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Suffolk County Council

Suffolk County Council Preliminary Flood Risk Assessment Report

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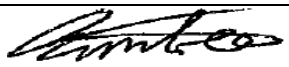
S Gee	Associate Director – AECOM Ltd		13 June 2011

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RELATED DOCUMENTS

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Term	Definition
Areas Susceptible to Groundwater Flooding	Strategic scale map showing groundwater flood areas on a 1km square grid. It shows the proportion on each 1 km grid square where geological and hydrogeological conditions show that groundwater might emerge.
Areas Susceptible to Surface Water Flooding	First generation of national surface water flood risk mapping
'Blue Squares' derived from the Flood Map for Surface Water	1 km grid squares where at least one of the following flood risk indicators is above the threshold given below: 1. Number of people > 200 2. Critical services >1 3. Number of non-residential properties >20 Indicators calculated using the EA's detailed method of counting (based on property outlines) for the new Flood Map for Surface Water (deep-for 1 in 200 annual probability rainfall)
British Geological Society (BGS)	A partly publicly-funded body which aims to advance geoscientific knowledge by means of surveying, monitoring and research.
Catchment Flood Management Plans	A high-level planning strategy through which the Environmental Agency works with their key decision makers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk.
Climate change	Long term variations in global temperature and weather patterns caused by natural and human actions
Defra	Department for Environment, Food and Rural Affairs. The Government organisation with primary responsibility for flood risk management in England.
DG5 Register	A water-company held register of properties which have experienced sewer flooding due to hydraulic overload, or properties which are 'at risk' of sewer flooding more frequently than once in 20 years.
Environment Agency	Primary UK organisation with the principal aim of protecting and improving the environment, and promoting sustainable development.
European Floods Directive	Aim of the directive is to provide a consistent approach to managing flood risk across Europe. It establishes four stages of activity within a six year flood risk management cycle
Flood and Water Management Act 2010	Provides for a better, more comprehensive management of flood risk for people, homes and businesses. The Act was created in response to the recommendations contained in Sir Michael Pitt's review of the significant recent flooding in the UK, notably in 2007. The Pitt Review identified key recommendations which have particular relevance for local authorities.
Flood Map for Rivers and Sea	Shows main rivers and sea flooding together with flood defences.
Flood Map for Surface Water	Second generation of national surface water flood risk mapping. Gives an indication of the areas where surface water would be expected to flow or pond during two different rainfall events: 1 in 30 and 1 in 200 annual chance of occurring, and includes a national allowance for drainage capacity in urban areas
Flood Risk Regulations 2009	Implement the requirements of the European Floods Directive in the UK.

Term	Definition
Geographic Information System	(GIS) is a system that captures, stores, analyses, manages and presents data with reference to geographic location data.
Highway Flooding Locations	Map showing locations where flooding has occurred on major and minor roads.
Historic Flooding Records	Historic records of flooding from surface water, groundwater and ordinary watercourses obtained from a number of sources including councils, Police, Fire and Rescue Service etc.
Indicative Flood Risk Areas	Areas determined by the Environmental Agency as indicatively having a significant flood risk, based on guidance published by Defra and WAG and the use of certain national datasets. These indicative areas are intended to provide a starting point for the determination of Flood Risk Areas by LLFAs. (There are ten of these areas in England but none in Suffolk)
Internal Drainage Board	An operating authority which is established in areas of special drainage need in England and Wales with permissive powers to undertake work to secure clean water drainage and water level management within drainage districts.
Key Environmental Site and Building Location dataset	Contains location of special environmental sites, World heritage, monuments, listed buildings and parks
Lead Local Flood Authorities (LLFAs)	Unitary or County Councils have been designated as LLFAs under the Flood and Water Management Act. As such they have responsibility for developing, maintaining, applying and monitoring a strategy for local flood risk management and for carrying out specified tasks required by the Flood Risk Regulations 2009.
Local Flood Risk Strategy	A primary document required to be prepared by LLFA to provide comprehensive information on how flood risk from surface runoff, groundwater, and ordinary watercourses will be managed in their administrative area.
Main River	A statutory watercourse, usually larger streams and rivers, but also include some smaller watercourses. A main river is defined as a watercourse marked as such on a main river map. The Environment Agency's powers apply to main rivers only.
Multi-Agency Flood Plans	Document detailing a planned response to flooding.
National Receptors Dataset	National dataset of flooding receptors (areas where surface water can pond), categorised into themes, including buildings, environment, heritage, transport, and utilities.
Ordinary Watercourses	A statutory watercourse which includes every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) through which water flows and which does not form part of a main river. (See definition of main river). An Internal Drainage Board where relevant, or second tier local authority has permissive powers to carry out works on ordinary watercourses at their discretion.
Strategic Flood Risk Assessments	The aim of a Strategic Flood Risk Assessment (SFRA) is to map all forms of flood risk and use this as an evidence base to locate new development primarily in low flood risk areas. SFRAs undertaken will provide a useful source of data on past and future flooding primarily in respect to the development of the Local Flood Risk Strategy.

Term	Definition
Suffolk Flood Management Partnership	A senior management level grouping which includes representatives from various organisations in Suffolk and is the primary mechanism for Stakeholder Engagement in local surface water management in Suffolk.
Surface water	Rainwater (including snow and other precipitation) which is on the surface of the ground (whether or not it is moving) and has not entered a watercourse, drainage system or public sewer.
Surface Water Management Plan	The purpose of a SWMP is to identify a process for assessing the risk of surface water flooding, identifying options to manage risk to acceptable level, making the right investment decisions and planning the delivery of actions to manage flooding.
Sustainable Drainage Systems	Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional techniques.
'Yellow Squares' derived from the Flood Map for Surface Water	Clusters defined where five or more 'blue squares' are present within a 3 km square. Recognised as increasing the priority for reviewing flood risk. (See definition of 'blue squares')

1 Executive Summary

The Flood Risk Regulations 2009[i] implement the requirements of the European Floods Directive[ii]. The aim of the Directive is to provide a consistent approach to managing flood risk across Europe. It establishes four stages of activity within a six year flood risk management cycle. Figure 1.1 below shows the stages of the cycle, the products required and the timescale for delivery.

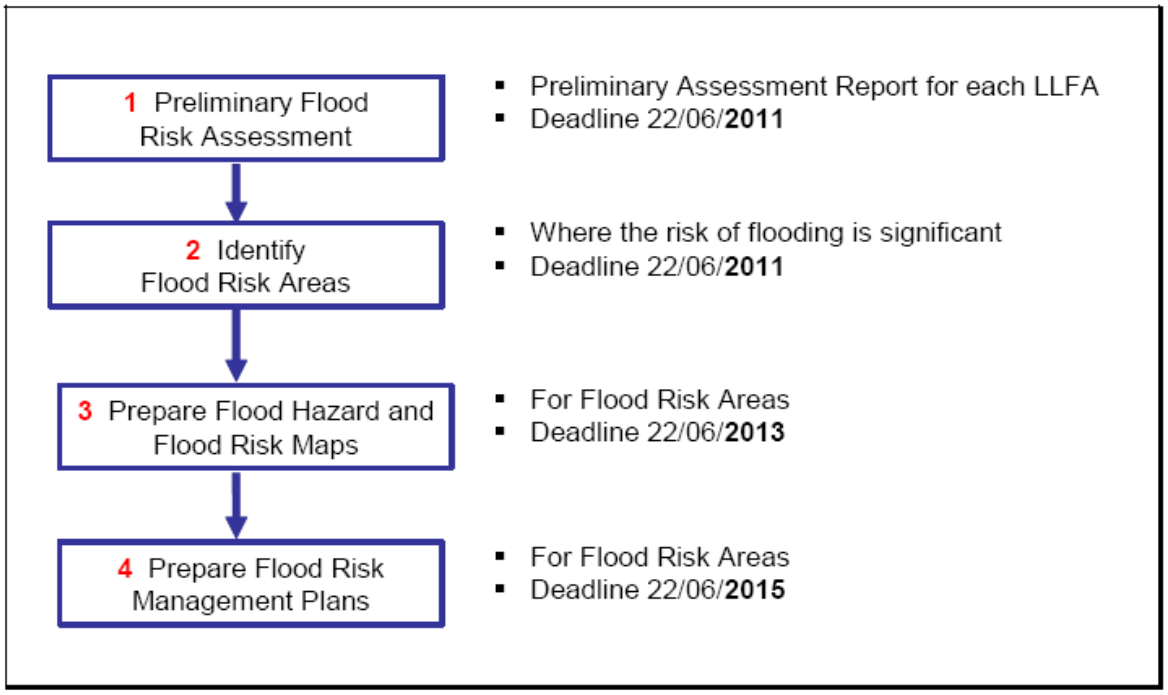


Figure 1.1 – Preliminary Flood Risk Assessment (PFRA) stages - extracted from Environment Agency document 'PFRA Final Guidance'.

The timescales for the publication of the outputs by the Environment Agency are also set out in the Regulations, matching those of the Directive and corresponding to the need to report to the European Commission. To meet these timescales Lead Local Flood Authorities have been tasked with submitting a Preliminary Assessment Report to the Environment Agency by 22 June 2011 to allow time for review, collation, publication and reporting.

Suffolk County Council has legal responsibilities for the control of flood risk as Lead Local Flood Authority under the Flood and Water Management Act 2010[iii] and is required to carry out a Preliminary Flood Risk Assessment (PFRA) under the Flood Risk Regulations. This report has been prepared to satisfy these responsibilities and also to inform the preparation of future Local Flood Risk Management Strategies.

The PFRA is a high level screening exercise that brings together, from a number of sources, easily available information on **past** and **potential** flooding to enable judgments to be made about local flood risk.

The assessment of **potential** flood risk contained within this report has been derived essentially from the national datasets produced by Defra but also with the benefit of some additional information from the Ipswich Surface Water Management Plan.

The assessment of **past** flooding has been obtained from a number of sources including the county council, 2nd tier councils, parish councils, Internal Drainage Boards, Police, Fire Service, Highways Agency and Anglian Water.

The process of analysing past flooding has revealed some inadequacies in the collection of data on individual flooding incidents which will be addressed through the implementation of a county-wide reporting process to inform the Local Flood Risk Strategy and to provide the level of detail required for the subsequent stages of the PFRA process. As a consequence of this current lack of certain information on flooding incidents, only a small number of locations have been identified in the Preliminary Assessment Report as having 'significant harmful consequences'. However the information on past flooding generated through the process of undertaking the PFRA will be used to inform the Local Flood Risk Strategy.

2 Introduction

2.1 What is a Preliminary Flood Risk Assessment?

The Preliminary Flood Risk Assessment (PFRA) is a high level screening exercise that brings together easily available information from a number of sources to assess local flood risk. The key stages of the PFRA involve:

- Collecting information on past (historic) and future (potential) floods and flood risk.
- Assembling the information into a Preliminary Assessment Report.
- Providing a review of the ten national indicative areas identified by the Environment Agency against local information from the Preliminary Assessment Report.

A key output from the PFRA is this Preliminary Assessment Report which will also inform the preparation of future Local Flood Risk Management Strategies as required by the Flood and Water Management Act 2010. This Preliminary Assessment Report identifies key flood risk areas within Suffolk and fulfils Suffolk County Council obligations as a Lead Local Flood Authority under the requirements of the Flood Risk Regulations 2009.

Surface water flooding can arise from a number of sources but, for the purposes of the PFRA, only flooding from ordinary watercourses, surface run-off, groundwater and other sources of flooding, such as public surface water sewers, is included. Responsibility for foul water flooding rests with Anglian Water.

Flooding from other sources such as main rivers, the sea and large raised reservoirs are not included as they fall within the responsibility of the Environment Agency

2.2 Background

The Flood Risk Regulations came into force in December 2009 with the aim of implementing the requirements of the European Floods Directive in England and Wales. The aim of the Directive is to provide a consistent approach to managing flood risk across Europe. It establishes four stages of activity within a six year flood management cycle (Table 2-1).

Stages	Delivery Date
Preliminary Assessment Report (PFRA)	22nd June 2011
Develop Flood Risk Areas based on the PFRA findings	22nd June 2011
Derive Flood Hazard and Risk Mapping for each Flood Risk Area	22nd June 2013
Develop an effective Flood Risk Management Plan for each Flood Risk Area	22nd June 2015

Table 2.1 Summary of stages of activity required as part of the European Floods Directive

The PFRA scope of work includes consideration of historic (past) flooding and possible future (potential) flooding from surface water runoff, groundwater and ordinary watercourses in Suffolk. These categories need only to be considered by Lead Local Flood Authorities as part of the PFRA process if it is considered that they may affect flooding from local flood sources.

The PFRA must consider floods which have ***SIGNIFICANT*** harmful consequences for human health, economic activity and the environment.

The work on the PFRA was intended to include a review of the existing Indicative Flood Risk Areas as designated by the EA of which there are a total of ten in England. These areas relate to large conurbations where in excess of 30,000 people are at risk from flooding. There are none of these Indicative Flood Areas within Suffolk and as a consequence no work needed to be carried out in respect to this.

2.3 Objectives

The aim of this document is to fulfil Suffolk County Council's obligations under the Flood Risk Regulations acting in the capacity of Lead Local Flood Authority. The carrying out of the PFRA aims to locate areas where the risk of surface water and groundwater flooding is significant and warrants further examination through the production of maps and management plans.

The PFRA provides an assessment of local flood risk across the study area, including information on past floods and the potential consequences of future floods. The key objectives can be summarised as follows:

- Identify relevant partner organisations involved in future assessment of flood risk; and summarise means of future and ongoing stakeholder engagement;
- Describe arrangements for partnership and collaboration for ongoing collection, assessment and storage of flood risk data and information;
- Provide a summary of the systems used for data sharing, storing, provision for quality assurance, security and data licensing arrangements;
- Summarise the methodology adopted for the PFRA with respect to data sources, availability and review procedures;
- Assess historic flood events within the study area from local sources of flooding (including flooding from surface water, groundwater and ordinary watercourses), and the consequences and impacts of these events;
- Establish an evidence base of historic flood risk information, to be held by Suffolk County Council, to support and inform the preparation of the Local Flood Risk Strategy;
- Assess the potential harmful consequences of future flood events within the study area

2.4 Study Area – Geographic Extent/Key partner organisations

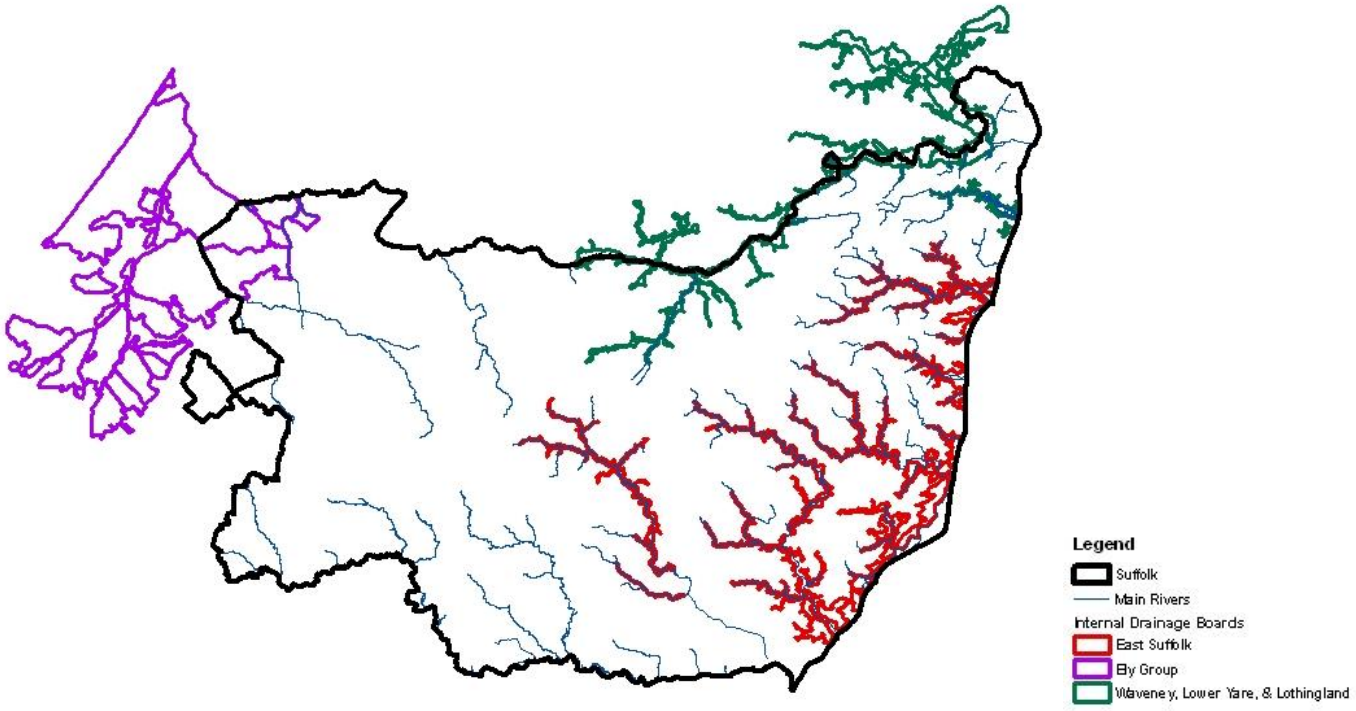
The Suffolk County Council administrative area covers approximately 3798 km^2 and is bounded to the north by Norfolk, to the west by Cambridgeshire, to the south by Essex and to the east by the North Sea. (See Figure 2.1).

Figure 2.1 Inter-relationship of Suffolk County Council with Neighbouring County Councils

The study area falls entirely within the region managed by Anglian Water, the organisation with responsibility for the provision of foul and surface water sewerage in Suffolk.

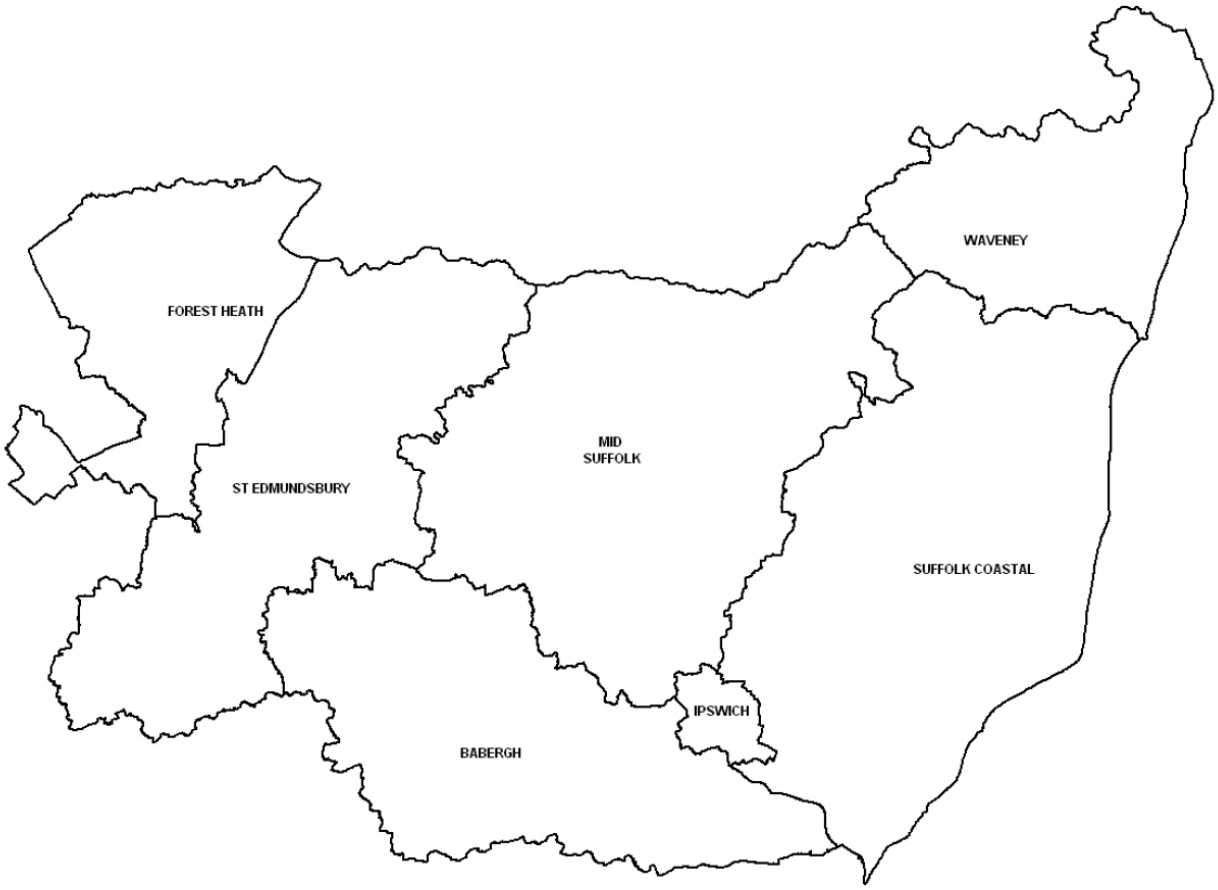
There are three Internal Drainage Boards located within the area. See Figure 2.2 below for details of the watercourses for which each Internal Drainage Board has responsibility.

Figure 2.2 Internal Drainage Board Watercourse Responsibilities



Within the administrative area of Suffolk County Council there are seven 2nd tier local authorities. See Figure 2.3 below for the location of these authorities.

Figure 2.3 – 2nd tier local authorities in Suffolk



3 Lead Local Flood Authority responsibilities

The PFRA is undertaken in response to two major pieces of legislation, the Flood and Water Management Act 2010 and the Flood Risk Regulations 2009. Included within the legislation is the identification of key responsibilities for Leadership, Partnership and Public Engagement .

3.1 Flood and Water Management Act 2010

This Act was created in response to the recommendations contained in Sir Michael Pitt's review[iv] of the significant flooding which has occurred in the UK in recent years, notably in 2007. The Pitt Review identified three key recommendations which have particular relevance for local authorities :-

RECOMMENDATION 14: Lead local authorities should lead on the management of local flood risk, with the support of the relevant organisations.

RECOMMENDATION 15: Lead local authorities should positively tackle local problems of flooding by working with all relevant parties, establishing ownership and legal responsibility.

RECOMMENDATION 16: Lead local authorities should collate and map the main flood risk management and drainage assets (over and underground), including a record of their ownership and condition.

The Flood and Water Management Act provides for better, more comprehensive management of flood risk for people, homes and businesses.

A key component of this legislation was the designation of Unitary and County Councils as Local Lead Flood Authorities with responsibility for developing, maintaining, applying and monitoring a strategy for local flood risk management. Under the Act 'local flood risk' means flood risk from:-

- surface runoff,
- groundwater, and
- ordinary watercourses.

The Act is being implemented in stages. Some key elements:-

1 October 2010 – Commencement order

This implemented provisions requiring the Environment Agency and Lead Local Flood Authorities to develop strategies for risk management.

1 October 2010 – Flood Risk Management Functions

This established the responsibility of the Environment Agency and Lead Local Flood Authorities to prepare flood risk assessments, flood maps and plans in accordance with the EU Floods Directive.

1 and 6 April 2011 – Commencement Order No. 3

This commencement order implements most duties and powers for Lead Local Flood Authorities.

The commencement of the remaining provisions of the Act, including notably the role of Sustainable Drainage Systems Approval Body, will be subject to regulatory committees, the outcome of consultations and further discussions.

3.2 Flood Risk Regulations

The Flood Risk Regulations 2009[i] implement the requirements of the European Floods Directive. The aim of the Directive is to provide a consistent approach to managing flood risk across Europe. It establishes four stages of activity within a six year flood risk management cycle.

In the UK, Lead Local Flooding Authorities have been given the responsibility for carrying out specified tasks required by the Regulations.

3.3 Responsibility for Leadership and Partnership

Clause 9 of the Flood and Water Management Act places a responsibility on Suffolk County Council to take the lead role in the reduction of surface water flooding risk. The creation of a partnership of all the relevant organisations having a role in surface water management is identified as particularly important.

In advance of the specific requirement under law, Suffolk County initiated the creation of the Suffolk Flood Management Partnership. This group has regular meetings and is formed from representatives of the following organisations:-

- Suffolk County Council
- District and Borough Councils within Suffolk
- Environment Agency
- Anglian Water
- Internal Drainage Boards
- Highways Agency
- Suffolk Resilience Forum
- Broads Authority
- Essex and Suffolk Water

The group as constituted will be the primary mechanism for Stakeholder Engagement in local surface water management in Suffolk. The need for Stakeholder Engagement is specifically identified in the Environment Agency final guidance for carrying out a PFRA. Early involvement with stakeholders is also identified as a key element of work to be undertaken on Surface Water Management Plans. These plans are prepared in areas deemed to warrant further investigation to resolve flooding problems and are funded by Defra in line with national priorities for flood risk reduction. The Ipswich Surface Water Management Plan is the only one to be undertaken so far in Suffolk.

The Suffolk Flood Risk Management Partnership has supported the carrying out of the PFRA through the provision of past and other data used in the study and scrutiny of the final report/recommendations. All future flooding strategies will be subject to the approval of the Stakeholder Group to ensure that the objectives/responsibilities of all the members are fully taken into account.

3.4 Responsibility for Public Engagement

It is important to incorporate public engagement into local flood risk management planning. The public can provide invaluable information which can aid the development of more effective management strategies. By keeping the public informed of future flood risk management plans, it is hoped that trust can be built between the public and local government.

Subsequent stages of this process will require increasing levels of public engagement, particularly during the formulation of the local flood strategy. The Environment Agency's 'Building Trust with Communities[v]' document provides useful guidance on communication with the general public and professional forums such as local resilience forums.

There will be a continuing need to balance the requirement to inform residents when flood risk is identified while at the same time being aware of sensitivities that this can give rise to. There may also be corporate sensitivities such as for Anglian Water which will need to be considered in detail.

3.5 Other Responsibilities-

Aside from forging partnerships and coordinating and 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:

Responsibility	Details
Preparation of an Asset Register	Lead Local Flood Authorities (LLFAs) have a duty to maintain a register of structures or features which are considered to have an effect on flood 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.
Designation of surface water management structures	LLFAs, as well as 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.
Investigation of flood incidents	LLFAs have a duty to co-ordinate the investigation and recording of significant flood events within their area. This duty includes identifying which authorities have flood risk management functions and what they have done or intend to do with respect to the incident, notifying risk management authorities where necessary and publishing the results of any investigations carried out. Further information with respect to this duty is provided at Section 8.
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
SuDS Approval Body*	LLFAs are designated the SuDS Approving Body (SAB) for any new drainage system, and therefore must approve, adopt and maintain any new sustainable drainage systems (SuDS) within their area
Works powers	LLFAs have powers to undertake works to manage flood risk from surface runoff and groundwater, consistent with the local flood risk management strategy for the area

* duty that has yet to be commenced

Table 3.2 Lead Local Flood Authority responsibilities under the Flood Risk Regulations and the Flood and Water Management Act

4. Methodology and data review

The approach for producing this PFRA was based upon the Environment Agency's PFRA Final Guidance, which was released in December 2010, and as required within the guidance, this PFRA is based on readily available or derivable data.

4.1 Data Sources

Data was obtained from a number of local and national sources as indicated in Table 4.1 below. Much of this information, held by partner's staff and contractors was made available for this purpose.

Table 4.1 Local and National Data Sources

	Dataset	Description
Environment Agency	Areas Susceptible to Surface Water Flooding	First generation of national surface water flood risk mapping
	Flood map for Surface Water	Second generation of national surface water flood risk mapping
	Flood Map	Shows main river and sea flooding
	Areas Susceptible to Groundwater Flooding	National mapping showing areas which are susceptible to groundwater flooding
	National Receptors Dataset	National dataset of flooding receptors including properties, schools, hospitals etc
	Indicative Flood Risk Areas	Nationally identified areas with more than 30,000 properties at flood risk
	Historic Flood Map	Spatial flood extent for flooding from all sources
	Catchment Flood Management Plans,East Suffolk and Broadland	Reports on all types of flooding and plans for reducing flood risk
District and Borough Councils	Strategic Flood Risk Assessments	May contain useful information on past and future flood risk
	Historic flooding records	Historic records of flooding from surface water, groundwater and ordinary watercourses
Parish Councils	Historic flooding records	Historic records of flooding from surface water, groundwater and ordinary watercourses
Suffolk County Council	Multi-agency flood plans	Document detailing a planned response to flooding
	Historic highways flooding records	Flooding of major and minor roads in the county.
Defra	Key environmental site and building location	Contains location of special environmental sites, World heritage, monuments, listed buildings and parks
Suffolk Fire, Rescue	Historic flooding records	Flooding records including call-out history, location response given etc
Suffolk Police	Historic flooding records	Flooding records including call-out history, location response given etc
Anglian Water	DG5 information	Records of sewer flooding incidents
Highways Agency	Highway flooding locations	Map showing locations where flooding has been experienced

4.2 Availability

All relevant stakeholders within Suffolk were contacted to collate as much readily available information on flooding as possible. The data provided had a number of limitations as outlined below.

4.3 Limitations

There are a number of limitations with the data provided for this PFRA. The requirement was to collect readily available data and this was what was used in assessment of significant flooding etc.

However, the data presented revealed a number of inconsistencies/lack of detail in respect to such things as frequency, source, depth, number of properties affected, time that roads were impassable due to flooding and the costs that flooding gave rise to.

To ensure that for the future the data supports the prioritisation of effort to resolve the most significant flooding and to enable more complete information to be provided in the next PFRA cycle, it will be necessary to instigate a comprehensive flood reporting process county-wide. (See Section 8 for details of a suggested approach with regard to this.) The creation of a standard flooding report which all stakeholders can use is an important element of the local strategy which will need to be taken forward early on in the process of its development.

4.4 Security, Licensing and Use Restrictions

A majority of the data has been provided specifically for this study (for use by the LLFA and their consultants) and there are restrictions in its use. A number of specific agreements have been put in place to facilitate the sharing of data between partners:

- GIS licences for mapping and data supplied by Suffolk County Council
- British Geological Society (BGS) licence for localised geological data
- Environment Agency Standard data licence
- Licence Agreement with Anglian Water

Further agreements will need to be established as and when it is identified that other sources of data are required particularly in the development of the local flood strategy.

4.5 Quality Assurance

Historical flood data was assessed for its data quality and suitability for use in the Assessment of Significant Risk as detailed in the Environment Agency's PFRA Guidance.

5. Past (Historic) Flood Risk

Relevant information on past flooding within Suffolk was obtained from a number of sources including the following:-

- Anglian Water
- County, 2nd tier and parish councils
- Local Internal Drainage Boards
- Fire and Rescue Service
- Police
- Suffolk Joint Emergency Planning unit
- Highways Agency
- Strategic Flood Risk Assessments

Existing datasets and reports from the stakeholders were collated and reviewed in an effort to identify details of major past flood events and associated consequences including economic damage, environmental and cultural consequences and impact on the local population.

It was anticipated that information would be provided in a geo-referenced format. However this was not the case for some datasets and in these circumstances the data was geo-referenced where this was possible. The primary purpose of geo-referencing was to enable the information to be displayed over an Ordnance Survey background. Once the geo-spatial data was loaded into the system it became much easier to access the particular information required to consider the spatial distribution of historic flood events and relate these datasets to locations of key infrastructure such as hospitals, Sites of Special Scientific Interest, etc.

Analysis of this data found that in most cases the information recorded was insufficient to be able to confirm 'significant harmful consequences', the description used in the Environment Agency Final Guidance for PFRA preparation. (It is important to note that there is no specific definition of significance in the guidance. It is for each Lead Local Flood Authority to determine what constitutes significant harmful consequences.) As a consequence only a small number of locations have been entered into Annex 1 of the reporting spreadsheet as meeting the significance criteria. The entries which do appear were taken from information passed over by Ipswich Borough Council from their Surface Water Management Plan, which is currently being finalised.

These flooding locations determined as significant were identified by reference to the criteria below which has been deemed to offer an appropriate indicator of significance.-

Flooding to:-

- 5 or more residential properties
- 2 or more business properties
- 1 or more critical service
- 1 transport link impassable for in excess of 10 hours

It should be stressed that this does not mean that the many records of past flooding processed during the PFRA will be discarded. This information will be used to inform the Local Flood Risk Strategy and, where possible, to provide an interim means of identifying priority in respect to where the effort for reducing flooding should be placed.

Table 5.1 Locations at significant risk of flooding – these will be refined through the Surface Water Management Plan.

National Grid Reference	Location	Date	Residential Properties	Non-Residential Properties	Listed Buildings
TM1795844064	Ipswich	09/08/2001	16	3	0
TM1432346922	Ipswich	05/08/2002	9	2	0
TM1408946360	Ipswich	29/06/2005	6	2	0
TM1711343380	Ipswich	24/10/2006	0	2	1
TM1593544314	Ipswich	03/07/2007	23	0	0
TM1593544314	Ipswich	15/06/2009	0	3	0
TM1385542416	Ipswich	13/05/2006	0	2	0

Note:- The potential flood risk in Ipswich (as indicated by number of properties affected in the Environment Agency's Areas Subject to Surface Water Flooding dataset), gave rise to Government providing funding for the preparation of a Surface Water Management Plan. This Plan, which is nearing completion, will provide a means of establishing what areas of the town should be considered as a priority for further work both in terms of significance and in respect to the ease/cost of reducing the flooding which may be occurring there)

It is important to note that tidal flooding represents a significant problem in Suffolk where the consequences are likely to be very serious, albeit infrequent. Suffolk is ranked number 3 in the national list of critical tidal flooding locations. Investigation of the interaction between tidal flooding and surface water flooding is likely to be a key element of the Local Flood Risk Strategy.

In urban areas major surface water flooding events are almost always affected by interactions with sewerage and highway drainage systems. Investigation of these interactions will be an important element of future work, particularly in the urban situation.

6. Potential (Future) Flood Risk

6.1 Potential flood risk from surface water run off

Potential flood risk has been identified from national sources. The national sources include a number of different datasets which have been used in the past but the most up to date information to hand is contained in the Flood Map for Surface Water, the second generation in national surface water flood mapping. The Flood Map for Surface Water gives an indication of the areas where surface water would be expected to flow or pond during two different rainfall events (with a 1 in 30 and a 1 in 200 annual chance of occurring) and includes a national allowance for drainage capacity in urban areas. The urban underground drainage system would be expected to be removing a proportion of rain falling thus reducing flood volumes apparent on the ground surface. This dataset has been used as the 'locally agreed surface water information' defined in the PFRA guidance document.

The data from the Flood Map for Surface Water has been used to develop maps for use in GIS systems. For each of the rainfall events two maps have been produced; one identifying areas where flooding is greater than 0.1m (surface water shallow) and one identifying where flooding is greater than 0.3m (surface water deep).

Using this information the Environment Agency has estimated the number of properties at risk of surface water flooding in Suffolk to be 32,500 (flooding to a depth of 0.3m from an event with a 1 in 200 annual chance of occurring). This compares to 54,000 in Essex and 35,800 in Norfolk.

The availability of the information in map format is consistent with the need to develop the use of GIS to assist in the understanding of all the inter-related issues that have a bearing on the identification of flood risk. As a consequence of this, an important element of the work which has been undertaken as part of this PFRA has been the conversion of data so that it can be imported into GIS.

(Surface water management tasks are much easier once all the different elements such as future flooding, past flooding, critical infrastructure location etc have been imported into GIS and in fact the process of preparing the spreadsheets that will need to be presented to the Environment Agency as an element of the PFRA was helped considerably by this.)

By using the flooding information derived from the Flood Map of Surface Water and comparing it with the location of urban areas from the Ordnance Survey background maps, the Environment Agency has been able to identify areas where the consequence of flooding can be described as significant.

Information on potential flooding and numbers of properties liable to flood was obtained for every 1km square nationwide and, using standard criteria, a view on flooding significance was taken.

The criteria used to determine which 1 km squares could be considered as having significant flooding were that for a rainfall event with a 1 in 200 annual chance of occurring the flooding affected :-

- 200 or more people* and/or
- 1 critical service (eg a hospital) and/or
- 20 non-residential properties

**Figure estimated by multiplying total number of properties by 2.4, the average occupancy figure*

The 1km squares (known as 'blue' squares) for which it was determined the criteria was met in Suffolk are shown in Appendix B. Each 'blue square' identified in Suffolk has been included in the PFRA spreadsheet.

See Table 6.1 below for details of the county-wide locations where potential flood risk has been identified.

Table 6.1 Kilometre square locations in Suffolk (blue squares) where potential flood risk has been identified

National Grid Reference	Place Name	Number of Squares at each Location
TL7250079500	Eriswell CP (Forest Heath)	1
TL7150075500	Mildenhall CP (Forest Heath)	1
TL6150065500	Exning CP (Forest Heath)	1
TL7250061500	Dalham CP (Forest Heath)	1
TL7250057500	Lidgate CP (St. Edmundsbury)	1
TL7750145509	Clare CP (St. Edmundsbury)	1
TL8044046574	Cavendish CP (St. Edmundsbury)	1
TL8350052500	Hartest CP (Babergh)	1
TL9150049500	Lavenham CP (Babergh)	1
TL9950049500	Bildeston CP (Babergh)	1
TL9650040500	Boxford CP (Babergh)	1
TM1050033500	Brantham CP (Babergh)	1
TM2750037500	Trimley St. Martin CP (Suffolk Coastal)	1
TM1750050500	Witnesham CP (Suffolk Coastal)	1
TM1050052500	Baylham/Barking CP (Mid Suffolk)	1
TM1150059500	Stonham Aspal/Stonham Earl/Stonham Parva CP; centred at Junction of A1120, Angel Hill and Pains Hill (Mid Suffolk)	1
TM2350063500	Earl Soham CP (Suffolk Coastal)	1
TM3050068500	Badingham/Dennington CP (Suffolk Coastal)	1
TM3550069500	Peasenhall/Sibton CP; centred at intersection of Mill Hill and Church Street intersection (Suffolk Coastal)	1
TM3850063500	Kelsale cum Carlton/ Saxmundham CP (Suffolk Coastal)	1
TM4450062500	Leiston CP (Suffolk Coastal)	1
TM3850077500	Halesworth CP (Waveney)	1
TM4050077500	Holton CP; centred at intersection of Bungay Road and Mill Road (Waveney)	1
TM4950082500	Wrentham CP; centred at intersection of London Road and Mill Lane (Waveney)	1
TL8750064500	Bury St. Edmunds CP (St. Edmundsbury)	1
TL9150065500	Great Barton/Thurston CP (Mid Suffolk/St. Edmundsbury)	1
TL9350061500	Hessett CP (Mid Suffolk)	1
TL9750058500	Rattlesden CP (Mid Suffolk)	1
TM0050062500	Haughley/Wetherden CP (Mid Suffolk)	1
TL9650073500	Stanton CP (St. Edmundsbury)	1
TM0050071500	Walsham-le-Willows CP (Mid Suffolk)	1
TM0250071500	Walsham-le-Willows CP (Mid Suffolk)	1
TM5150089500	Carlton Colville/Gisleham CP (Waveney)	1
TM5349999096	Corton CP (Waveney)	1
TM3050056500	Hacheston/Wickham Market CP (Suffolk Coastal)	1
TL7850586157	Brandon/Santon Downham CP (Forest Heath)	3
TL6422564276	Newmarket CP (Forest Heath)	5
TL6690045300	Haverhill CP (St. Edmundsbury)	5
TL8464364643	Bury St. Edmunds CP (St. Edmundsbury)	7
TL8793141346	Great Cornard/Sudbury CP (Babergh)	5
TM0300042500	Hadleigh CP (Babergh)	2

National Grid Reference	Place Name	Number of Squares at each Location
TM1604544683	Ipswich	24
TM1284150821	Barnham/Claydon/Great Blackenham CP (Mid Suffolk)	3
TM0883354829	Creeting St. Mary/Needham Market CP (Mid Suffolk)	3
TM0475058500	Stowmarket CP (Mid Suffolk)	4
TM1750063000	Debenham/Winston CP (Mid Suffolk)	2
TM2850063000	Framlingham CP (Suffolk Coastal)	2
TM2750249502	Melton/Woodbridge CP (Suffolk Coastal)	4
TM2350045167	Kesgrave/Martlesham CP (Suffolk Coastal)	3
TM2940534611	Felixstowe CP (Suffolk Coastal)	5
TM4252289948	Beccles CP (Waveney)	2
TM5374892393	Kirkley/Normanston/Roman Hill; Lowestoft (Waveney)	9

See also Appendix C for information on the population at risk from potential flooding.

To provide a means of prioritising flooding location further, the Environment Agency applied a second level of criteria to the data identified from the Flood Map for Surface Water. This considered 3 km squares and if there were five or more 'blue squares' present within that 3km square they designated it as a cluster. There are a number of these clusters in Suffolk. (See Appendix D for their location and Table 6.2 below). As these clusters represent more significant potential flooding they have been identified separately within Annex 2 of the PFRA spreadsheet.

Table 6.2 Location of clusters of 1 kilometre squares in Suffolk

National Grid Reference	Place Name	Population at Risk*
TL6693545561	Haverhill	1661
TL8490064900	Bury St. Edmunds	1989
TL8752941591	Sudbury	1769
TM1635444583	Ipswich	13501
TM5358692227	Lowestoft	2590

* Population at risk figures obtained from the Flood Map for Surface Water attribute data

Where clusters gave rise to flood risk for in excess of 30,000 people they were designated as indicative Flood Risk Areas. There are none of these in Suffolk.

6.2 Potential flood risk from groundwater

There is no consistent local information available which provides evidence of possible future groundwater flood risk in Suffolk. However the Environment Agency has produced a national dataset for groundwater flooding entitled 'Areas Susceptible to Groundwater Flooding'. The view has been taken that this flooding does not satisfy the significance criteria and as a consequence has not been included in the PFRA reporting spreadsheet but the data will be used to inform the Local Flood Risk Strategy (see Appendix E). Possible interactions between groundwater and flood water will also be included in the local strategy.

The north west corner of the county, which is in The Fens, does have an increased flooding risk as a consequence of a high water table but the land is largely agricultural and water levels are managed by Internal Drainage Boards. Thus the real risk is low in terms of its impact on people, commercial property etc.

The physical/geological characteristics of this area will have a significant bearing on decisions regarding particular SuDS that can be used. It is likely that in this location surface water infiltration will not be possible.

6.3 Potential flood risk from ordinary watercourses

There are two definitions that are used for watercourses:-

- Main rivers –are a statutory type of watercourse, usually larger streams and rivers, but also include some smaller watercourses. A main river is defined as a watercourse marked as such on a main river map. The Environment Agency's powers apply to main rivers only.
- Ordinary watercourses – are a statutory type of watercourse and include every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows and which does not form part of a main river. An Internal Drainage Board where relevant or second tier local authority has permissive powers to carry out works on ordinary watercourses at their discretion.

Information provided by the Environment Agency identifies a number of locations where there is a risk of flooding relating to ordinary watercourses.

Principal locations identified

- Cowlinge
- Hartest
- Hundon
- Little Green
- Thornham Magna
- Walsham-le-Willows
- Wetheringsett
- Newmarket (No. 1 Drain -identified in the Great Ouse Catchment Flood Management Plan)

The frequency, extent and harmful consequences of this flooding will be investigated as an element of the Local Flood Risk Strategy.

With regards to the interaction of ordinary watercourses with main rivers and the sea, insufficient data was available to draw definitive conclusions at this point. However, there is anecdotal evidence to suggest that surface water flooding is exacerbated in some areas, such as Lowestoft, Ipswich and along the estuaries, during high tidal cycles when gravity drains and outfalls are blocked with high tidal waters. In addition the local Catchment Flood Management Plan has identified river/local drainage interaction at Bury St Edmunds which will be investigated further as there is insufficient data available at the moment regarding this.

6.4 Impact of climate change

The impact of climate change on local flood risk is 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 Flood Map (ordinary watercourses). These do not show the impact of climate change on local flood risk.

There was a consensus amongst climate model projections presented in the IPCC fourth assessment report for northern Europe suggesting that in 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[vi].

UKCP09

United Kingdom Climate Projections 2009 (UKCP09) provides the most up to date projections of future climate change for the UK[vii]. In terms of precipitation, the key findings are:

By the 2080s, under Medium emissions, over most of lowland UK

- Central estimates are for heavy rain days (rainfall greater than 25mm) to increase by a factor of between 2 and 3.5 in winter, and 1 to 2 in summer.

By the 2080s, under Medium emissions, across regions in England & Wales

- The central estimate (50% probability) for winter mean precipitation % change ranges from +14 to +23.
- Central estimate for summer mean precipitation % change from -18 to -24.

Certain key processes such as localised convective rainfall are not represented within this modelling so there is a still considerable uncertainty about rarer extreme rainfall events for the UK. We can be more certain that heavy rainfall will intensify in winter compared to summer. The proportion of summertime rainfall falling as heavy downpours may increase. The impact of these changes on local flood risk is not yet known.

Appraisal Guidance

Current project appraisal guidance[viii] provides indicative sensitivity ranges for peak rainfall intensity, for use on small catchments and urban/local drainage sites. These are due to be updated following the UKCP09 projections above. They describe the following changes in peak rainfall intensity; +5% (1990-2025), +10% (2025-2055), +20% (2055-2085) and +30% (2085-2115). This was reviewed by the Met Office in 2008 using UKCP09 models[ix]. They suggest that, on the basis of our current understanding, these levels represent a pragmatic but not a precautionary response to uncertainty in future climate impacts. In particular for a 1 in 5 year event, increases in precipitation intensity of 40% or more by the 2080s are plausible across the UK at the local scale.

6.5 Impact of future development

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)[x] 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 the 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 Governments criteria), but should be recorded here so that they can be reviewed in future.

7. Review of Indicative Flood Risk Areas

Flood risk becomes more significant where greater numbers of people are liable to be affected and the Environment Agency has given the title of ‘Indicative Flood Risk Areas’ to locations where in excess of 30,000 people are deemed at risk of flooding. In the whole of England there are just ten of these Indicative Flood Risk Areas but none in Suffolk. As a consequence there was no need to carry out a review.

8. Next Steps

The Flood and Water Management Act requires each Lead Local Flood Authority 'to develop, maintain, apply and monitor a strategy for local flood risk management'. There is no deadline identified within the legislation but in recognition of its importance Suffolk County Council aims to complete it by June 2012.

The strategy must be consistent with the National Flood and Coastal Erosion Risk Management Strategy, due to be published later this year, and must identify:-

- Risk management authorities in the area and functions they perform
- Assessment of local flood risk (surface, ground and ordinary watercourse flooding and interactions with other sources of flooding)
- Objectives for managing local flood risk
- Measures proposed to achieve the objectives
- How and when they will be implemented
- Costs and benefits of the measures and how they are to be funded
- Strategy review process
- Contribution to wider environmental objectives

There are also general responsibilities under the Flood and Water Management Act that Suffolk County Council will need to take forward including the preparation of an asset register of all surface water infrastructure, the investigation of new flooding incidents and, once implemented under the Act, to perform the role of approval body for Sustainable Drainage Systems. With regards to the latter, all planning applications involving two or more properties will need to be accompanied by a detailed proposal for surface water management which Suffolk County Council will have to view to ensure that they satisfy national and local requirements. Legislation prohibits commencement of construction work on site until the drainage proposals have been formally approved.

From the above it can be seen that a significant amount of work will need to be undertaken to satisfy the Suffolk County Council obligations in flood risk management. Some of the key issues are discussed below.

8.1 Flooding incident recording

As has been identified elsewhere within this document, the level of detail in data provided on past flooding was generally insufficient to enable a judgement to be taken of 'significant harmful consequences' as detailed in the PFRA Final Guidance document. This lack of information will need to be addressed before the next PFRA cycle so as to ensure that at that time the required information is to hand. In any event it will be a requirement for Lead Local Flood Authorities to record the minimum information shown below from December 2011:-

- Start date and duration in days
- Probability
- Main source
- Main mechanism
- Main characteristics
- Significant consequences of flooding.

The PFRA Final Guidance document will need to be reviewed to see what additional information over and above the minimum required will need to be collected to satisfy the PFRA requirements. For example, a particular criteria for significance is the length of time that a highway is impassable due to flooding. It would therefore be prudent for this data to be recorded in flooding incident reports.

Suffolk County Council intends to establish a county-wide reporting procedure using a standard template. Data from each flooding incident will be recorded and passed, on an annual basis, to a central record system administered by Suffolk County Council.

All stakeholders will need to be involved in these new arrangements so as to ensure that the flooding information is both comprehensive and suitable for supporting county-wide judgements such as the identification of priority in any flood risk reduction schemes to be implemented.

In this context it will be important to establish the level of significance of any rainfall giving rise to flooding i.e. what can be described as the annual probability of occurrence or, in previously used terminology, the return period of the rainfall event. Data can be obtained from the Meteorological Office after any flooding event. This data can then be analysed to produce the annual probability of occurrence of both the rainfall event and the associated flooding.

8.2 Measures proposed to achieve the objectives

It is unlikely that significant reductions in flood risk could be achieved in the short term. Making progress will require the implementation of a wide range of initiatives.

Perhaps the most important of these initiatives would be the establishment of a Suffolk County Council policy for surface water management which is embedded in the local Town and Country Planning Policy. This will be particularly important in the context of controlling increased flood risk that new development could give rise to, but also could be used as a means of making progress in generating a positive effect with regards to existing known flooding. An important early action in this particular initiative would be the preparation of a locally-tailored Sustainable Drainage System Guide which would support the Suffolk County Council responsibilities as Sustainable Drainage Systems (SuDS) Approval Body under the Act. The Guide would look at aspects such as location-specific opportunities for infiltration of surface water and could form an important supporting document for Suffolk County Council's general initiatives in sustainability through the establishment of policy statements in respect to protection of water resources etc.

DEFRA have initiated the preparation of a document which will establish how SuDS are to be implemented on a national basis, the National SuDS Guidelines, and this document is believed to include reference to the need for a local policy to take account of localised opportunities and current ways of dealing with surface water so that any new proposals can be properly integrated with those.

It should be noted that the development of a sustainable strategy for surface water, which the local SuDS guide would be at the heart of, has the potential to generate significant benefits for the human and natural environments which could make a valuable contribution to the quality of life of residents in Suffolk. It could also make an important contribution in respect to water quality and overall water availability which will become increasingly important in view of anticipated climate change and population growth.

8.3 Surface Water Asset Register

As from 1 April 2011, the Flood and Water Management Act places a responsibility on Suffolk County Council to maintain a register of assets and features which are likely to have a significant effect on flood risk in the area and to make this register available publicly. Suffolk County Council can optionally make available for public inspection the records of such things as location, ownership, state of repair and frequency of inspection/routine maintenance activities but this is not mandatory under the legislation. Also any new assets constructed for instance as part of new development in Suffolk, should be recorded in the register.

It is important to note that the availability of a comprehensive register of drainage assets and the associated record data is a fundamental first step in the identification of a targeted and risk based process for maintenance to ensure continued good performance of drainage assets at optimum cost. Experience suggests that many flooding problems could be minimised through activities such as timely intervention in trash screen clearing avoiding the need for more costly capital investment in the surface water infrastructure.

Stakeholders and partners should be encouraged to use GIS formats to store their data in order to facilitate exchange and management of data. A data management plan would be valuable in ensuring data sets were kept up to date and consistent across all stakeholders. A future consideration could be the development of an online GIS asset register database. This would enable a wider range of organisations to contribute information.

Responsibility for the overall management of the data, updating of databases using internal systems, or perhaps via a web based interface, will rest with Suffolk County Council. An option for holding the data through the enhancement of a computer system which is in place currently for highway related assets is being explored, along with other options.

8.4 Communication with stakeholders and residents

The bringing together of all relevant stakeholders to discuss surface water management issues has enabled much progress to be made already and Suffolk County Council will ensure that there is a continuing dialogue with those stakeholders. Legislation brought in over many years has resulted in the administrative framework for drainage becoming complicated. Good communication will be needed to make sure that the potential which the new legislation offers for simplification and general improvement in surface water management is realised.

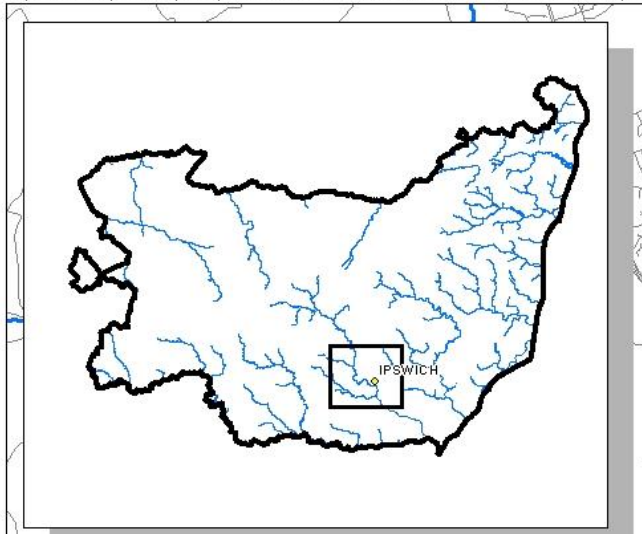
The Environment Agency report entitled 'Working with others – building trust with communities' along with any Suffolk County Council guidance on communication with stakeholders will form useful references in the establishment of a targeted Communications Plan.

Experience elsewhere confirms that significant relevant information on flooding issues can be obtained from members of the public and the Communications Plan will need to be put together to ensure that it addresses how best to access this important source of information.

The Communications Plan should also detail how organisations and individuals who may be interested in a greater involvement in surface water management can be brought into the process. This could include organisations such as Wildlife Trusts who may be interested in taking responsibility for sustainable drainage systems which have, or can be designed to have, an inherent environmental value. Another possibility could be a local resident who would be motivated to inspect drainage features, such as perhaps a screen on a drainage culvert, where a previous lack of maintenance has given rise to flooding of the resident's property.

APPENDICES

Appendix A: Significant past flooding locations



Legend

- Significant Past Flooding Locations
- Main Rivers
- Suffolk County

Client: Suffolk County Council

Project: Suffolk PFRA

Title: Appendix A - Significant Past Flooding Locations

Design:	JC	Drawn by:	JC
Chk'd:	RE	App'd:	RE
Date:	26 May 2011	Scale:	1:40000

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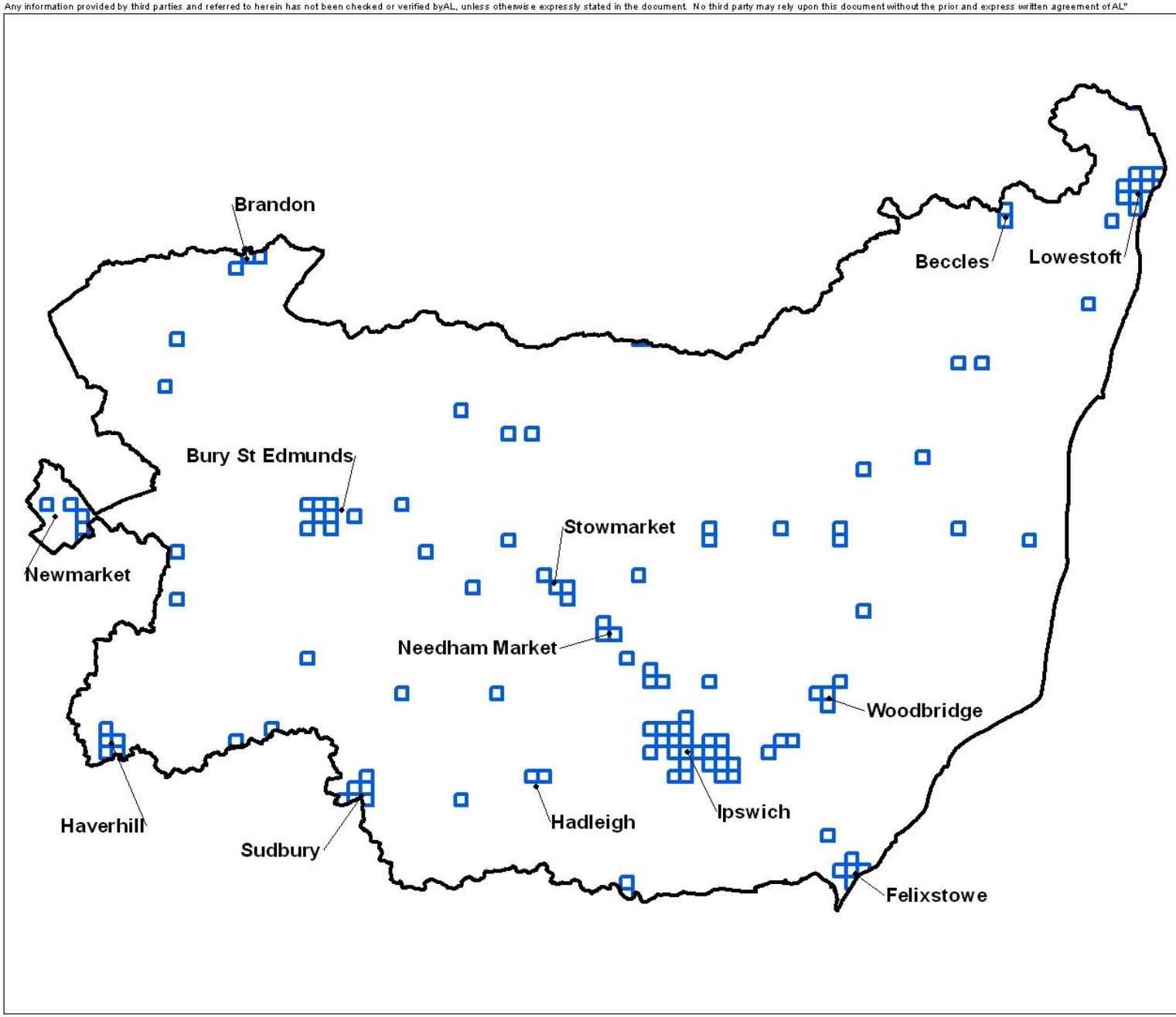
Drawing No.

Size: A4

Appendix B: Potential flooding areas



Legend

Suffolk County

Potential Flooding Areas*

*These are 1 km grid squares where at least one of the following flood risk indicators is above the threshold given below:

1. Number of people > 200
2. Critical Services > 1
3. Number of Non-Residential Properties > 20

Indicators calculated using the EA's detailed method of counting (based on property outlines) for the new Flood Map for Surface Water (deep- for 1 in 200 annual probability rainfall)

Client:	Suffolk County Council
Project:	Suffolk PFRA
Title:	Appendix B - Potential Flooding Areas
Design: JC	Drawn by: JC
Chk'd: RE	App'd: RE
Date: 6 May 2011	Scale: 1:300000

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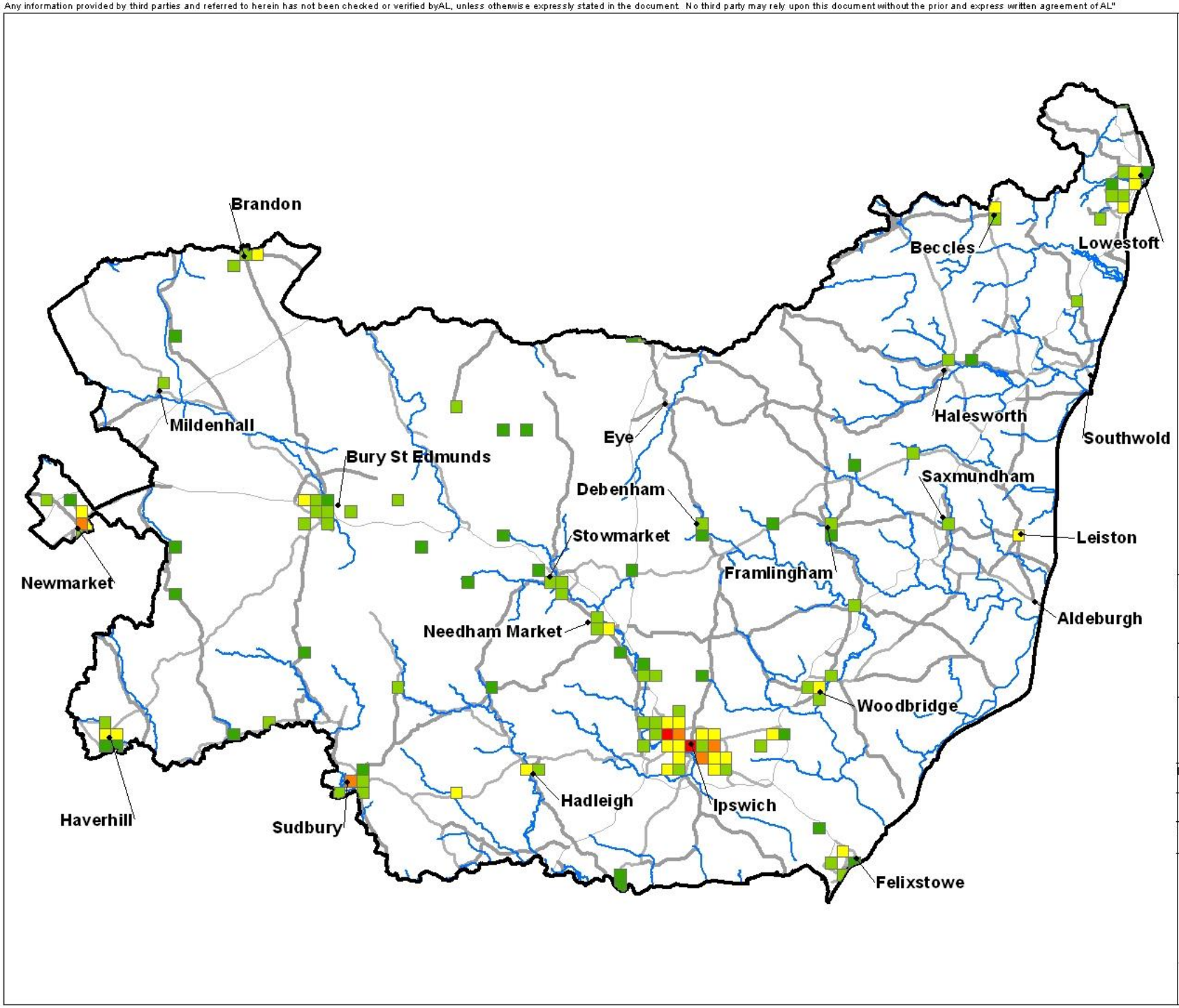
Size: A4

Appendix C: Population at risk in potential flooding areas



Legend

Potential Flooding Areas*

Population at Risk

- < 125
- 125 - 300
- 300 - 600
- 600 - 1200
- >1200
- Suffolk County
- Main Rivers
- Roads

*These are 1 km grid squares where at least one of the following flood risk indicators is above the threshold given below:

1. Number of people > 200
2. Critical Services > 1
3. Number of Non-Residential Properties > 20

Indicators calculated using the EA's detailed method of counting (based on property outlines) for the new Flood Map for Surface Water (deep- for 1 in 200 annual probability rainfall)

Client: Suffolk County Council

Project: Suffolk PFRA

Title: Appendix C - Potential Flooding Areas Population at Risk

Design:	JC	Drawn by:	JC
Chk'd:	RE	App'd:	RE
Date:	6 May 2011	Scale:	1:300000

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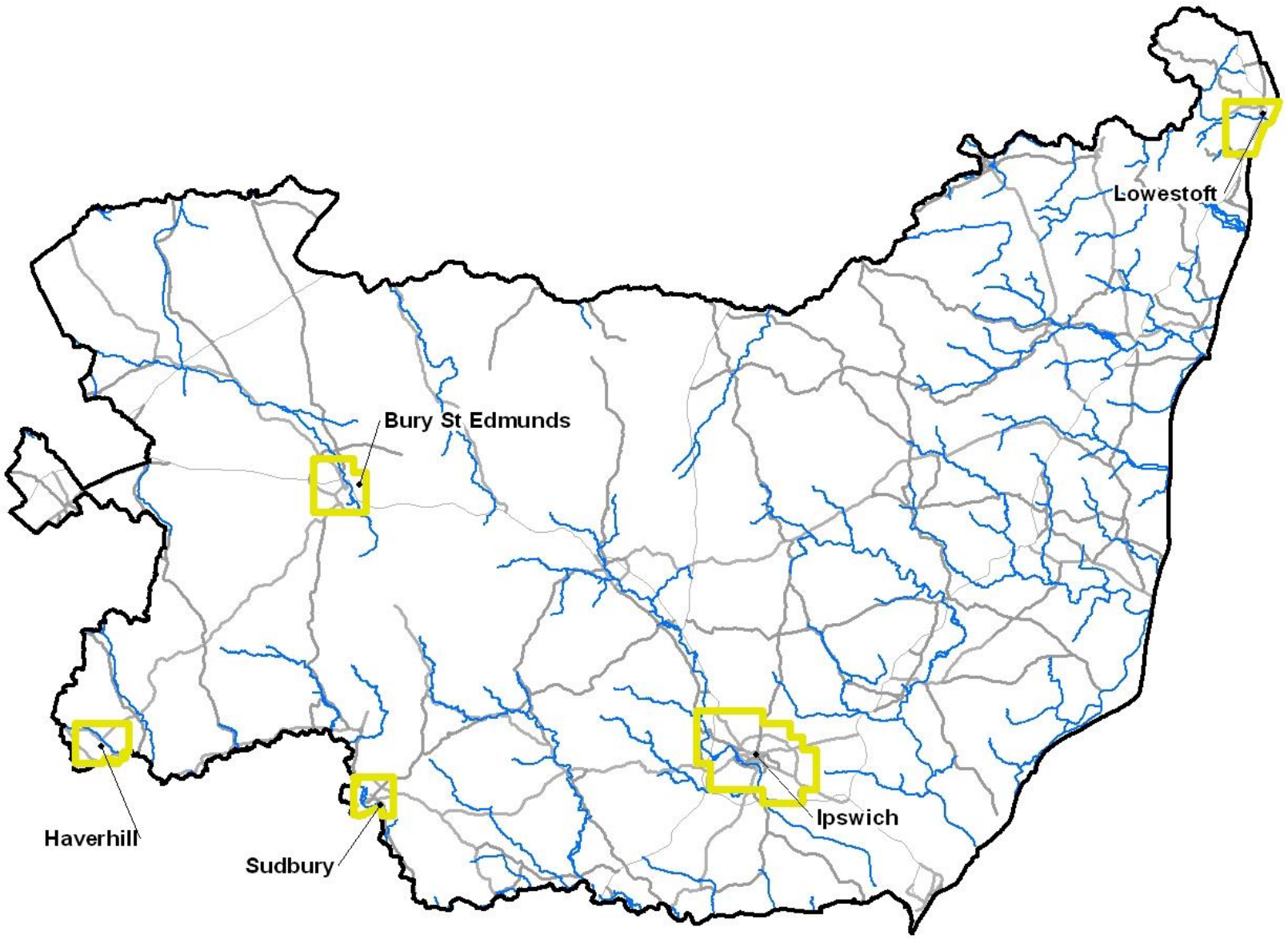
Appendix D: Clusters of flooding areas



Legend

- Clusters of Flooding Areas*
- Suffolk County
- Main Rivers
- Roads

*Clusters defined where five or more 'blue squares' are present within a 3km square

Client: Suffolk County Council

Project: Suffolk PFRA

Title: Appendix D - Clusters of Flooding Areas

Design:	JC	Drawn by:	JC
Chk'd:	RE	App'd:	RE
Date:	26 May 2011	Scale:	1:300000

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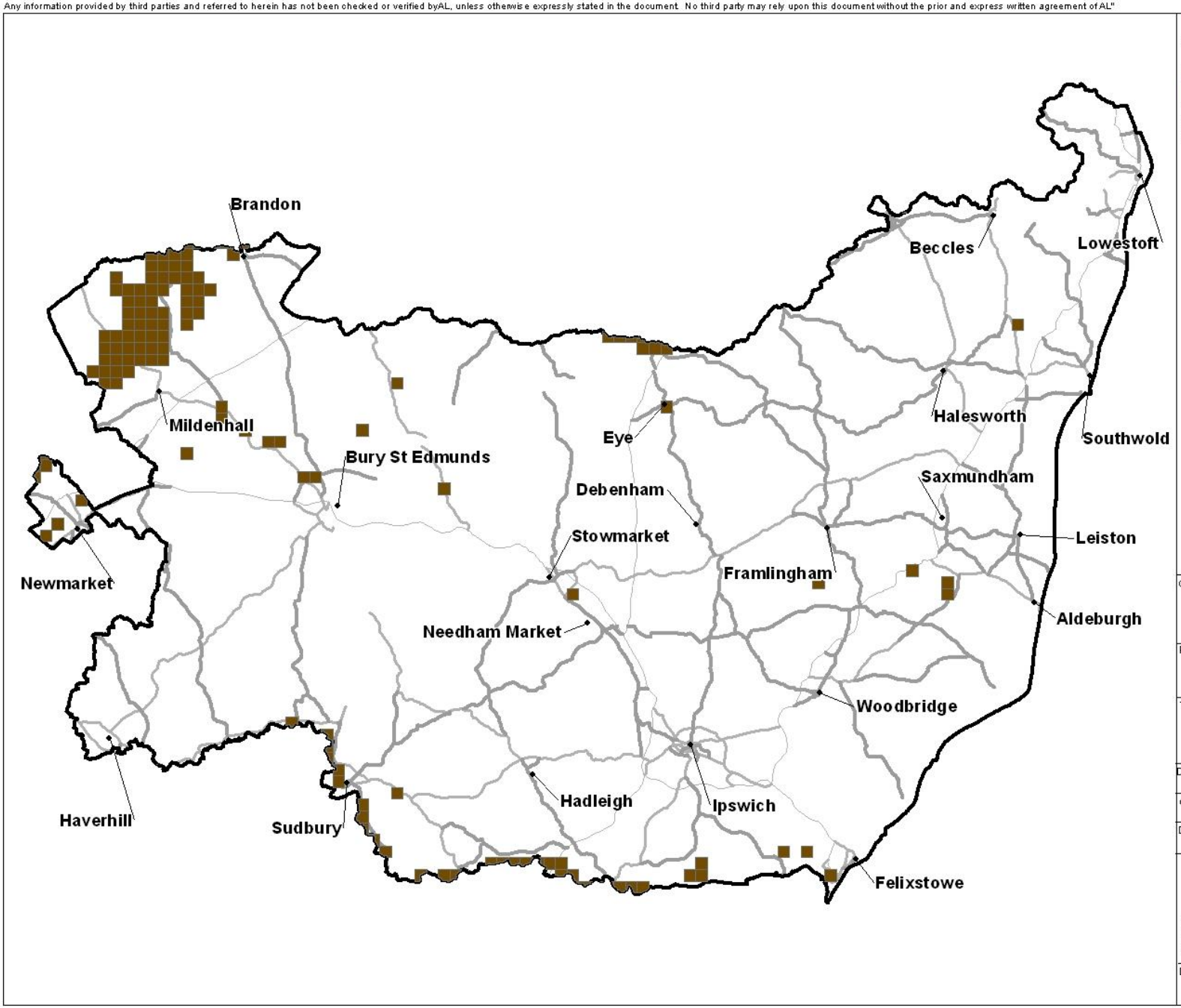
Appendix E: Potential Flood Risk from Groundwater



Legend

Areas Susceptible to GW Flooding*

- >= 75%
- Suffolk County
- Roads

*Shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.

Client: Suffolk County Council

Project: Suffolk PFRA

Title: Appendix E - Potential Flood Risk from Groundwater

Design:	JC	Drawn by:	JC
Chk'd:	RE	App'd:	RE
Date:	13 June 2011	Scale:	1:300000

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Drawing No.

Size: A4

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