Consequences of Flooding
Very few, if any, providers were able to provide comprehensive details of the consequences of specific past flood events, which made accurately assessing the consequences of historic flooding difficult.

5.7 Geographical Information Systems (GIS)

- Current Situation:
The Borough of Poole currently has a wide range of GIS being used throughout the authority. Due to the logistics of providing support and ensuring high integration levels Cadcorp is the corporate solution.

The Borough of Poole uses Oracle database to store all the corporate datasets. This database can be accessed through a variety of systems which include Cadcorp and CAD systems such as AutoCAD. This ensures data is accessed from one definitive source, which has appropriate read and edit permissions assigned to each dataset.

- Future Developments:
Currently an internal project is being conducted to deliver a council-wide intranet GIS solution. This will not alter the corporate solution of Cadcorp; but will deliver GIS to all council employees.

This easy to use solution will encourage employees to use GIS within their decision making processes. With a searchable metadata library and appropriate permissions data will be quickly and easily viewed. The centralised corporate spatial data store will also ensure ownership and accountability for data is implemented throughout the entire authority.

A flexible infrastructure means future integrations and the ability to deliver GIS on the internet are greatly increased having advantages for reporting flooding instances in the future.

6. Past Flood Risk

6.1 Significant Harmful Consequences

National guidance issued by Defra sets thresholds for defining areas where the flood is significant. No guidance has been issued for defining locally significant harmful consequences and it is up to each LLFA to set its own definition. It has been suggested by the Environment Agency that the threshold should be an order of magnitude below the significance criteria for determining flood risk areas. They also recommend that, as a minimum, it should involve flooding of a number of properties, on more than one occasion.

The following revised definition has been agreed by the South West Flood Risk Managers Group (via the communities of practice website) as a consistent definition for use in all the South West PFRAs.

For the purpose of reporting past floods, a flood is deemed significant if it:

- 1) caused internal flooding to five or more residential properties, or
- 2) flooded two or more business premises, or
- 3) flooded one or more items of critical infrastructure, or
- 4) caused a transport link to be totally impassable for a significant period.

The definition of 'significant period' is dependent on the transport link affected as follows (Highway categories are as set out in Table 1 of the UKRLG Code of Practice for Highway Maintenance).

- 1) Category 1 highways (motorways) and major rail links – 2 hours or more
- 2) Category 2 and 3a highways and other railway links – 4 hours or more
- 3) Category 3b and 4a highways – 10 hours or more
- 4) Category 4b highways – 24 hours or more

The reasoning behind these criteria is as follows:

- Defra set a threshold of 200 persons or 20 businesses per km grid square flooded to a depth of 300mm during a 1 in 100 year flood.
- An order of magnitude less can be considered as 20 persons, which would average 8.5 properties (based on a national occupancy rate of 2.34 persons per property).
- In-keeping with the other South West Counties, Borough of Poole are adopting the threshold of 5 properties.
- The number of business premises has not been reduced beyond two (the order of magnitude suggested by the EA), as this would have reduced the threshold to 1, which could result in very isolated, minor flooding being considered significant.

- Using the km square grouping criterion of 30,000 persons an order of magnitude less would result in a threshold of 3,000 persons or 1,300 properties and for Poole this would give no significant past events.
- The 2-hour period for closure of a motorway or a major railway link is based on a figure suggested by a Highways Agency representative for all parts of the trunk road and motorway network.
- The 4-hour period for closure of a category 2 or 3a highway or other railway link equates to an event affecting one peak period in a working day, (0800 to 1800).
- The 10-hour period for closure of a category 3b or 4a highway equates to an event affecting both peak periods in a working day, (0800 to 1800).
- The 24-hour period for closure of a category 4b highway equates to an event cutting off small numbers of properties and impacting some rural businesses.
- Major rail links have twin tracks carrying several trains per hour in each direction, a number of which are 'through trains' (not stopping at minor stations).

6.2 Consequences of Historic Flooding

As a result of the issues discussed in section 5, insufficient data is available to draw definitive conclusions on the impacts and consequences of historic flooding on people, the economy and the environment, as this information has not been consistently recorded in the past.

There are no recorded historic flood which are considered to have had "significant harmful consequences" as defined by the criteria set by the UK government Secretary of State and guidance provided by the Environment Agency.

Even employing the lesser criteria from the South West Flood Risk Managers Group produces no historic flooding deemed significant in Poole.

However, a record of locations where what is thought to be the most notable cases of flooding have occurred is shown below in Table 1. and will be kept by the Borough of Poole as a database.

In the future this database will be compiled in conjunction with GIS mapping to try and ensure full details of flood events are recorded. This information will then be used to support and inform future PFRA cycles as well as Poole's Local Flood Risk Management Strategy.

Table 1: History of Most Notable Local Flooding in Poole

Location	Type of Flooding	Extent of Flooding	Date (last record)
Whitecliff, Sandbanks Road	Tidal locking causes surface water to surcharge sewer	Section of highway and back gardens of private properties	10/03/08
Hamworthy Blandford Road	Tidal locking causes surface water to surcharge sewer	Highway flooding, improved by Wessex Water scheme	08/01/04
Old Town West Quay Road	Overtopping of sea wall tidal not SW	Section of highway and a commercial property	10/03/08
Evening Hill, Shore Road	Overtopping of sea wall tidal not SW	Section of highway	10/03/08
Sandbanks, Seacombe Road	Tidal locking causes surface water to surcharge sewer	Section of highway	10/03/08
Sandbanks, Shore Road	Overtopping of sea wall and tidal locking	Section of highway	10/03/08
Little Canford	Main river – Stour Fluvial not SW	Land adjacent to river	31/10/00
Knighton	Main river – Stour fluvial not SW	Land adjacent to river	31/10/00
Oakdale, Oakdale Middle School	Blockage/obstruction to watercourse	Back gardens of private properties and public open space	12/09/09
Branksome Chine Stream, Pinecliff Road	Blockage/obstruction to watercourse	Section of highway flood and public open space	10/11/08
Fleetsbridge Fleetsbridge roundabout	Surface Water	Section of highway and subway	05/10/10
Sterte Espanade	Tidal locking causes surface water to surcharge culverts	Section of highway flood and public open space	26/11/03 (possible)
Magna Road	surface water runoff	Section of highway	10/11/08
Ringwood Road	combination surface water, blockage and capacity	Section of highway and property	22/07/09
Millfield	surface water runoff	Housing association properties improved by BoP Scheme	09/02/09
Broadstone Lower Blandford Road	surface water possible capacity	Section of highway	22/01/08
Parkstone, Ashley Road	highway drainage	Section of highway	07/01/08
Lower Parkstone, Bournemouth Road	highway drainage	Section of highway	01/06/08
Creekmoor, Creekmoor Lane.	Tidal locking causes surface water to surcharge sewer	Section of highway	10/03/08
County Gates, Poole Road	Capacity problem	Section of highway	16/11/10
Turlin Moor, Middlebere Crescent	Blockage	Section of highway	08/05/08
Turlin Moor, Maryland Road	Tidal locking causes surface water to surcharge sewer	Section of highway	15/12/08

Bearwood, Wood Lane	Possible capacity problem/unknown	Private gardens	19/11/09
Broadstone, Fairview Road	Blockage/capacity	Section of highway and front gardens	12/072010
Parkstone, Herbert Avenue	Blockage/capacity	Section of highway and front gardens	22/01/08
Alderney, Dolbery Road North	Possible Blockage/capacity	Section of highway and subway	17/01/08
Oakdale, Darby's Close	Capacity problem	Section of highway	22/11/07
Parkstone, Walton Road	Possible capacity problem	Section of highway and garden	13/11/09
Bourne Valley Road	Capacity/Blockage	Section of highway	10/02/05
Alder Road	Capacity/Blockage	Section of Highway	24/06/10

The incidences of flooding in the above table that are either tidal or fluvial (main river) and not as a result of surface water are not considered further for the PFRA or the Surface Water Management Plan. Tidal and fluvial flooding is addressed by the Environment Agency.

7. Future Flood Risk

This section summaries all relevant information on future floods. It is essential to consider future, or potential, flood risk as well as past flooding. Just because there is no record of flooding at a location, it does not mean there is no flood risk.

7.1 Information available on future floods

In Poole, there have been no studies to assess the flood risk from surface water, although there have been studies on coastal areas. The Environment Agency has produced a national assessment of surface water flood risk in the form of two national mapping datasets. The first generation national mapping, Areas Susceptible to Surface Water Flooding (AStSWF), contains three susceptibility bandings for a rainfall event with a 0.5% annual probability (1 in 200 year). The national methodology has since been updated to produce the Flood Map for Surface Water (FMfSW), a revised model containing two flood events (3.3% annual probability (1 in 30 year) and 0.5% annual probability (1 in 200 year)) and two depth bandings (greater than 0.1m and greater than 0.3m). The Flood Map for Surface Water with a greater than 0.3m depth of flooding is illustrated in Figure 1.2, highlighting areas at risk of surface water flooding in the future.

The Environment Agency's surface water flood maps give an indication of the broad areas likely to be at risk of surface water flooding and **are not suitable for identifying whether an individual property will flood**. The modelling undertaken by the Environment Agency only gives an indication of broad areas at risk, and information on floor levels, construction characteristics or design of properties is not held. This would be needed, along with other detailed information, to be able to say whether flooding of certain depth would enter into an individual property and cause damage.

The capacity of the local drainage system in Poole is unknown. In general the surface water sewer system is designed to accommodate a 30 year flow. The ultimate capacity will depend on conditions at the outlet and in the 100 year conditions being considered in this PFRA, these are unknown but will be investigated as part of the local strategy.

7.2 Locally agreed surface water information

In the absence of any detailed local information, the locally agreed surface water information is based on the Environment Agency's Flood Map for Surface Water (FMfSW), 0.5% annual probability (1 in 200 year) with a depth banding of greater than 0.3m. Other relevant stakeholders were consulted to check that the FMfSW gives a reasonable representation of surface water flood risk. At this stage it has not been possible to undertake any verification of the data.

Environment Agency Flood Map for Surface Water 1 in 200 Year

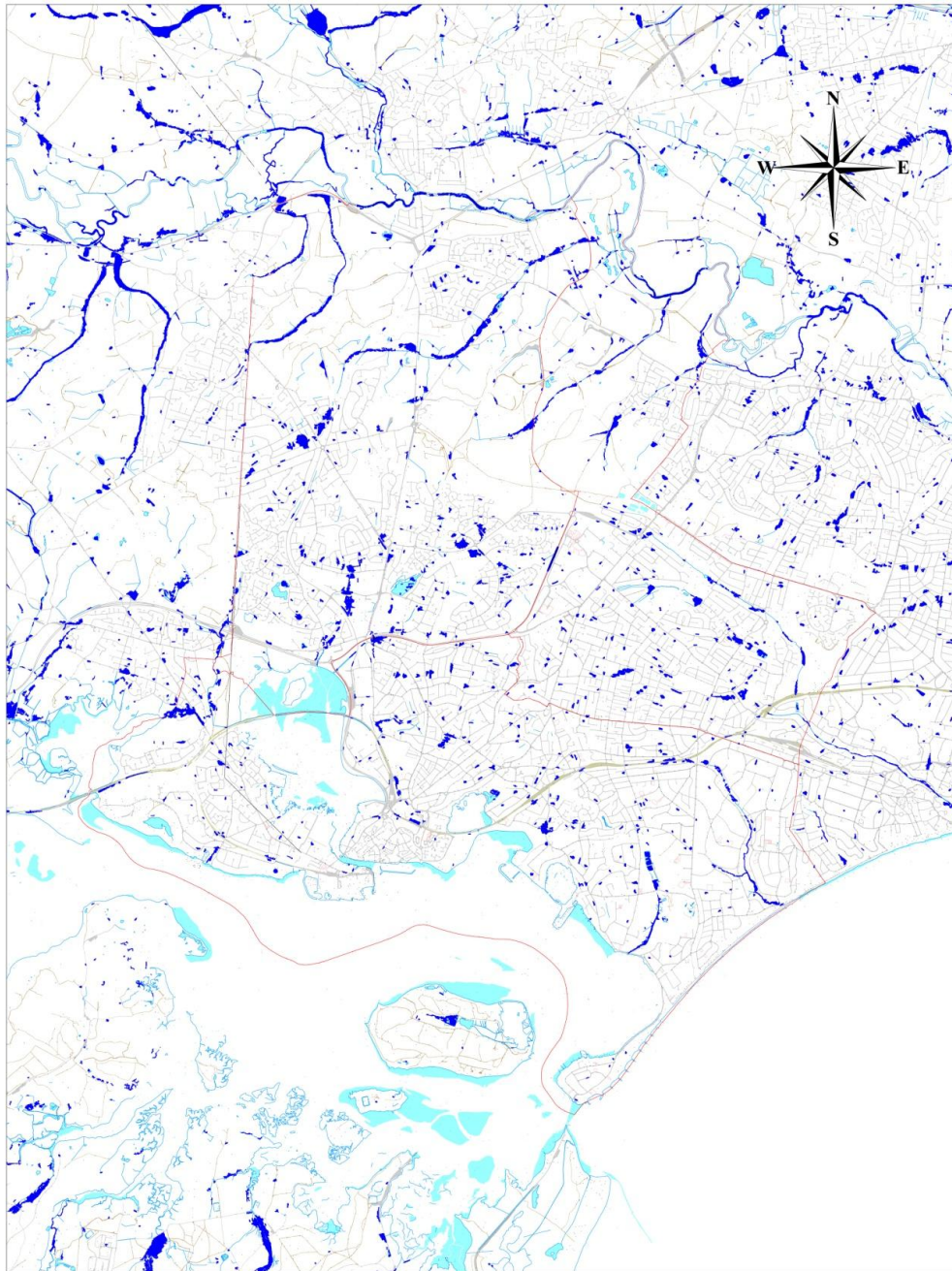


Fig. 1.2
Not suitable for identifying flood risk to individual properties



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7.3 Future floods and their possible consequences

By simple GIS analysis of the datasets the number of properties at risk of surface water flooding within Poole has been estimated. For a rainfall event with a 0.5% annual probability (1 in 200 year) of occurring, 1162 properties are at risk of flooding to depths greater than 0.3m. Of these properties at risk, 1124 are residential.

Table 2. The number of properties per council ward as identified by the Environment Agency's Flood Map for Surface Water (FMfSW), 0.5% annual probability (1 in 200 year) with a depth banding of greater than 0.3m. These figures are not suitable for identifying whether an individual property will flood.

Council Ward	Number of residential properties	Number of people	Number of non residential properties
Broadstone	118	276	5
Creekmoor	93	218	1
Merley & Bearwood	61	143	0
Canford Heath East	66	154	0
Canford Heath West	99	232	1
Alderney	90	211	1
Newtown	92	215	2
Branksome East	11	26	0
Branksome West	71	166	1
Hamworthy East	9	21	1
Hamworthy West	94	220	8
Poole town	19	44	3
Oakdale	108	253	3
Parkstone	67	157	7
Penn Hill	101	236	1
Canford Cliffs	25	59	4

The areas listed in the table above have been identified with the use of the FMfSW as areas that may possibly be prone to future flood risk. It is envisaged that further studies will be undertaken in the Surface Water Management Plan to gain a better understanding of the potential flood risk in these areas. This additional work may take the form of modelling so that the effects of the local drainage networks can be included. This may also allow the investigation of possible options to try and alleviate flooding within specific areas of study.

Possible Future Flood Risk Areas

- Bearwood
- Branksome/Bourne Valley
- Broadstone
- Canford Heath/Fleetbridge/Hatch Pond/
- Creekmoor/Waterloo
- Hamworthy/Turlin Moor
- Oakdale
- Old Town
- Parkstone/Whitecliff

Groundwater flooding occurs as a result of water rising up from the underlying aquifer or from water flowing from springs. This tends to occur after long periods of sustained high rainfall, and the areas at most risk are often low-lying where the water table is more likely to be at shallow depth. Groundwater flooding usually occurs in areas underlain by major aquifers, but can be associated with more localised floodplain sands and gravels. Poole geology is sedimentary; underlying beds having been laid down during the Cretaceous and Eocene periods, namely of River Terrace Deposits and Bracklesham Group deposits. The Tertiary formation, the Bracklesham Group sands and clays, underlies most of the borough.

There is no local information available which provides evidence on future groundwater flood risk across Poole. The Environment Agency's national dataset, Areas Susceptible to Groundwater Flooding, has been used to form the basis of the assessment of future flood risk from groundwater. The Areas Susceptible to Groundwater Flooding (AStGWF) is a strategic scale map showing groundwater flood areas on a 1km square grid. It was developed specifically by the Environment Agency for use by LLFAs for use in the PFRA as required under the Flood Risk Regulations. The data was produced to annotate indicative Flood Risk Areas for the PFRA with information to allow LLFAs to determine whether there may be a risk of flooding from groundwater. It is also being made available to LLFAs to support PFRAs, so that LLFAs can obtain a broad feel for the wider areas which might be at risk from groundwater flooding.

This data has used the top two susceptibility bands of the British Geological Society (BGS) 1:50 000 groundwater flood susceptibility map and thus covers consolidated aquifers (chalk, sandstone etc, termed 'clearwater' in the data attributes) and superficial deposits. It does not take account of the chance of flooding from groundwater rebound. It shows the proportion of each 1km grid square where geological and hydrological conditions show that groundwater might emerge. The susceptibility areas are represented by one of four area categories showing the proportion of each 1km square that is susceptible to groundwater emergence. It does not show the likelihood of groundwater flooding occurring. This dataset is illustrated in Figure 1.3.

Environment Agency Areas Susceptible to Groundwater Flooding

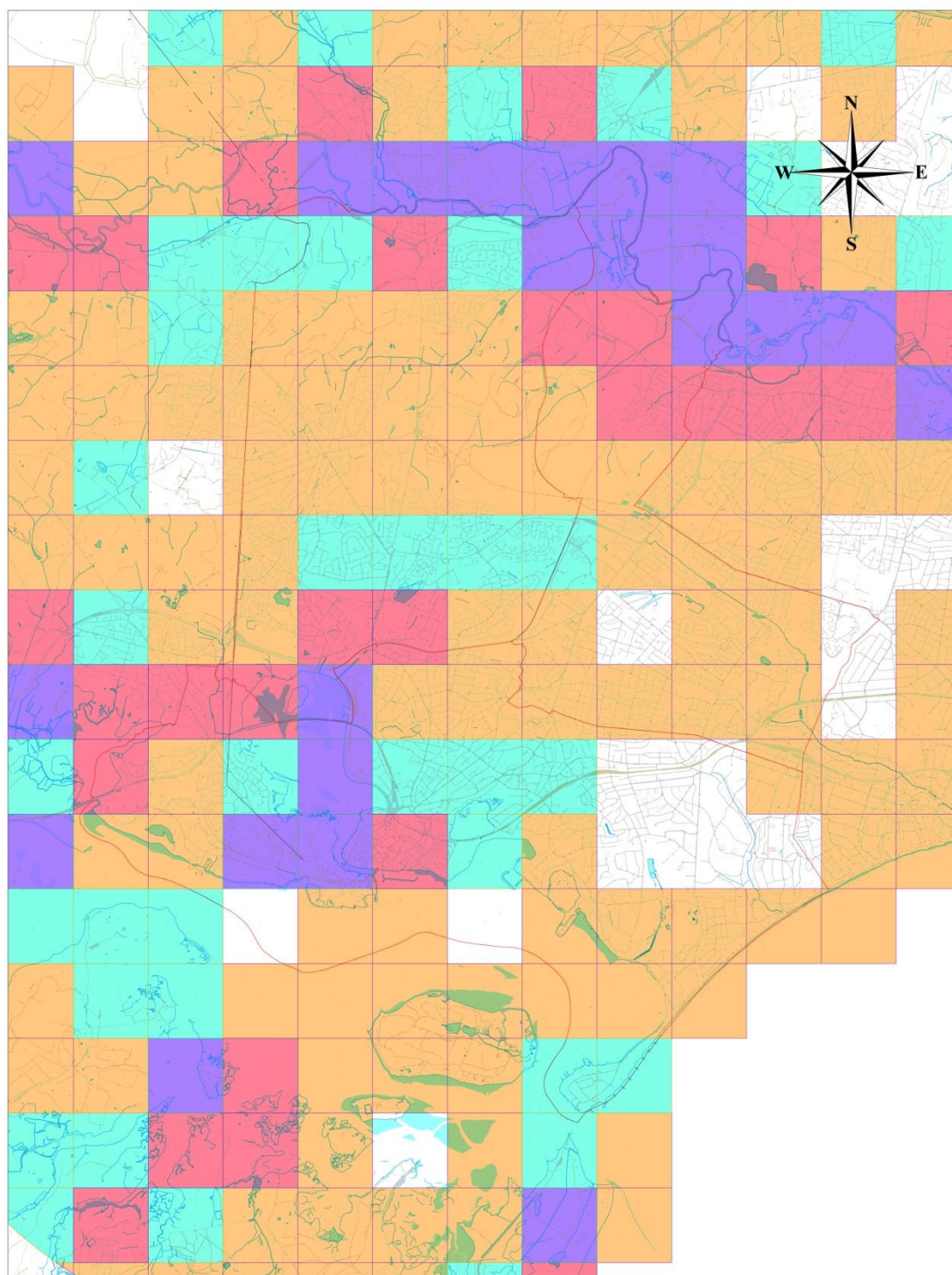
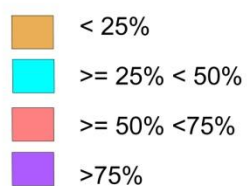


Fig 1.3



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In common with the majority of datasets showing areas which may experience groundwater emergence, this dataset covers a large area of land, and only isolated locations within the overall susceptible area are actually likely to suffer the consequences of groundwater flooding. The groundwater flood map for the Borough of Poole indicates that most of the borough could be susceptible to groundwater flooding. This data will need further refinement before it can be used effectively to understand groundwater flooding in Poole.

7.4 The impacts of climate change

The impact of climate change on local flood risk is relatively poorly understood. Several national flood maps have informed the preliminary assessment report – specifically the Flood Map for Surface Water (surface runoff), Areas Susceptible to Surface Water Flooding (surface runoff), Areas Susceptible to Groundwater Flooding (groundwater) and the Flood Map (ordinary watercourses). These do not show the impact of climate change on local flood risk.

There was consensus amongst climate model projections presented in the IPCC fourth assessment report for northern Europe suggesting that in the winter high extremes of precipitation are very likely to increase in magnitude and frequency. These models project drier summers with increased chance of intense precipitation – intense heavy downpours interspersed with longer, relatively dry periods (Solomon et al., 2007).

UKCP09

United Kingdom Climate Projections 2009 (UKCP09) provides the most up to date projections of future climate for the UK (<http://ukclimateprojections.defra.gov.uk/>).

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 South 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 17% (very likely to be between 4 and 38%)
- Precipitation on the wettest day in winter up by around 12% (very unlikely to be more than 24%)
- Relative sea level at Plymouth very likely to be up between 12 and 42cm 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 21%.

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. 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. Rising sea or river levels may increase local flood risk inland or away from major rivers because of interactions with drains, sewers and smaller watercourses. There is a risk of flooding from groundwater in the district. Recharge may increase in wetter winters, or decrease in drier summers. 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.

7.5 Long term developments

It is possible that long term developments might 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 high risk. Where new development is, exceptionally, necessary in such areas, policy aims to make 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). However there are no such developments planned in Poole.

8. Review of Indicative Flood Risk Areas

No indicative Flood Risk Areas have been identified by the Environment Agency in Poole.

9. Identification of Flood Risk Areas

No additional Flood Risk Areas have been identified because nowhere in Poole does the local flood risk meet the significance threshold set by Defra of 30,000 people affected.

For this initial round of assessments, Flood Risk Areas only compromise areas in England and Wales with most significant local flood risks. Areas lying outside the proposed Flood Risk Areas will still have flood risk issues. Appropriate risk management measures for these areas will be considered as part of the work in preparing a Strategic Surface Water Management Plan that will, in turn, inform the Local Flood Risk Management Strategies under the Flood and Water Management Act 2010.

10. Next Steps

As there are no Flood Risk Areas in Poole, there is no requirement to produce hazard and risk maps by 2013 or a Flood Risk Management Plan by 2015.

The four stage process of

- undertaking a Preliminary Flood Risk Assessment (PFRA)
- identifying Flood Risk Areas
- preparing flood hazard and risk maps
- preparing flood risk management plans

starts again in 2016. It is important to ensure that information is maintained and kept up to date for future use to support other flood risk assessments (such as SWMP's, SFRA's) and as part of local strategies. In the next cycle, the recording of more information will be mandatory for floods that occur after 22 Dec 2011.

In order to continue to fulfil their role as Lead Local Flood Authority, Borough of Poole are required to investigate future flood events in their respective administrative areas. However, it is crucial that all records of flood events are documented consistently and in accordance with the INSPIRE Directive (2007/2EC). It is recommended that a centralised database will be kept up to date by Borough of Poole, who has the overall responsibility to manage flood data through the whole administrative area of the borough of Poole. This can then be used as an evidence base to inform assessments and reviews.

11. Review and Approval Process

The review procedures that must be adopted when producing a PFRA are set out by the European Commission. Meeting quality standards is important in order to ensure the appropriate sources of information have been used to understand flood risk and the most significant flood risk areas are identified.

Another important aspect of the review procedure is to ensure that the guidance is applied consistently; a consistent approach will allow partners to understand the risk and manage it appropriately. The review and approval process will comprise two key steps as detailed below.

Local Authority Review

The first part of the review procedure is through internal local authority review of the PFRA. This report will be reviewed by Borough of Poole officers who will recommend its approval to the Environmental Overview and Scrutiny Committee. The committee decision is then expected to be confirmed by cabinet.

Environment Agency Review

Under the Flood Risk Regulations, the Environment Agency has been given the role in reviewing, collating and publishing all LLFA's PFRA's once submitted.

The Environment Agency will undertake a technical review of the PFRA. If satisfied, they will recommend submission to the relevant Regional Flood and Coastal Committee (RFCC) for endorsement. RFCC's will make effective use of their local expertise and ensure consistency at a regional scale. Once the RFCC has endorsed the PFRA, the relevant Environment Agency Regional Director will sign it off, before all PFRAs are collated, published and submitted to the European Commission.

The first review cycle of the PFRA must be submitted to the Environment Agency by the 22 June 2011. However owing to the potential disruption caused by the local government elections in May 2011, local authorities have been given until 19 August, 2011 to approve the PFRA internally providing the unapproved PFRA is still submitted to the Environment Agency in June.

12. References

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