

Defra/EA Flood and Coastal Erosion Policy

Availability and Uses of Property Level Flood Risk Data and Information

Technical Report FD2637/TR
Final Report

Produced: 27th May 2010

Author(s):

Neil Thurston, Bill Finlinson and Richard Breakspear (Entec)
Ben Kidd and Jonathan Glerum (CIRIA)
Jessica Lamond and David Proverbs (University of Wolverhampton)
Mary Dhonau (National Flood Forum)

Statement of use

Dissemination status

Keywords: Property, Flood, Data, Information, Insurance, Risk

Research contractor: Entec UK Limited, CIRIA, University of Wolverhampton and National Flood Forum

Defra project officer: Daniel Johns

Publishing organisation

Department for Environment, Food and Rural Affairs
Flood Management Division,
Ergon House,
Horseferry Road
London SW1P 2AL

Tel: 020 7238 3000

Fax: 020 7238 6187

<http://ww2.defra.gov.uk/environment/flooding/>

© Crown copyright

Copyright in the typographical arrangement and design rests with the Crown. This publication (excluding the logo) may be reproduced free of charge in any format or medium provided that it is reproduced accurately and not used in a misleading context. The material must be acknowledged as Crown copyright with the title and source of the publication specified. The views expressed in this document are not necessarily those of Defra or the Environment Agency. Its officers, servants or agents accept no liability whatsoever for any loss or damage arising from the interpretation or use of the information, or reliance on views contained herein.

Third Party Disclaimer

Any disclosure of this report to a third party is subject to this disclaimer. The report was prepared by Entec at the instruction of, and for use by, our client named on the front of the report. It does not in any way constitute advice to any third party who is able to access it by any means.

Entec excludes to the fullest extent lawfully permitted all liability whatsoever for any loss or damage howsoever arising from reliance on the contents of this report. We do not however exclude our liability (if any) for personal injury or death resulting from our negligence, for fraud or any other matter in relation to which we cannot legally exclude liability.

Document		Revisions
No.	Details	Date
1	Draft Report v1	24/2/10
2	Draft Report v2	23/3/10
3	Draft Report v3	25/3/10
4	Final Report	14/5/10
5	Final Report	27/5/10

Glossary

ABI	Association of British Insurers
AEP	Annual Exceedance Probability
BGS	British Geological Survey
DBIS	Department for Business, Innovation and Skills
DCLG	Department for Communities and Local Government
DCMS	Department for Culture, Media and sports
DG5	Sewer flooding risk register
DTM	Digital Terrain Model
EA	Environment Agency
EPC	Energy Performance Certificate
FCA	Flood Consequence Assessment
FCERM	Flood and Coastal Erosion Risk Management
FRA	Flood Risk Assessment
FRIS	Flood Reconnaissance Information System
FRM	Flood Risk Management
FSA	Flood Storage Area
FWMB	Flood and Water Management Bill
FZ	Flood Zone
GIS	Geographical Information System
HIP	Home Information Pack
IRS	Incident Recording System
IUD	Integrated Urban Drainage
LGA	Local Government Association
LIDAR	Light Detection and Ranging
MSA	Mapping Services Agreement
NFCDD	National Flood & Coastal Defence Database
NLPG	National Land and Property Gazetteer
NPD	National Property Dataset
OS	Ordnance Survey
PEA	Predicted Energy Assessment
PFRA	Preliminary Flood Risk Assessment
PGA	Pan Government Agreement
PIQ	Property Information Questionnaire
PPS25	DCLG Planning Policy Statement 25 - Development and Flood Risk
RMS	Risk Management Solutions
SFRA	Strategic Flood Risk Assessment
SME	Small and Medium Enterprise
SWMP	Surface Water Management Plan
TOID	Topographic Identifier
UKCIP	United Kingdom Climate Impacts Programme
VAR	Value Added Reseller
VOA	Valuation Office Agency
WCS	Water Cycle Strategy

Executive Summary

1 Introduction

In November 2009, Defra Flood Management (with the support of the Environment Agency) commissioned Entec UK, CIRIA, University of Wolverhampton and National Flood Forum to undertake a study to evaluate the availability and uses of flood history, risk and mitigation information relating to residential and small/medium enterprise (SME) commercial properties.

The generic term “property level flood risk information” is used in the remainder of this report and covers sources of information relating to flood history, flood risk and flood mitigation for residential and SME commercial properties.

This executive summary presents the findings of the study and considers the current requirements for property level flood risk information; the availability and use of this information; the barriers to its wider use; an assessment of the future requirements of users; and outlines a number of proposed actions for how these requirements could be realised in the future.

2 Background

The Environment Agency’s Long Term Investment Strategy (based on figures from the 2008 National Flood Risk Assessment) showed there are 2.4 million properties at risk of flooding from fluvial or tidal sources in England with up to 490,000 of these judged to be at significant risk (i.e. with an annual probability greater than 1.3%, 1 in 75, chance in a year) (Environment Agency 2009).

A preliminary assessment of surface water flood risk also suggests that one million properties at risk of tidal and coastal flooding are also susceptible to surface water flooding, with a further 2.8 million properties susceptible to surface water flooding alone. In all, around 5.2 million properties in England, or one in six properties, are thought to be at risk of flooding (Environment Agency 2009).

Over recent years, there has been considerable effort by a range of organisations to improve the information which is available regarding the relative intensity and frequency of potential flood events. Foremost amongst these organisations has been the Environment Agency who has worked alongside experts in many fields to capture historical flood areas and develop models to enable the evaluation of the depth, speed and duration of floodwater. These outputs are extensively used to support the delivery of flood risk assessments, evaluation of new defence schemes and Strategic Flood Risk Assessments (SFRAs) delivered by local authorities.

The Environment Agency has also published national online fluvial & tidal flood risk maps; undertakes research to develop a new generation of flood risk maps from other sources (including groundwater and surface water) and developed a

national address property dataset (NPD 2008) for use in its National Flood Risk Assessment (NaFRA). The Environment Agency also provides a range of flood risk assessment products. Examples are provided later in this report.

Another prime mover in the development of property level flood risk information has been the insurance and reinsurance industry. The increase in claims activity has highlighted the commercial importance of good flood risk evaluation and underwriting. Insurers also have the potential to add the extra dimension of claims recording to modelled flood risk data.

The water companies covering England and Wales also manage a variety of sewer and drainage data sources and have a direct responsibility to assess and manage registers of properties “at risk” of flooding from sewer and drainage exceedance. The barriers which currently restrict the wider access to this information are discussed later in this report.

The major flood events experienced in the last decade have also led to a range of other organisations collecting and using flood risk and flood history data. Sometimes, as in the case of loss adjusters and surveyors, this collection occurs as a normal part of their business operations. Other organisations that record, communicate and use property based flood risk information include emergency responders and local authorities.

Over recent years, there has also been a growing interest from communities and individuals in obtaining effective property level flood risk information which they can readily understand. This requirement is linked to a number of different drivers including: (a) an individual’s desire to understand the potential risks to their own home or business or one they are seeking to acquire; (b) assisting discussions with insurance companies regarding obtaining or renewing insurance cover and/or (c) potential consideration of the purchase of flood resistance and resilience solutions.

3 Aim and objectives of the study

The central aim of this research project has been to provide a clear assessment of the current availability, requirements and uses of flood risk information relating to residential and small and medium enterprise (SME) commercial properties and to provide suggested actions for how the collection and use of this information could be improved in the future.

To address this overall project aim, this report considers four main objectives. These are:

- Assess the current uses and requirements of information relating to residential and commercial property level flood risk, history and mitigation measures;
- Evaluate the availability of information concerning residential and commercial property level flood risk, history and mitigation measures;

- Assess the future requirements and uses for information relating to residential and commercial property level flood risk, history and mitigation measures;
- Evaluate how the accessibility and use of information relating to residential and commercial property level flood risk, history and mitigation data can be improved.

4 Delivering the study

The study objectives were investigated using three research methods. These were:

- structured telephone interviews with 60 stakeholders with interests in the collation and/or use of property level flood risk information;
- an internet based review of available datasets and information; and
- a stakeholder workshop.

The first major task undertaken was the development of a series of questions which could be used as the basis of telephone interviews with consultees with a direct interest in the management and use of property level flood risk data and information. These are reproduced in Appendix A.

In conjunction with developing the research questions, the project team developed a list of 110 stakeholder organisations with a direct interest in the management and use of property level flood risk data and information. From this original list, the project team identified 70 organisations that would be the focus of the primary contacting undertaken in the project. The process of telephone contact calls with these priority stakeholders began in early December 2009 and continued until the end of February 2010.

The initial conversations with these stakeholders were relatively short and focused on providing an introduction to the project and requesting a suitable date/time to conduct a longer interview. This initial approach was followed-up with additional information (in the form of the project profile and list of interview questions) sent by email. A total of 60 stakeholder interviews were completed during the study (see Appendix B for list of organisations).

In addition to the telephone interviews, a stakeholder workshop was held on the 2nd March 2010 at the Defra Innovation Centre in Reading. This event was attended by 30 stakeholders and considered a number of issues (including assess the future requirements of users and discussing potential solutions to barriers) in greater detail. The information gained from the workshop is reflected in the evidence presented in the remainder of this executive summary.

5 Study Findings

5.1 Assessment of Current Uses and Requirements

The study found that there are many different uses and requirements for property level flood risk information as currently used by a wide range of different interest groups including architects, damage management specialists, property owners, insurers and local authorities. These uses include:

- Architects / designers need to access information on flood risk and the impact brought about by the proposed development.
- Local Authorities need to assess the suitability of new development proposals following the PPS25 government guidance when considering planning applications.
- Emergency responders are required to develop an understanding of flood risk to inform long-term resource planning and the deployment of resources during flood events.
- Insurers must undertake an assessment of flood risk when providing buildings and contents insurance to property owners.
- Loss adjusters and surveyors also use flood risk information in assessing damage and recommending adaptation and mitigation measures that might be considered.
- Property owners, a key focus for the study, would like to use information relating to flood risk but find it hard to do so due to access and difficulty in understanding the different sources.

It is anticipated that the demand and use of such information is likely to increase in the future as flooding events become more frequent and intense.

5.2 Availability of Property Level Flood Risk Information

The Environment Agency is the main provider of flood risk information for coastal and fluvial flooding in England and Wales. A range of products is available including the Flood Map, historical flood event outlines, National Property Dataset (NPD 2008), National Flood Risk Assessment (NaFRA) products and flood risk assessment (FRA) products. The availability of this information varies and includes information that is freely available (such as the Flood Map), information that is shared with others (such as NaFRA) and other information that is used only by the EA (such as NFCDD).

The insurance industry is another major owner and user of property level flood risk information. A number of major companies have developed in-house flood risk models and / or make use of information purchased from the EA. Agents acting for insurers, such as loss adjusters, also collect information about flooded properties. Much of this information remains confidential and is only available internally within the individual organisation concerned.

Water companies have a responsibility under DG5 “At Risk Registers” to record the number of properties that have flooded from sewers and are at risk of flooding again. This information remains confidential to each company albeit there are signs that companies are willing to consider sharing this information to others such as local authorities.

Sources of information on other sources of risk include the JBA surface water flood risk map, the BGS groundwater survey and the JBA reservoir failure dataset. Additional information about flood history is collected by other organisations such as local authorities and emergency responder registers but tends to be only collected for isolated events and is geographically variable in coverage and quality.

Value added resellers often combine the information available from these original sources to provide comprehensive risk assessments for a variety of end users.

The study found a wide range of barriers to making property level flood risk information more widely available including the awareness and understanding of the data, commercial sensitivity of the data, costs of data collection, data protection and liability issues, licensing arrangements, a fear of property blight, and concerns over the accuracy and reliability (i.e. quality) of the information.

5.3 The future requirements and uses for information

Future user requirements of property level flood risk information include a range of functions including resource planning, incident management, informing property owners about risk, assessing the suitability of new development, designing flood defences or property protection, informing government policy, and providing more accurate flood risk and flood damage models.

Most of the current users of this information are looking for enhancements to what they see as useful data which helps them to deliver their business plans. Rather than identify new uses, it seems as a general rule that users are looking for more detailed flood risk information than is currently available. For example, information on the depth of future flooding is seen to be important for many while more transparency about risk models is required by others.

Accessibility and cost were seen as key barriers for individuals who did not currently use property flood risk data. Many of these individuals would like to see less costly, preferably free, access for all to data which is currently restricted by insurers and other professional partners. A desire to see more contextualisation of data is widely felt with a wider variety of reporting formats requested. This includes the production of sequential flood risk maps and translation of flood risk into maps on expected damages.

5.4 Improving the accessibility and use of information

It is anticipated that there will be an increased interest in the use of property level flood risk information in the future. This interest will be driven by a number

of factors including predicted increases in flood frequency and magnitude due to climate change. It is also expected that the Flood and Water Management Bill and Floods Directive will encourage data sharing and a demand for detailed information. The Environment Agency FCRM Risk Mapping Strategy 2010-2015 was also seen as an important mechanism which will lead to the development of future products relevant to the assessment of property level flood risk.

The insurance industry clearly has a major role to play in continuing to provide affordable insurance to property owners located in flood risk areas. It is therefore essential that the agreements made under the ABIs Statement of Principles with the Government are met and that this relationship helps to encourage wider and co-operative sharing of access to flood risk data.

The development of more collaborative working and data sharing between the EA, local authorities and water companies is seen as a logical development that could help improve the availability of property level flood risk information. There is plenty of evidence that these sorts of relations are being established in developing the new Surface Water Management Plans across England and Wales. It is anticipated that future developments in regard to collaborative working might well extend to the insurance industry. The use of good practice examples can be of assistance in encouraging such developments across all professional partners.

6 Conclusion

The interviews conducted in the study highlighted a number of key requirements for the future use of property level flood risk data. Some of the most important elements identified by users were: access to flood risk information for other sources of flooding; flood event history; water level information for different flood events; and a dataset showing the location of properties which have installed flood resistance and resilience measures

However, there are still barriers which limit the availability and uses of information relating to property level flood risk. These include: number of organisations collecting information; data costs; costs of primary data collection; commercial and contractual concerns; data licensing; liability and data protection issues and public perception and property blight issues.

Although many of these barriers will remain in the short term, changes in government flood management policies (including the Floods and Water Management Bill and Flood Risk Regulations 2009); operation of the UK insurance industry; climate change pressures; personal interests in accessing property level information will help to promote access to and use of property level information.

From the information presented in the earlier sections of this report, the project team has identified a number of strategic goals to improve the current landscape of data availability and use. These goals are:

- Develop methods to ensure that information relating to individual properties is collected in a consistent manner and managed securely;
- Development of new data products (including surface water, groundwater, sewer flooding and reservoir failure flood risk maps) each to an appropriate scale relevant to the assessment of property level flood risk;
- Promote the increased sharing of non-sensitive information between government departments and external stakeholders (see HM Government, 2006 and DCMS/DBIS, 2009);
- Increasing the awareness of available data sources across all stakeholder groups;
- Development of report tools relating to property level flood risk data which are relevant to the needs of users.

7 Proposed Future Actions

To achieve the strategic goals established above, the project team identified **16 proposed actions** which are designed to help improve the availability and use of property level information over the next five years (2010 – 2015). These actions are:

7.1 Improving the collection and management of information

- Finalisation and active use of a consistent survey method/template for the survey/loss adjuster and insurance industries.
- Continued development of nationally available maps of flood risk from other sources (i.e. surface water, groundwater and reservoir inundation maps) which can be shared directly with professional parties.
- Development of national fluvial and tidal flood risk maps which delimit vulnerability for high frequency return periods.
- Creation of an adapted national property level dataset (based on the OS Address Layer 2) which includes additional attributes relating to flood potential for all sources of flooding and flood history.
- Consistent recording of property level flood risk information using a standardised address format. This would ideally be based upon the address structures contained within the NLPG or Ordnance Survey Addresspoint / Address Layer 2 products.
- Assessment of the potential use of the Environment Agency's National Property Dataset or National Flood and Coastal Defence Database (NFCDD) to store future property level flood risk information recorded directly by government agencies (i.e. the Environment Agency, Defra and DCLG) and/or supplied by other agencies.
- Future storage of all details of all properties which have been protected by the Defra flood resistance and resilience grant scheme in a central database system – potentially using the Environment Agency NPD 2008 data structure.

7.2 Improving the sharing of property level flood risk information

- Security controlled supply of claims data between the insurance industry and Government departments (Environment Agency).
- Direct access by the Environment Agency flood risk mapping team to relevant flood event information held on the DCLG Incident Recording System.
- Actions to encourage all water companies to share (where possible) relevant flood risk datasets with professional partners.
- Encouragement of local authorities to supply details of the location of previously flooded properties to the Environment Agency.

7.3 Improving the accessibility and use of property level flood risk information

- Use of existing internet web portal/guidance to manage metadata details of sources of property related flood risk information, including their routes to access, costs and limitations. Examples might include Project Atlantis¹ or data.gov.uk² websites.
- Increased actions by relevant professional bodies to communicate the availability of existing sources of information to their members.
- Enhancement of the Environment Agency 'What's in my backyard' website to include national surface water and/or groundwater flood risk maps.
- Development of an enhanced report tool on the Environment Agency What's in my backyard website to report fluvial, coastal, surface water and groundwater risks.
- Enhancement of the Environment Agency existing FRA products to include data layers covering other sources of flooding.
- Encourage individuals seeking to purchase a property in a significant flood risk area to obtain a detailed flood risk report.
- Development of spatial data layers which detail (a) all (rather than some) areas which currently benefit from flood defences and (b) locations where defences are currently being built.

Although the future delivery of these actions is targeted at government agencies (including the Environment Agency, Defra and DCLG), many of these proposed actions also have direct relevance to the stakeholders consulted in this study. This includes a range of actions which will encourage the collation of more consistent data; improved data sharing; development of collaborative working and development of new products relevant to property level flood risk.

¹ <http://www.projectatlantis.net/>

² <http://data.gov.uk/>

Contents

GLOSSARY	IV
EXECUTIVE SUMMARY	V
CONTENTS	XIII
1. INTRODUCTION	1
1.1 Background	1
1.2 Aim and objectives of the study	2
1.3 Structure of the report	3
2. DELIVERING THE STUDY	6
2.1 Introduction	6
2.2 Accessing the views of key data owners and users	6
2.3 Contacting key data owners and users	6
2.4 Workshop	7
3. CURRENT INFORMATION NEEDS	8
3.1 Summary of current requirements	8
4 CURRENT AVAILABILITY OF INFORMATION	10
4.1 Environment Agency data sources	10
4.2 Insurance and reinsurance Industry	15
4.3 Water companies - Sewer flooding	18
4.4 Data held by internal drainage boards	19
4.5 Information on other sources of flooding	20
4.6 Value added resellers	22
4.7 Local government registers of flooded properties	23
4.8 Emergency responders - registers of flooded properties	24
4.9 Awareness of currently available datasets	25
5 EXISTING BARRIERS TO THE AVAILABILITY AND USE OF CURRENT INFORMATION	27

5.1	Introduction	27
5.2	Commercial sensitive data / commercial advantage data	27
5.3	Costs of primary data collection	28
5.4	Data protection and liability issues	28
5.5	Licensing arrangements	29
5.6	Multiple sources of information and access to data	30
5.7	Public perception and property blight issues	31
6	FUTURE REQUIREMENTS OF USERS	35
6.1	Summary of future requirements of users	35
6.2	Profiles of future user requirements	37
6.3	Assessment of overarching user requirements	42
7	OVERCOMING THE BARRIERS	44
7.1	Summary of potential solutions to barriers	44
7.2	Addressing the institutional barriers	47
7.3	Addressing the barriers to data availability and quality	55
8	FUTURE VISION AND SUGGESTED ACTIONS	60
8.1	Developing five year goals (2010-2015)	60
8.2	Future actions	61
9	CONCLUSION	70
9.1	Assessment of Current Uses and Requirements	70
9.2	Availability of Property Level Flood Risk Information	71
9.3	The future requirements and uses for information	72
9.4	Improving the accessibility and use of information	72
10	REFERENCES	73
11	ACKNOWLEDGEMENTS	76
	APPENDIX A INTERVIEW QUESTIONS	77
	APPENDIX B LIST OF ORGANISATIONS CONSULTED	79

APPENDIX C	USER CASE STUDIES	80
APPENDIX D	ENVIRONMENT AGENCY DATA PRODUCTS FOR FRAS88	
APPENDIX E	COMMERCIAL FLOOD RISK MODELS	91
APPENDIX F	ENVIRONMENTAL CONSTRAINT REPORTS	94
APPENDIX G	DRAFT FLOOD AND WATER MANAGEMENT BILL – CLAUSES RELATING TO DATA SHARING	97

1. Introduction

In November 2009, Defra Flood Management (with the support of the Environment Agency) commissioned Entec UK, CIRIA, University of Wolverhampton and National Flood Forum to undertake a study to evaluate the availability and uses of flood history, risk and mitigation information relating to residential and small/medium enterprise (SME) commercial properties.

The generic term “property level flood risk information” is used in the remainder of this report and covers sources of information relating to flood history, flood risk and flood mitigation for residential and SME commercial properties.

The following report presents the findings of the study and considers the current requirements for property level flood risk information; the availability and use of this information; the barriers to its wider use; an assessment of the future requirements of users and proposed actions for how these requirements could be realised in the future. These issues are considered in the remainder of this report.

1.1 Background

The Environment Agency’s Long Term Investment Strategy (based on figures from the 2008 National Flood Risk Assessment) showed there are 2.4 million properties at risk of flooding from fluvial or tidal sources in England with up to 490,000 of these judged to be at significant risk (i.e. with an annual probability greater than 1.3%, 1 in 75, chance in a year) (Environment Agency 2009).

A preliminary assessment of surface water flood risk also suggests that one million properties at risk of tidal and coastal flooding are also susceptible to surface water flooding, with a further 2.8 million properties susceptible to surface water flooding alone. In all, around 5.2 million properties in England, or one in six properties, are thought to be at risk of flooding (Environment Agency 2009).

Over recent years, there has been considerable effort by a range of organisations to improve the information which is available regarding the relative intensity and frequency of potential flood events. Foremost amongst these organisations has been the Environment Agency who has worked alongside experts in many fields to capture historical flood areas and develop models to enable the evaluation of the depth, speed and duration of floodwater. These outputs are extensively used to support the delivery of flood risk assessments, evaluation of new defence schemes and Strategic Flood Risk Assessments (SFRAs) delivered by local authorities.

The Environment Agency has also published national online fluvial & tidal flood risk maps; undertakes research to develop a new generation of flood risk maps from other sources (including groundwater and surface water) and developed a national address property dataset (NPD 2008) for use in its National Flood Risk

Assessment (NaFRA). The Environment Agency also provides a range of flood risk assessment products. Examples are provided later in this report.

Another prime mover in the development of property level flood risk information has been the insurance and reinsurance industry. The increase in claims activity has highlighted the commercial importance of good flood risk evaluation and underwriting. Insurers also have the potential to add the extra dimension of claims recording to modelled flood risk data.

The water companies covering England and Wales also manage a variety of sewer and drainage data sources and have a direct responsibility to assess and manage registers of properties “at risk” of flooding from sewer and drainage exceedance. The barriers which currently restrict the wider access to this information are discussed later in this report.

The major flood events experienced in the last decade have also led to a range of other organisations collecting and using flood risk and flood history data. Sometimes, as in the case of loss adjusters and surveyors, this collection occurs as a normal part of their business operations. Other organisations that record, communicate and use property based flood risk information include emergency responders and local authorities.

Over recent years, there has also been a growing interest from communities and individuals in obtaining effective property level flood risk information which they can readily understand. This requirement is linked to a number of different drivers including: (a) an individual’s desire to understand the potential risks to their own home or business or one they are seeking to acquire; (b) assisting discussions with insurance companies regarding obtaining or renewing insurance cover and/or (c) potential consideration of the purchase of flood resistance and resilience solutions.

1.2 Aim and objectives of the study

The central aim of this research project has been to provide a clear assessment of the current availability, requirements and uses of flood risk information relating to residential and small and medium enterprise (SME) commercial properties and to provide suggested actions for how this information could be collected and used in the future.

To address this overall project aim, this report considers four main objectives. These are:

- Assess the current uses and requirements of information relating to residential and commercial property level flood risk, history and mitigation measures;
- Evaluate the availability of information concerning residential and commercial property level flood risk, history and mitigation measures;

- Assess the future requirements and uses for information relating to residential and commercial property level flood risk, history and mitigation measures;
- Evaluate how the accessibility and use of information relating to residential and commercial property level flood risk, history and mitigation data can be improved.

These four objectives are considered in the remainder of this report.

The project has focused on considering the availability and uses, requirements of flood risk information relating to residential and SME commercial properties. It does not consider in detail the availability and uses of information relating to larger industrial sites, utility assets and/or transport networks.

1.3 Structure of the report

The remainder of the report is divided into eight main sections. The broad content of these sections is summarised below.

Section 2 Delivering the study

Section 2 describes the methodology which was used to assess the current availability and use of property level flood risk information and also the future requirements and drivers for improved access to this information. This includes development of the questionnaire used in the telephone interviews conducted in the study; the selection of representative interviewees and the development of a stakeholder focused workshop. Each of these work elements has been essential to the development of the final report.

Section 3 Current requirements for information

This short section provides an overview of the main interests and requirements of different interest groups in collecting, owning and/or using information relating to property level flood risk. This provides the setting for the more detailed discussion presented in the remainder of the report.

Section 4 Current availability of information

Section 4 focuses on detailing the key spatial and database datasets which are currently collected by different organisations to meet the requirements detailed in Section 3. This includes considering the characteristics of national flood risk models and asset databases produced by the Environment Agency; water companies; reinsurance/insurance companies and other data suppliers. Further details are presented in Appendices, D, E and F

The section also considers the relevance of localised datasets held by local authorities and emergency responders and the integration of different flood risk information datasets within commercial environmental constraint reports. This provides the setting for the consideration of potential barriers to wider use (i.e. quality, accuracy, coverage, data protection and commercial issues) covered in Section 5.

Section 5 Existing barriers to the availability and use of current information

Section 5 details the key barriers which currently limit the wider collection and/or use of existing information relating to property level flood risk. This includes consideration of the quality, accuracy and coverage of the datasets reviewed in Section 4. The section also considers the important issues of data licensing, data protection and commercial drivers which influence the current availability and uses of these datasets.

Section 6 Future requirements of users

This section considers the future requirements of users for improved access to information relating to property level flood risk information. This section also considers the type of information which users would like to access and how readily this could be achieved given the availability of current information (see Section 4) and the barriers which were identified in Section 5.

Section 7 Overcoming barriers

This section complements the information outlined in Section 6 and considers the key legislative / policy drivers which will help encourage the availability of flood risk information and steps which will help improve the accessibility, usefulness and accuracy of the data provided. The discussion contributes to the development of the proposed actions arising from the study (Section 8).

Section 8 Future vision and proposed future actions

From the information presented in Section 4-7, the project team have identified a number of strategic goals to improve the current landscape of data availability and use. These goals include:

- Development of new data products (including surface water, groundwater, sewer flooding and reservoir failure flood risk maps) each to an appropriate scale relevant to the assessment of property level flood risk;
- Developing methods to ensure that information relating to individual properties is collected in a consistent manner and managed securely;
- Promoting the increased sharing of non-sensitive information between government departments and external stakeholders³ (see HM Government, 2006; DCMS/DBIS, 2009);
- Increasing the awareness of available data sources across all stakeholder groups;
- Development of report tools relating to property level flood risk data which are relevant to the needs of users.

The section also outlines a series of proposed actions to be addressed by government agencies and external stakeholders over the next five years (2010-2015). These actions are detailed in Section 8.2.

³ See also data.gov.uk and www.bis.gov.uk websites

Section 9 Conclusion

The final section of the report reviews the progress of the research against the key objectives set at the start of the study and summarises the main findings of the research.

2. Delivering the study

2.1 Introduction

The objectives outlined in Section 1.2 have been investigated using three research methods. These were:

- structured telephone interviews with 60 stakeholders with interests in the collation and/or use of property level flood risk information;
- an internet based review of available datasets and information; and
- a stakeholder workshop.

The detailed approaches adopted in these methods are outlined in the remainder of Section 2.

2.2 Accessing the views of key data owners and users

The first major task which was the development of a series of questions which could be used as the basis of telephone interviews with consultees with a direct interest in the management and use of property level flood risk data and information. The final questions used are reproduced in Appendix A. The use of these questions in the subsequent telephone interviews is described below.

2.3 Contacting key data owners and users

At the start of the project, the project team developed a list of 110 stakeholder organisations with a direct interest in the management and use of property level flood risk data and information. Table 2.1 details the range of organisations included.

Table 2.1 Broad categories of organisations contacted

Organisations who either own and/or use data relating to property level flood risk	
Architects	Local authority emergency planners
Consultants	Local authority emergency planners
Data providers	Local authority spatial planners
Emergency responders	Local authority drainage engineers
Environment Agency	Loss Adjusters
Flood product producers	National Flood Forum - Flood Action Groups
Flood restoration specialists	Surveyors
Insurance brokers	Universities
Insurance companies	Water and sewage companies
Internal Drainage Boards	

Using the original list of contacts, the combined project team identified 70 organisations from the broad categories identified in Table 2.1 who would be the focus of the primary contacting undertaken in the project. The process of telephone contact calls with these priority stakeholders began in early December 2009 and continued until the end of February 2010.

The initial conversations with these stakeholders were relatively short and focused on providing an introduction to the project and requesting a suitable date/time to conduct a longer interview. This initial approach was followed-up with additional information (in the form of the project profile and list of interview questions) sent by email. This information is presented in Appendix A.

A total of 60 stakeholder interviews were completed during the study. A full list of the organisations which involved is presented in Appendix B.

2.4 Workshop

In addition to the telephone interviews, a stakeholder workshop was held on the 2nd March 2010 at the Defra Innovation Centre in Reading. This event was attended by 30 stakeholders and considered a number of issues (including assess the future requirements of users and discussing potential solutions to barriers) in greater detail. The information gained from the workshop is reflected in the evidence presented in the remainder of this report.

3. Current information needs

3.1 Summary of current requirements

The interviews conducted in this study revealed that there are many different reasons for individual organisations to collate, manage and/or ultimately use information relating to property flood risk. The main reasons are summarised in Table 3.1. Further detailed case studies for selected user groups are presented in Appendix C.

Table 3.1 Summary of the main user interests in property level flood risk information

Interest Group	Major interests and activities relating to property level flood risk	Flood related datasets collated and owned by this interest group	Interests in other flood related datasets and information
Architects and Master planners	Development of new residential and/or commercial designs which are compatible with flood risk	Only users of information	Access to flood risk and threshold information which can be incorporated into a flood resilient design.
Damage management specialists	Assessment of residential and commercial damages incurred during a flood event.	Recording of confidential information (i.e. property address, details of flood damage) necessary to assess overall damages and the best options for flood recovery	Limited interest in accessing external datasets.
Environment Agency	Statutory responsibility to reduce flood risks to people, residential and commercial properties.	Production of a range of digital information relating to flood risk. These include the National Flood Map, National Flood Risk Assessment (NaFRA); National Property Dataset (NPD 2008) and mapping/data products for flood risk assessment.	Interest in new mapping products relating to flooding from other sources, including surface water, groundwater and/or reservoir failure.
Emergency Responders (Fire and Police Service)	Understanding of locations of people and/or properties vulnerable to flooding for long term resource planning. Need to plan in real time how resources (including equipment) are best deployed during a flood event.	Records of flood related incidents (typically stored for a 5 year period). Providing information via the national DCLG Incident Recording System (further details provided in Section 4.7).	Access to near real time flood warning / event modelling information. Access to latest flood risk maps for pre event planning purposes.
Flood resistance and resilience product producers	Interest in location of properties which would benefit from the use of flood resistance or resilience solutions.	Detailed survey of property characteristics (including construction materials, threshold levels and flood mechanisms) before installation of resistance and/or resilience products. This approach has been integral in the recent Defra flood resistance and resilience grant scheme.	Interest in flood risk information produced by the Environment Agency but where it adds value to business activities.
Flood Action Groups	Focused interests in future flood risk to own property and community. Very interested in the accuracy of information used to assess risk levels for individual properties – especially by the insurance industry	Strong personal knowledge of property level flood potential and history but this information is rarely recorded due to concerns of the potential mis-use of this information.	Main interests in information used in the Environment Agency flood map with additional flood risk information requested on an as needs basis.

Table 3.1 (cont)

Summary of main user interests in property level flood risk information

Interest Group	Major interests and activities relating to property level flood risk	Datasets collated and owned by this interest group	Interests in other datasets and information
Insurance industry	<p>Assessment of risk exposure across national insurance portfolios.</p> <p>Assessment of flood risk from all sources for individual or groups of residential or commercial properties.</p>	<p>Records of commercially sensitive claims information.</p> <p>Development of in-house flood models or purchase of external flood risk models to improving evaluation of risk.</p>	Access to the Environment Agency's flood map layers or NaFRA.
Local Authorities – Spatial Planners and Development control	<p>Assessment of the suitability of new development proposals following the PPS25 government guidance.</p> <p>Development of local development framework which considers flood risk alongside other planning constraint issues.</p>	<p>Production of strategic flood risk assessments (SFRA).</p> <p>Some authorities have access to varying detailed terrain data (LIDAR), OS Mastermap and aerial photography which can be used to assess specific risk issues.</p>	Access to latest Environment Agency flood map for update of own SFRA mapping products and more detailed information where relevant.
Local Authorities – Emergency Planners	Assessment of the location of vulnerable properties and members of the public and development of emergency planning responses.	<p>Some local authorities have collected databases of flooded properties information following major flood events.</p> <p>Interest in access latest detailed Environment Agency Flood Risk maps for scenario and emergency planning purposes.</p>	<p>Access to latest Environment Agency flood map and models to enable assessment of areas of land which are particularly vulnerable.</p> <p>Information key to pre and post event flood risk planning</p>
Loss Adjusters	Assessment of residential and commercial damages incurred during a flood event	Recording of confidential information (i.e. property address, details of flood damage) used as basis of insurance company settlements	Limited interest in accessing external datasets.
Surveyors	Assessors of residential and commercial damages incurred during flood events or assessors of potential flood resistance or resilience.	Detailed (potentially Individual) property based information relevant to assessment of risk. Attributes of information may include: property threshold levels; construction materials and/or assessment of likely causes of future flooding.	Limited interest in accessing external datasets
Water companies	<p>Reduction of the number of properties subject to flooding due to sewer/drainage exceedance.</p> <p>Increasing engagement in the development of surface water management plans (SWMPs) in conjunction with local authorities and the Environment Agency.</p>	<p>Locations of properties subjected to sewer flooding and which are recorded on the DG5 risk register.</p> <p>In-house drainage and flood risk models.</p>	Access to latest Environment Agency flood risk maps to understand links between locations of sewer/drainage exceedance and fluvial/tidal flood risks.
Research and academic organisations	Academic based research into causes and impacts of flooding at a variety of spatial levels.	Potential for isolated collation of new information but main interest in accessing property level flood risk information for research purposes.	Obtaining access to Environment Agency flood risk, National Property Dataset and/or insurance claims information for academic research.

The importance of these current user requirements in determining the availability and quality of property level flood risk datasets is discussed in Section 4. This table also provides the context for the consideration of detailed future requirements of users which is considered in Section 6 of this report.

4 Current availability of information

The following section summarises a variety of flood risk datasets which are currently held by the organisations detailed in Section 3. This includes a review of relevant data sources owned by the Environment Agency, water companies, local authorities and emergency responders. The section also considers the role of Value Added Reseller (VARs) in providing a range of report products relating to property level flood risk and the resale supply of available flood risk datasets.

The section focuses specifically on assessing the characteristics of these datasets (in terms of spatial resolution, accuracy and currency) and their relevance to the assessment of flood risk to individual or groups of residential or SME commercial properties.

This review has been based upon information supplied by consultees interviewed in the study and information obtained from internet sources. It should be noted that any third party user of this report should consider carefully the appropriateness of different products for their own use and the authors accept no liability for the inappropriate use of the information reproduced in this report.

4.1 Environment Agency data sources

The following section summarises the main datasets which are produced by the Environment Agency for national and local flood risk assessment purposes. This includes the Flood Map, historical flood event outlines, National Property Dataset (NPD 2008), NaFRA products and flood risk assessment (FRA) products.

4.1.1 Environment Agency Flood Map

The most widely used national dataset used for the broad scale assessment of flood risk is the Environment Agency's Flood Map and is freely available for viewing at the Environment Agency's What's in My Backyard webpage (see Figure 4.1).

The Flood Map product consists of a series of five layers which provide information on flooding from rivers and the sea for England and Wales. The layers of information included in the current product are:

Flood zone 3

This layer shows the area that could be flooded from the sea with a 1 in 200 (0.5%) or greater chance of happening each year or from a river with a 1 in 100 (1%) or greater chance of happening each year, not considering the effect of defences.

Flood zone 2

This layer shows the extent of extreme flood from rivers or the sea with up to a 0.1% (1 in 1000) or greater chance of happening each year, not considering the effect of defences.

Flood defences

This layer shows linear flood defences which have been constructed in the last five years and which have a standard of protection equal or better than 1% for rivers and 0.5% from the sea. Some additional defences, which may be older or may have been designed to a lower standard of protection are also shown where the information is currently available. However the layer does not show all flood defences or those which might be built in the future.

Flood Storage Areas (FSA)

This layer details features such as balancing reservoirs, storage basins and balancing ponds which have a specific purpose in attenuating incoming flood peaks to a flow level which can be accepted by a downstream channel.

Areas benefiting from flood defences

This layer details some of the areas which would be flooded in a 1% annual probability fluvial flood event or a 0.5% annual probability tidal flood event if flood defences were not present. It should be noted that the assessment of these areas is usually only possible where a detailed flood model has been produced. It is also important to note that the dataset does not show all areas that benefit from flood defences.

Figure 4.1 Environment Agency Flood Map ⁴



Imagery courtesy of the Environment Agency

⁴ <http://www.environment-agency.gov.uk/homeandleisure/floods/default.aspx>

Although the Flood Map includes a variety of useful data layers, its primary purpose is to provide a broad scale view of risks posed by fluvial and tidal flood risks. The Flood Map does not provide information on flood depth, speed or volume of flow and does not show flooding from other sources, such as groundwater, direct runoff from fields, or overflowing sewers. Further investigation of these issues using other datasets (see information presented in the remainder of this section); detailed modelling or site investigation is considered in the remainder of this section.

4.1.2 Environment Agency National Property Dataset (NPD 2008)

Over the past decade, a variety of asset databases have been used as part of national assessments of economic and financial flood losses. These include postcode units, Ordnance Survey Addresspoint/Address Layer 2 and the VOA Focus Commercial rating database.

To provide consistency in future national flood risk studies, the Environment Agency developed the National Property Dataset which integrates the attributes of two different datasets: Ordnance Survey (OS) Address Point and the Valuation Office Agency (VOA) Rating List (Focus) for commercial property. This spatial dataset consists of over 26 million records and provides a point representation of each residential and commercial property in England and Wales. Some of the key fields included in the NPD 2008 dataset are illustrated below in Table 4.1.

Table 4.1 Structure of National Property Dataset

Field name	Description
OA	OS AddressPoint unique Identifier
PostCode	Postcode
Easting	AddressPoint X coordinate
Northing	AddressPoint Y coordinate
RawDCCode	FOCUS Property type code
RawRV	FOCUS Rateable Value
Valuation	Valuation calculated
VO_CODE	Valuation Office rating list unique ID
MCM_CODE	Multi Coloured Manual equivalent property type code
GroundLevel	Property is not at groundlevel where value = 1, and maybe at ground level value =2. All other values property is considered at groundlevel
LocalID	Unique ID for this dataset
F_ID	FOCUS ID

This dataset (now in its third version – NPD 2008) is used to support a variety of internal Environment Agency flood risk management assessment studies, including the National Flood Risk Assessment (NaFRA). The outputs of this process are described in subsequent sections of this report.

The potential for this detailed dataset for the future capture of information relating to property level flood risk is also discussed later in this report.

4.1.3 NaFRA Spatial Flood Likelihood Category Grid

One of the core products produced in the Environment Agency NaFRA programme is the 2008 NaFRA Spatial Flood Likelihood Category Grid. This product is a GIS dataset which provides a strategic level assessment at a 50m grid resolution of the likelihood of flooding at a national scale, based on assessments undertaken for 85 catchments and coastal cells.

The main characteristic of this dataset is the comparison of the relative risks and their distribution within each of these catchments, rather than a detailed, local assessment of the risk at a specific location. As a consequence, the calculations provide an indication of the likelihood of flooding at the centre of each cell. The current version of the dataset includes the following three risk categories:

- Low: the chance of flooding each year is 0.5 % (1 in 200) or less
- Moderate: the chance of flooding in any year is 1.3 % (1 in 75) or less but greater than 0.5 % (1 in 200)
- Significant: the chance of flooding in any year is greater than 1.3 % (1 in 75)

This dataset is also supplied (under licence) by the Environment Agency to the insurance industry.

4.1.4 NaFRA Property Flood Likelihood Category Database

The NaFRA programme has also led to the development of a national database which provides flood likelihood information indicating the level of flood risk to land in the area of a property address.

This database has been produced through combining the OS Mastermap Address Layer 2 (September 2008); National Property Dataset 2008; NaFRA 2008 Results and the OS Mastermap Building Layer (September 2008). The attributes included in the dataset are:

- A unique ID for each address location from OS Address Layer 2 September 2008 (TOID)
- A unique ID for each non-addressable property from OS Mastermap Building Layer 2008 (AREATOID).
- The flood likelihood category low, moderate, or significant according to the NaFRA 2008 flood risk analysis.
- The areas classified as having no result. This occurs where there is no output data from the analysis used to produce NaFRA 2008, but the area falls within the extreme flood outline (with a 0.1% or 1 in 1000 chance of flooding in any year), as shown on the Environment Agency's Flood Map at the start of the analysis (May 2008).
- A count of properties at the location identified by the combination of TOID or AREATOID and Flood Likelihood Category split into property types.

It should be noted that this dataset does not provide address information but does include Ordnance Survey TOID (Topographic Identifier) reference. As a consequence, an appropriate Ordnance Survey licence is required to make use of this dataset.

Although the underlying structure of the datasets is on an individual property basis, the accuracy of the flood risk information provided (i.e. NaFRA likelihood category) is limited to the original scale of the model which is at best 50m. As a consequence, the accuracy of the dataset can only be used to highlight properties in locations which may require a more detailed flood risk assessment. The dataset is not designed to give an assessment risk for an individual property and a more detailed survey or assessment should be considered in these situations.

4.1.5 Environment Agency Historic Flood Outlines

The Environment Agency has also created a Historic Flood Events Outline dataset which includes the individual footprint of every flood event recorded by the Environment Agency and its predecessors. In all, over 21,000 separate events are recorded in the dataset with the earliest record dating from 1947.

The key attributes contained in the dataset are: the spatial outline of the flood event; flood event code; names of the event; start and end date of the event; original data source; the source and cause of flooding; and a flag saying if the flood was tidal, fluvial or coastal. The Historic Flood Events Outlines dataset is updated as necessary on a quarterly basis and complements the NaFRA 2008 Spatial FLC Grid and the outputs of the NaFRA programme detailed in this section.

The use of this dataset in the Environment Agency's suite of flood risk assessment products is detailed below.

4.1.6 Environment Agency Data products for use in Flood risk assessment (FRA)

The Environment Agency also provides a series of individual data products aimed specifically at the assessment of risks at a more localised level. Details of the seven products currently available are provided in Appendix D.

The detailed report outputs are increasingly being used to help inform the initial assessment of fluvial and coastal flood risk for new development sites. The detailed products (4 -7) are also of particular interest to flood risk management consultants who are able to utilise the information produced by the Environment Agency together with other sources of data for the production of detailed interpretation style flood risk assessments.

4.1.7 Other Environment Agency databases

The final data source managed by the Environment Agency which is relevant to the terms of this project is the National Flood and Coastal Defence Database (NFCDD) and a number of locally based systems such as the SW Regions Flood Reconnaissance Information System (FRIS).

NFCDD is held on an Oracle system and has been upgraded in recent years to facilitate the recording of information relating to both flood defences and recent flood events. This includes capture of flood event outlines and information concerning flood impacts.

The FRIS system was built around a Microsoft Access database and was designed to provide links to flood related information such as flood event questionnaires, historic event data and media reports. The database was also developed to record information relating to all sources of flooding including fluvial, groundwater, urban drainage etc. The FRIS system was designed to hold information (where recorded) relating to flooding of individual or groups of properties.

The information held in both the NFCDD and FRIS systems is primarily used to support the Environment Agency role to manage flood risk. It is possible that additional information could be recorded in the NFCDD but this would require additional resources to transfer the information held in FRIS and potentially from other local data sources.

4.2 Insurance and reinsurance Industry

4.2.1 Flood risk models

Over the past decade, a number of major insurance and reinsurance companies have developed in-house flood risk models or licenced Environment Agency's Flood Map and NaFRA flood risk datasets. The main reason for insurance companies to acquire this information has been to improve the assessment of risks posed to individual properties and thereby improve the setting of insurance premiums by using more detailed risk based information. This development has also enabled insurers to more effectively assess risk exposure for a portfolio of properties and thereby evaluate the level of reinsurance cover required.

Although many of the leading reinsurance and insurance companies have access to internally produced flood risk models, the content and uses of most internally developed models remains confidential to individual companies due to commercial and licensing issues. The broad characteristics of a number of representative flood models/maps used within the insurance industry are summarised in Appendix E.

In reviewing the applicability of these models for property based evaluation, it is important to remember that most of the insurance flood models have been produced to assess relative risks at a resolution of 10-50m.

As a consequence, they have the ability to provide a broad indication of risk but cannot provide the level of accuracy which a detailed flood risk assessment, modelling or ground survey would provide. This issue will be considered later in the use of map layers created by reinsurance/ insurance industry in combined environmental constraint reports (see Section 4.5).

4.2.2 Insurance industry claims information

The other important information source which is collected and managed by the insurance industry is residential and commercial claims information. This information is the key asset of the insurance industry and serves (along with available flood risk models) as the primary source of information used to evaluate insurance premiums across a risk portfolio.

Although this information is key to insurance company operations, it is only recently that most insurance companies have started to record flood claims separately from claims relating to household water escapes; burst pipes or water damage relating from storm damages. These changes were primarily driven by major flood events experienced in UK and the realisation by the UK insurance industry that better information was needed to effectively understand current and future risk exposure.

Although many insurance companies are working to improve the quality of their data, there remains no national standard on the type of information which is recorded for flooded homes. In many cases, the information is supplied (over the phone) by the individual whose home or business has been flooded. In most cases, this is simply a record of the name/address of the claimant, a brief explanation of the water damage and dimensions of the rooms affected.

In cases where a property has been subjected to higher value damage (typically exceeding £10,000) a loss adjuster / surveyor is usually appointed and will undertake a more detailed survey. However the primary aim of these surveys is to verify the value of the damage to the building or contents and to assess the cost for their “like-for-like” replacement. Other information which might be very useful for future risk evaluation or reduction (e.g. depth of flooding, building threshold or mechanism of flooding – if known) is recorded routinely by some loss adjusters but this is not universal. Further information such as the velocity of flow may be recorded under incidental information for some claims.

Although the evidence collected in this study has shown that insurers are recognising the need to improve the recording of damage information (i.e. location and impact), the interviews conducted in this study have shown that the future collation of additional data by surveyors or loss adjusters working on behalf of the insurance industry will be unlikely. The main reason given by the interviewees in this study was the extra cost of collating and managing this information and the view that this would only provide minimal additional benefit to the business activities of the insurance industry.

The additional barrier which was emphasised in many of the interviewees conducted in the study was the competitive nature of the insurance market and the fact that release of the internal flood claims information could compromise commercial interests.

Although these concerns remain within the industry, the interviews conducted in the study did indicate that the Association of British Insurers (ABI) and the Environment Agency are continuing to discuss potential future data sharing arrangements. This includes the potential sharing of “non-confidential” claims information to aid the

improved assessment of risk and future prioritisation of flood risk management spending/actions. However any potential sharing arrangement would only take place under secure data arrangements and would not lead to release of this information for wider government or commercial applications.

4.2.3 Aggregated insurance claims information

Crawford & Co Insurance Claims rating for Flood Risk

Although the external use of insurance claims information is largely restricted, a dataset expressing Insurance Claims rating for Flood Risk has been created by Crawford & Co. This dataset was produced by comparing the number of flood insurance claims made to the number of properties in the postcode sector. The rating system has five levels, ranging from 'Very Low' to 'High', whilst the fifth category represents postcode sectors that have too few properties contained within them to make an assessment.

However due to the nature of claims recording outlined earlier in this section, the claim rating also reflects flood claims from domestic accidents or blocked drains, as well as flooding from river or tidal events. At present, this dataset is used within the insurance industry and is also included in the outputs of some environmental constraint reports (see Section 4.5). However its usefulness in assessing the flood risk for an individual property is limited due to the geographical resolution (i.e. postcode sector) of the dataset

Dundee Tables

The University of Dundee are custodians on behalf of the UK insurance industry of the National Flood Insurance Claims Database. The dataset is being updated periodically usually on an event basis and the latest data included in the database was for the summer 2007 flood event.

The content of the database is obtained under confidential conditions from insurance sources (mainly directly from loss adjusters) for a sample of properties. The data held includes postcode details (address or name information is not held), insurance reference number, date on which insured was damaged, peril for which a claim is made (either storm or flood, and there is a fair amount of mis-classification) approximate depth of internal flooding, notes on contamination effects (not always reliable), details of settled claim (i.e. net of excess or deductions) for the building and contents separately, business interruption and loss of stock amount settled, property type, age, construction type, sum insured building and contents.

Discussions with the University of Dundee have highlighted that collection of the primary data for inclusion in the master database is a very time consuming exercise. This is primarily due to security restrictions and differences imposed by different insurance/loss adjuster companies. In addition, data are supplied in a range of different formats and details from some loss adjusters are not available digitally. The issue of standardising data collection protocols within the insurance industry is covered later in this report.

The wider use of the data is also limited by a range of confidentiality agreements and as a result the raw data can not be made available to other interested parties,

including the research community or government agencies. This is the main barrier to wider use of this important property related information source.

4.3 Water companies - Sewer flooding

The main responsibility of water companies in relation to flooding is the reduction of flood risk from sewer systems. This responsibility is expressed through the maintenance of the DG5 “At Risk Registers” by each of the ten water and sewerage companies in England and Wales. These registers are used to report to OFWAT, the number of properties that have flooded from sewers and are therefore more likely to be at risk of flooding again.

There are separate registers for internal and external flooding, and each register records properties which have been subjected to sewer flooding in the last 20 years. The categories used are: twice in ten years (2:10), once in ten years (1:10) and once in twenty years (1:20). The two registers are used to generate two major reports for OFWAT: These are the reduction in size of the 2:10 and 1:10 internal flooding register (the ‘net reduction’), and the number of problems resolved.

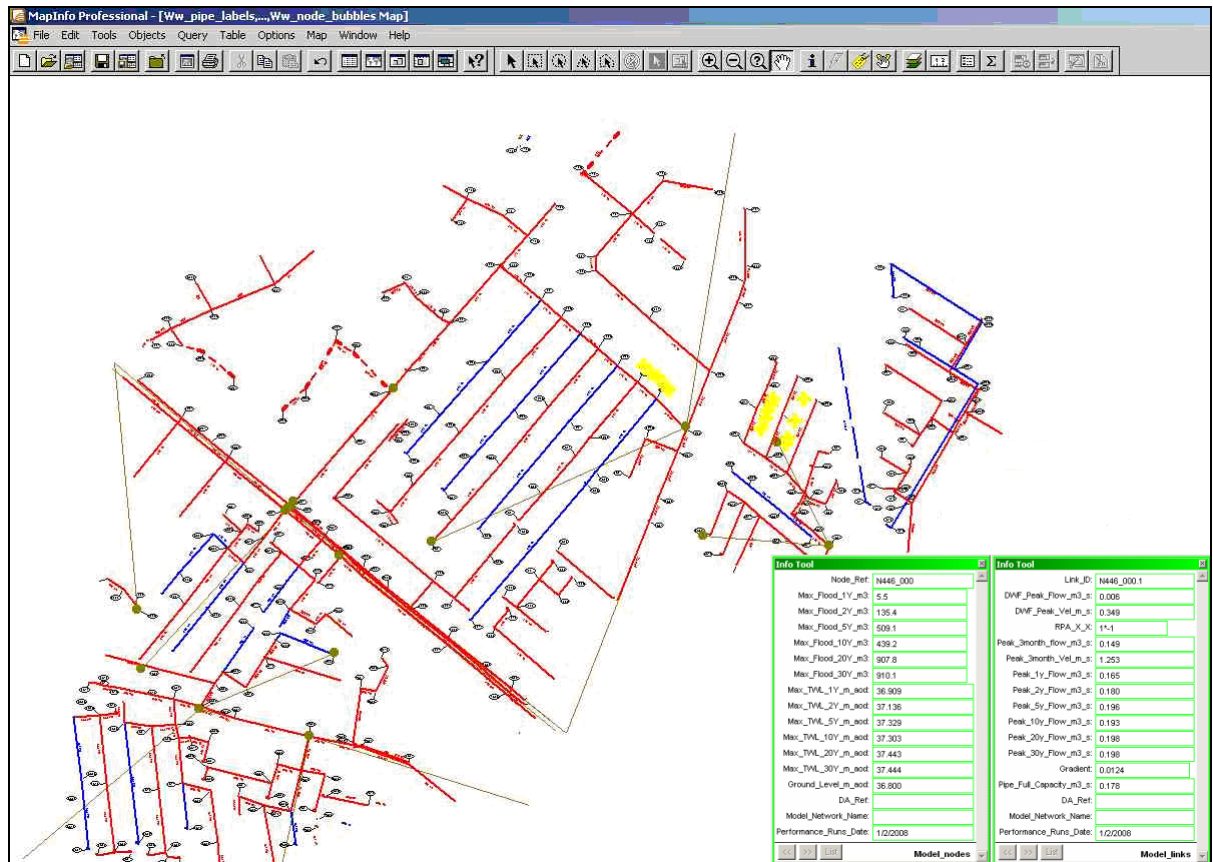
The regulatory nature of these reporting requirements means that each of the water companies has a direct responsibility to record and report the location of all properties which have a specific history of sewer flooding.

Although this is a key responsibility, the detailed information collected on the DG5 register has until recently remained confidential to each individual water company and OFWAT. Only summary information (i.e. number of properties at risk) has been accessible in the public domain.

Although these confidentiality issues remain in the industry, there are increasing signs of data sharing by the water companies with local authorities and the Environment Agency. This broadly reflects the recommendations outlined in the Pitt Review which followed the summer 2007 national floods (Cabinet Office, 2008)

United Utilities is one example of a water company which has been proactive in providing asset and DG5 risk register information to professional partners for flood risk management activities. This includes providing information for recent Strategic Flood Risk Assessment (SFRA), Surface Water Management Plan (SWMP) and Water Cycle Studies (WCS) led by local authorities in the North West. An example of the kind of information provided is shown below in Figure 4.2 and further information is provided in the case study included in Appendix C.

Figure 4.2 Water company asset and DG5 information supplied for local authority SFRA, SWMP and WCS studies



Imagery courtesy of the United Utilities. Shows sewer system and model layouts, location of DG5's and examples of sewer system performance data. In this example, all address and OS grid coordinate information have been removed.

The issues of data sharing and collaborative working are considered in Section 7.4 of this report.

4.4 Data held by internal drainage boards

The Internal Drainage Boards (IDBs) in existence in England in April 2005 covered 1.2 million hectares of England –representing 9.7% of the total land area. The IDBs predominantly operate under the Land Drainage Act 1991 and have permissive powers to undertake work to secure drainage and water level management of their districts and undertake flood risk management works on ordinary watercourses within their districts (e.g. watercourses other than ‘main river’). Much of their work involves the maintenance of rivers, drainage channels and pumping stations, facilitating drainage of new developments and advising on planning applications. They also have statutory duties with regard to the environment and recreation when exercising their permissive powers.

The IDBs provide a valuable contribution to Defra’s Making Space for Water Strategy by protecting and managing the water corridor. They also provide a

valuable service to the Planning process by guiding and advising Planning Authorities regarding surface water management, flood risk and sustainable urban drainage. Specific IDBs responsibilities also include 'Development Control', 'Contingency Planning', 'Risk Assessment & Strategic Planning' and 'Operations & Incident Response'.

For the areas covered by the IDBs, the IDBs have specific local knowledge of drainage networks and the history of localised flooding from pluvial and fluvial events. The internal drainage boards also have a good record of working closely with local authorities and therefore have an important role to contribute to the future production of detailed local flood models and assessment of flood risks for properties in areas covered by the IDBs.

4.5 Information on other sources of flooding

Surface water flooding

The JBA Consulting surface water flood map produced in 2007/2008 was the first nationally available map in the UK to identify areas likely to flood following extreme rainfall events, i.e. land naturally vulnerable to surface water or "pluvial" flooding. The map covers all of England and Wales plus major cities in Scotland and was produced by simulating the design 1 in 200 event for a 6½ hour duration rainfall.

The model provides the maximum depth of flooding in each 5m cell of the digital terrain model, which is processed into depth bands to identify varying levels of risk.

The maps include four bands indicating areas of increasing natural vulnerability to surface water flooding. These bands are obtained by extracting data based upon flooded depths of:

- Less than 0.1m
- 0.1m (less likely to flood)
- 0.3m
- 1m or greater (more likely to flood)

The bands indicate those areas that will be more and less likely to flood as well as the relative depth of flooding.

This dataset is included in a number of available environmental constraint reports which are discussed in Section 4.6.

It is also understood that the Environment Agency is currently developing an improved second generation surface water flood map for future flood risk assessment purposes.

Groundwater Flooding

The British Geological Survey (BGS) “groundwater flooding” dataset is the main nationally available source of groundwater flooding hazard information. Groundwater flooding is increasingly recognised as a hazard and can be defined as the emergence of groundwater at the ground surface, or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded. Based on geological and hydrogeological information, digital data have been used to identify areas where geological conditions could allow groundwater flooding to occur and where groundwater may come close to the ground surface.

The data set categorises areas into one of five levels of groundwater susceptibility, ranging from high susceptibility to negligible or no susceptibility. Areas with no data have no susceptibility to groundwater flooding. The resolution of the modelled output is 50m by 50m cells. The data set is a hazard data set, not a risk data set, meaning that it does not provide any information about the likelihood of a groundwater flooding event occurring.

Reservoir failure maps

The JBA Consulting reservoir failure flood maps identify areas in England that are most likely to suffer damage to property following the sudden catastrophic failure of a reservoir. 1700 reservoirs are included in the model. The maps are based on modelling that used empirical methods to predict water flow resulting from failure, which was then modelled on the 5m digital terrain models (DTM) using a 2D hydraulic modelling techniques. These maps are the UK’s first large scale mapping of the risk from reservoir failure. The digital terrain model is supplied by Infoterra and uses 1-2m LIDAR data in large urban areas and 5m GeoPerspectives (photogrammetric DTM) data elsewhere.

4.6 Value added resellers

Over the past few years, there has been a growth in the number of companies who provide flood risk information in the form of digital environmental constraint reports and/or the resale of available GIS datasets.

The remainder of this section describes the broad characteristics of representative products available in the market and has been based upon information supplied by interviewees in this study and/or information available from the internet.

Environmental constraint reports

The flood based environmental constraint reports which are currently available are designed for use by professionals and members of the public and are intended to provide access to available flood risk information within a relatively small geographical area. Examples of the representative environmental constraint report products are detailed in Table 4.5.

Although these products provide a very useful first tier assessment of potential flood risk, it is important to note that these reports can only provide an indication of risk for an individual property. These reports also caution owners of properties in significant flood areas that a more detailed flood risk assessment should be considered to assess the potential risks.

These products provide clear guidance on the relative accuracy of the component information used but it is reliant on the end user to ensure that the product is used appropriately. The importance of data accuracy and appropriate use of information is considered further in Section 5 of this report.

Suppliers of digital flood risk datasets

Over recent years there has been an increase in the number of commercial companies who act as Value Added Resellers (VARs) for flood risk information. A selection of providers is detailed below in Table 4.2.

Table 4.2 Resellers of digital flood risk information in the UK

Value Added Reseller (VAR)	Data layers provided
Cities Revealed	Surface water flood risk mapping – in association with Ambiental
Landmark ProMap www.promap.co.uk	Environment Agency Flood Map Environment Agency NaFRA spatial Environment Agency Historic Flood Extents BGS Geological Indicators of Flooding BGS Groundwater Flooding Susceptibility Risk Management Solutions pluvial flood risk maps for a 75, 100 and 1000 Year Return Period
FindMaps www.findmaps.co.uk	Environment Agency Flood Map Environment Agency NaFRA spatial Environment Agency Historic Flood Extents BGS Geological Indicators of Flooding BGS Groundwater Flooding Susceptibility Risk Management Solutions pluvial flood risk maps for a 75, 100 and 1000 Year Return Period
Infoterra GeoStore www.geostore.com	JBA Surface Water Flood Map JBA Reservoir Failure Flood Map JBA undefended River Flood Map

A key feature of these VARs is their commercial focus on supplying digital CAD and GIS datasets to a range of different sectors. This includes supply of flood risk data layers to flood risk management, property and environmental consultants, who then provide additional interpretation services for their clients.

4.7 Local government registers of flooded properties

The interviews conducted in the study have highlighted a number of local authorities which have developed registers of flooded properties following major recent flood events. A number of examples of these local registers are provided below.

Herefordshire County Council started to compile a list of properties (both residential and commercial) which were flooded following the summer 2007 floods. This exercise was followed up by the issuing of a proforma and covering letter to all parish councils in Herefordshire requesting details of the properties which had been flooded. This exercise was repeated in late 2008 and early 2009 following further major flooding in the areas. The resulted in around 125 returns for parish councils and local members of the authority.

The key purpose of this proforma was to allow local information about flooded properties to be added to the list already held by the Council. This data has

subsequently been shared with the Environment Agency to assist in the planning for and prevention of a response to any future events.

In the second example, Cumbria County Council and its partners have developed a centralised contact service for individuals who were affected by the 2005 and 2009 floods. All callers to this service were asked questions about their current living arrangements, how their properties and lives have been affected by the floods, and what support they've had or still need. The questionnaire can also be completed online⁵.

A key aim of the central contact line and questionnaire has been to identify properties which were affected by the floods and to assess what kind of support property owners require. This information has a number of direct uses including helping contribute to future emergency and spatial planning decisions made by the council.

The third and final example examined in the study is the work which has been undertaken by the Gloucestershire Council following the 2007 floods. For this council, a dedicated flood management team has been established to work closely with the Environment Agency and other agencies to help provide recovery support and work to reduce future flood risks.

As part of the post event work, the council co-ordinated a doorstep survey of the 5000 residential and commercial properties flooded in the council's area during 2007. This work was undertaken by the six local districts within Gloucestershire. Although the survey has been an important dataset which has helped to improve the allocation of resource and recovery effort, most of the information is only available for 2007 and new information will only be collected for properties which are flooded in the future. As a consequence, the survey is not a complete assessment of all properties which are at risk from current and future flooding.

These three examples show that the collection of property level flood risk information (including the location and characteristics of flooded properties) following major flood events has a number of important benefits, including aiding post event recovery and assessment of future risk potential. However the datasets collected by local authorities tend to be event specific (i.e. 2007 focused); geographically constrained and collected in a range of different formats. The supply of information is also largely restricted due to data protection issues (i.e. names and address included in the dataset collected). These important barriers to wider use are discussed later in Section 5.

4.8 Emergency responders - registers of flooded properties

The interviews with emergency responders (i.e. Cumbria, Gloucester and West Sussex Fire and Rescue Services) conducted in the study have highlighted their important role in collecting detailed information regarding the location and characteristics of properties which have been flooded.

⁵ <http://www.cumbriaobservatory.org.uk/floods2009questionnaire.asp>

The interviews highlighted that individual command and control systems are used by each of the fire services to record incident related information. This information typically includes six figure Ordnance Survey grid references; property address; type of flood event (internal and external); time of the first call; time to respond and the amount of time at the incident. Some of the services also record additional information on the depth of flooding; what was done to mitigate the problem and details of the occupier. However the capture of this additional information is not universal.

The interviewees highlighted that the collection of this information has a number of internal benefits, including aiding the planning of resources during flood events (e.g. where should boats be most effectively located) and the development of future risk management plans.

The interviews also highlighted that each fire rescue service has a responsibility to report back to government on all attendances using the National Incident Recording System (IRS) maintained by DCLG. This system only went live in Autumn 2009 and is automatically populated using mobilisation details recorded in individual Fire and Rescue Service command and control systems. Additional information is populated by the incident manager after attendance at the incident. Although development work on the system is still ongoing, it is expected that this national database system will provide a valuable source of information relating to flooding of individual properties and data which could be beneficial to other agencies.

In terms of sharing of this information, it is understood that information held by emergency responders is generally not supplied externally to other organisations, largely due to issues of data protection regarding the data held in the database. However contact with individual emergency responders has shown that some local data is shared with partner organisations (including some Environment Agency area offices and Local Resilience Forums). However this sharing is largely ad-hoc and no formal arrangements are currently in place for provision of information from the IRS or local system

4.9 Awareness of currently available datasets

In addition to reviewing the availability of datasets, the project team have also investigated the current awareness and use of these datasets across the stakeholders considered in the study. To investigate this important issue, a number of unprompted questions were posed to attendees during the workshop event.

The responses received from these questions showed that a wide range of datasets are currently accessed and used. The most popular datasets cited were:

- British Geological Survey groundwater geological indicators
- Claims databases held by insurers
- Emergency services-held data on emergency response and post-flood recovery
- Environment Agency flood warnings

- Environment Agency historic flood outlines
- Environment Agency NAFRA dataset
- Highway authorities (e.g. road closures, post-incident recording)
- Individual flood models
- Internal drainage boards
- JBA surface water map
- Local authorities surface water incident records
- Local press / media
- MOSAIC socio-economic data⁶
- Ordnance survey digital terrain model
- Planning applications register (inc those rejected by local authorities)
- Strategic flood risk assessments developed by local authorities (with input from a range of other stakeholders)
- Surface water management plans developed by local authorities (with input from a range of other stakeholders)
- The public word of mouth / anecdotal information
- Water company flood records

The layers which were most commonly obtained and used were the Environment Agency datasets (including the flood Map, historical flood outlines; flood warning data and NAFRA layers). Many data users also indicated their active use of local authority produced SFRAs (mainly due to the access of these documents from the web or sourced from the council) and where obtainable, surface water flood records/models and water company records.

Although data were obtained for a wide range of purposes, it was common for users to cite different barriers which current restrict the use of selected data sources. These barriers are discussed in Section 5 and provide the setting for the consideration of the future requirements of users which are outlined in Section 6 of this report.

⁶ Mosaic is a customer socio-demographic classification produced by Experian. In the 2009 classification, the classification included 67 socio-economic types which have been developed using 440 data variables. A number of different MOSIAC products are currently available including a specific public sector product which is used by local authorities, fire and rescue, police and health care providers to plan resources and assess vulnerability. The mosaic data can also be linked to Experian's perils data which quantifies risk at postcode unit level for flooding for insurance portfolio management

5 Existing barriers to the availability and use of current information

5.1 Introduction

As outlined in Section 4, there are a wide range of organisations responsible for the primary collection of data sources relating to property level flood risk information. Many of these datasets have been captured by an organisation for a specific business purpose and wider distribution of the information is generally limited.

The interviews conducted in this study have also highlighted a number of specific barriers which limit the wider use of currently available property level flood risk information. These barriers include: commercial and contractual issues; the costs of primary data collection and resale costs; data protection and liability issues; licencing arrangements; the number of organisations collecting the information; multiple sources of information; public perception and property blight concerns and restrictions on accessibility. Table 5.1 (at the end of this section) presents a summary of the impact of these barriers upon the availability and use of the datasets described in Section 4.

The information presented in this section provides essential context when considering whether the current datasets can meet the future requirements of users (Section 6) and ultimately assists the development of actions to improve the accessibility and use of property level flood risk information (see Section 8).

5.2 Commercial sensitive data / commercial advantage data

One of the main types of barrier restricting the wider circulation of property level flooding information is the commercial interests of specific data holders.

This issue is particularly important within the insurance industry where claims data and flood risk information are classed as commercially sensitive information and there is currently no wider sharing of these datasets outside individual companies. Some insurance information is used to produce aggregated data products (i.e. Crawford's loss adjusters and Dundee tables) but access to primary data is controlled – see Section 4.2.3.

This issue of commercial and contractual governance is also an important issue for surveyors, loss adjusters and damage management specialists interviewed in the study. For these industries, the key driver for collecting property level flood risk information is to provide effective information for the insurance company, mortgage lender or individual which has commissioned them for the survey.

As a consequence, information collected by the surveyor, loss adjuster or damage management specialists is normally confidential to the end user and release of the information by the data collector would contravene this agreement. This issue was highlighted in a number of interviews undertaken in the study.

5.3 Costs of primary data collection

One of the other main barriers to the collection of additional property level information is the cost of primary data capture and the subsequent cost of datasets which are sold commercially.

Recent work conducted on behalf of the Environment Agency has indicated that undertaking a detailed flood risk survey of individual properties costs between £28 and £32 per property at 2008 prices (Environment Agency, 2008). These figures were based upon estimates of undertaking the survey work for 1241 properties in the West Midlands and with the higher cost level relating to a survey to the full Environment Agency specification. Further details are provided in Environment Agency, 2008.

Between £19-24 of this overall cost was attributed to the cost of the survey necessary to establish the level of the property threshold with the remaining cost relating to the collection of other relevant property characteristics and the associated project management time. For technical reference, this cost was based upon using a 'Rapid Static' Global Position Systems (GPS) survey approach. Further detail can be obtained from Environment Agency, 2008.

Based upon these unit costs, a detailed survey of all 490,000 properties at significant risk of fluvial and coastal flooding in England would cost £9-£12 million. As a result, it is likely that the collection of detailed information relating to properties at risk from flooding will continue to be limited to focused surveys such as those undertaken for the Defra flood resistance and resilience grant scheme and post event surveys undertaken by the Environment Agency, local authorities and the insurance industry.

Due to the levels of investment required, many data collectors (especially those operating in a commercial market) are reluctant to provide information without appropriate return on their own investment. This issue clearly influences the resale value of the information and ultimately cost is a factor which inhibits take-up of some datasets by some users.

5.4 Data protection and liability issues

It is possible that some of the property level flood risk information collected includes personal information which needs to be securely managed under the terms of the Data Protection Act⁷. The terms outlined in this act ensures that personal information is securely managed and is not open to inappropriate third party use. These issues clearly restricted the wider data sharing of some elements of data and must be considered by all parties when developing data sharing arrangements.

It also equally important that data holders ensure that information collected is accurate, held securely and ultimately used appropriately. These requirements are essential for all data owners to ensure that the use of the data does not infringe an

⁷ http://www.ico.gov.uk/what_we_cover/data_protection.aspx

individual personal or business interests. These requirements will also help limit any potential liability issues for data owners.

The issues of data protection and liability were two of the important barriers cited by a number of individuals interviewed in the study.

One interesting example provided during the interview process came from a representative of a water company who commented that historically the release of information relating to flood incidents had been limited due to data protection and liability issues. These restrictions had been reviewed following the national floods of summer 2007 and the company now actively provided information to other professional parties for the purposes of mutually beneficial flood risk management studies.

This situation contrasted with the experiences of the local authority spatial planners and consultants interviewed in the study who had sought to access surface water or sewer flooding data from other water companies for Strategic Flood Risk Assessments (SFRAs). In most cases, access to detailed information had been withheld due to security issues and only coarse aggregated DG5 information was provided.

The attitude demonstrated by the water company cited above shows that the sharing of sewer/drainage related information is both possible and assist in wider flood risk management activities. It is suggested that this type of open sharing is adopted by more water companies operating in England and Wales. This influence of the Flood and Water Management Bill and the Flood Risk Regulations 2009 in encouraging wider data sharing is considered in detail in Section 7.

5.5 Licensing arrangements

The discussion presented in Section 4 also demonstrated a range of datasets which have been developed by integrating a variety of different third party data products. One specific example is the Environment Agency National Property Dataset (NPD 2008) which integrates Ordnance Survey AddressPoint (Address Layer 2)⁸, Ordnance Survey MasterMap, Valuation Office Agency (VOA) FOCUS rating valuations for non-residential property and the Environment Agency's own flood risk assessment information. The characteristics of this last dataset were described in detail in Section 4.1.

A specific feature of Ordnance Survey's licencing terms is that derived products, cannot not be supplied (under licence) to a third party who does not have an appropriate licence agreement. As an example, third party use of the NPD 2008 requires an appropriate Ordnance Survey Agreement for OS AddressPoint / AddressLayer 2 and OS Mastermap as a minimum.

For government organisations, such as crown and non-crown bodies, government departments, executive agencies and sponsored bodies (including Defra, Natural England) this licencing arrangement is covered under the terms of the Pan

⁸ <http://www.ordnancesurvey.co.uk/oswebsite/products/>

Government Agreement (PGA). This agreement provides central government departments with access to a wide range of Ordnance Survey digital map products and is managed by the Intra-Governmental Group on Geographic Information.

In addition, more than 500 local government organisations are able to access the latest Ordnance Survey digital mapping and geographic data through the Mapping Services Agreement (MSA). The agreement covers all district, county and unitary councils, metropolitan borough councils, London boroughs, national park authorities and some emergency services – notably local police and fire services. This agreement also means that these organisations should be able to access (under specific licencing terms) some of the attributes contained in the National Property Dataset.

In addition to these arrangements, the NPD 2008 also contains some attribute fields which are derived from the Valuation Office Agency (VOA) FOCUS rating layer. This information is covered by separate licencing arrangements and further limits the direct use of the dataset by other organisations.

Although the current OS arrangements are beneficial for central government and local organisations, the licencing of detailed Ordnance Survey products is more variable in the commercial sector and particularly the insurance market. This is a specific barrier which currently restricts the sharing of datasets between some organisations with shared interests in the management and assessment of flood risk for individual properties.

In conclusion, this section demonstrates that licencing conditions and ultimately data supply costs are significant barriers to the widespread supply of datasets relating to property level flood risk.

5.6 Multiple sources of information and access to data

Another barrier which restricts the wider use of data (i.e. location, property type and flood characteristics) relating to flood properties is the disparate number of organisations who collate this information. This issue was raised in Section 4.

Across the UK, there are probably several hundred different companies and systems which are used to record and manage risk based information. This diversity is particularly evident in the survey, loss adjuster and insurance industries.

Although surveyors and loss adjusters are increasingly using digital methods of data collection, some local surveyors still rely on paper recording of property based details. This information is typically scanned as a digital record but data are not always stored in a format which can be easily accessed. This issue was raised earlier in Section 4.2. In addition, access to this information is largely restricted for a particular purpose, such as settlement of an insurance claim and in many cases deleted or archived after a limited period of time.

Although there have been recent initiatives to improve the consistency of data recording (including the development and use of the National Land and Property

Gazetteer (NLPG)⁹), information collected by survey and loss adjuster companies working on behalf of the insurance companies is typically recorded using different address standards. This is an important barrier which limits any future attempts to collate and share property based information between professional parties.

In addition to these developments, discussions with the Environment Agency and the ABI have highlighted ongoing work to produce a standardised data collection template will help to develop more consistent and ultimately shareable information. The development of this template is still ongoing but once finalised it is hoped that the collection of flood related survey information will become more consistent and potentially shareable. This development would ultimately benefit all interested parties involved in managing and reducing future flood risks.

5.7 Public perception and property blight issues

The aftermath of recent national flood events and growth of the work of the National Flood Forum has shown that there is a growing appreciation by many individual residents of current and future flood risks, and how information relating to individual properties is being used by different professional organisations.

The experiences of some flooded residents have also contributed (in some quarters) to concerns of how flood risk information may be used by some organisations (notably insurers) and how this may directly lead to increased insurance costs or in extreme cases reduction in the value of their property (i.e. blight). Anecdotal reports and media speculation in this area has led to an understandable caution towards publication of flood risk information among property owners in the floodplain.

The appreciation of these facts was a clear issue which emerged in the interviews conducted in the study and was reflected in a number of specific comments reproduced below:

“With regards to actual/ historic property level flood risk data, members of the general public are often unwilling to disclose flooding to their property in the case that this leads to increased insurance premiums.” (Flood risk management consultant)

“Another issue which limits the release of our data is our concern that if flood information gets into the public domain and used inappropriately then property prices may decrease and result in property blight” (Water company representative)

The management of data to limit any potential issues of property blight was a particular concern for organisations which had responsibility for the ownership of primary information and which direct interface with members of public and communities. The concerns of potential property blight were also raised during a number of the interviews conducted with Flood Action Groups.

⁹ <http://www.nlpg.org.uk>

However, research indicates that under the current disclosure regimes, the majority of property transactions involving flooded or at risk property are not negatively affected by flood issues. The exceptions being recently flooded property, property sold in an unrestored condition and property with compromised insurance. The publication of the Environment Agency floodplain maps did not have a discernable effect on the price of properties in floodplain areas.

These issues have been investigated in recent research projects and readers should refer to these reports for further information (Building Flood Research Group 2004, Kenney *et al.* 2006, Harries, 2007, Lamond 2008, Thurston *et al.* 2008 and Lamond 2009).

The results of this research suggests that wider public access to the level of flood risk data which is currently accessed by insurers is unlikely to lower the value of the majority of properties located in floodplain areas.

Although, it is difficult to estimate the impact of these issues, previous studies have suggested that the maximum discount applicable for flood risk would be equal to the expected annual damages for a property plus a small amount for anticipated social and health loss. This has been estimated as £200 per year for a property at significant risk of flooding (Environment Agency/Department of the Environment Food and Rural Affairs 2005).

For the majority of floodplain properties, this will represent a relatively small discount. However for properties at greatest risk, particularly property which cannot gain insurance, the increased availability in risk information may result in difficulties in selling, and potentially in the short term a loss in value. However, it can also be argued that continued frequent flood events and subsequent claims will have the same impact and that properties at such high risk are likely to be already well known by the insurance companies.

These important issues are considered further in Section 6 and 7 of this report.

Table 5.1 Summary of current barriers to the access and use of datasets relating to property level flood risk

Dataset name	Owner	Coverage	Availability	Type of barrier(s)	Details of the barrier(s)
Flood Map	Environment Agency	National	Available for basic viewing on Environment Agency website and data layers available to professional partners	Financial costs for some users – Only freely available to some professional partners	Data layers provided to professional partners (i.e. government departments and local authorities) and under licence terms to other organisations. Selected layers are available in PDF reports and subject to a limited charge.
National Property Dataset	Environment Agency	National	Mostly available (subject to licence) for OS PGA and MSA licence holders	External licencing terms and costs	Dataset is based upon OS AddressPoint/ Address Layer 2 dataset. Requires end user to have the necessary OS PGA or MSA licence agreements to receive most of the attributes in the dataset.
NaFRA outputs	Environment Agency	National	Available (subject to licence agreement) to professional partners	External licencing terms	Selected outputs from NaFRA available (under licence terms) to insurance industry and other organisations.
Fluvial and coastal flood risk models	Environment Agency	National	Available to licence for FRA purposes	Cost	Cost of obtaining model data related to size and complexity of model information required. See Appendix D for further details.
Fluvial and coastal flood risk models	Insurance Companies	National	Restricted	Commercial restrictions and costs	A majority of in-house insurance models are not available to other users due to commercial considerations.
Insurance claims records	Insurance Companies	National	Restricted	Commercial restrictions	Claims records not made available due to commercial and data confidentiality considerations. Aggregated records integrated into Dundee Tables product prepared for the UK insurance industry.
RMS flood risk model	Risk Management Solutions	National	Commercial product Available in third party risk reports	Costs	Dataset integrated into RMS Risk Assessment product and not available for direct purchase. Data also included as a layer in third party (Landmark) environmental constraint reports (see Appendix E).
AIR flood risk model	AIR	National	Commercial product	Costs	Available in insurance based risk portfolio products (see Appendix E).

Table 5.1(cont) Summary of current barriers to the access and use of datasets relating to property level flood risk

Dataset name	Owner	Coverage	Availability	Type of barrier(s)	Details of the barrier(s)
Registers of properties at risk from sewer flooding	Water Companies	Regional	Variable dependent on water company concerned	Commercial restrictions	Information available from some water companies for local authority led SWMP and SFRA studies and use by the Environment Agency. Information more restricted by some water companies due to commercial and confidential data issues.
Records of calls relating to flooded properties	Fire Brigade	National and County basis	Available to professional partners for non-commercial applications	Format of information	Stored in range of different databases but information will in the future be collated using the DCLG IRS database
Flood property registers	Local Authorities	Unitary/district authority	Available to professional partners for non-commercial applications	Format of information and property blight concerns	Only likely to be held by authorities who have experienced recently flooding. Quality and accuracy of information held variable.
Surveyed properties with flood resistance products	Flood product producers	Individual properties	Restricted	Commercial restrictions	Commercial information – format and quality of information held very variable
Individual property survey	Survey industry	Individual properties	Restricted	Format of information and commercial restrictions	Information held in confidence by surveyor on behalf of the end client (i.e. property seller/buyer).

6 Future requirements of users

6.1 Summary of future requirements of users

As outlined in Section 1.2, one of the key objectives of this study was to evaluate the future requirements for property level flood risk information. However as highlighted in earlier sections, the realisation of individual users are influenced by three key factors. These are:

- the current availability of datasets;
- specific barriers which limit access to required information and
- policy drivers which will help increase the availability and use of the information.

With these factors in mind, the stakeholders interviewed in the study were asked to state their future requirements for property level flood risk information. These requirements are summarised below in Table 6.1. Additional information regarding the detailed requirements of users (including required data attributes) is presented in Section 6.2 and 6.3

Table 6.1 Future data requirements of key user groups

Future need	Interested user groups	Current sources of information	How might available data be made more accessible
Additional information concerning the uncertainty/limitations of Environment Agency flood risk map	Insurers	Environment Agency	Additional technical information provided on request or via Environment Agency website.
Access to claims information	Local Authorities and Universities	Restricted by the insurance industry	Potential future sharing of selected claim details with professional partners.
Detailed land use and building information	Insurers	Commercial data suppliers (including Ordnance Survey)	Priced datasets will continue to develop and be supplied through commercial companies.
Flood history	Brokers and flood product providers	Environment Agency	Available information can be accessed in some Environment Agency and commercial products. Increased awareness needed for some users.
Flood flow velocity and depth information	Insurers, universities, local authority and emergency planners	Only available for areas covered by detailed flood risk models	Access to available flood risk model results.
Interpretation of risk	Architects and emergency responders	Flood risk management consultants	Products provided in a clear user friendly manner which maximise electronic mapping format and professional mapping approaches.

Table 6.1 (cont)

Summary of the future data requirements of key user groups

Future need	User groups	Current availability	How might available data be made more accessible
GIS layer showing location of defences which are planned or currently being developed	Insurers	Not currently available	Difficulties of mapping features when exact timetable of implementation is unknown.
LIDAR data	Range of users	Environment Agency and a variety of third party data suppliers.	Information available from a number of sources but price could be an issue for some users.
Locations of properties which have been flooded and which emergency responders have attended	Many interest groups	Store in emergency response command and control centres and uploaded to national IRS database.	Future sharing of flood related emergency call information with professional partners (i.e. Central government departments and local authorities).
Mapping which highlights future risks of flooding including climate change	Emergency responders, Architects and surveyors	High level mapping available from Environment Agency and in detail for areas which have been subject to an SFRA.	Collation of available mapping outputs from SFRA and SWMP and integration into centralised national mapping programmes.
Presence of properties with basements	University research and local authority emergency planners	Limited information available from census and at risk register maintain by local authorities.	Information derived from the future analysis of Land Registry or Home Information Pack data.
Property construction type (including materials and depth to foundations)	Insurers and universities	Information only obtainable from site survey.	Capture of additional information by surveyors using industry agreed template/ methods.
Property thresholds and floor levels	Insurers, Environment Agency and universities	Site survey and limited availability.	Capture of additional information by surveyors using industry agreed template/ methods.
Sewer flooding and drainage exceedance information	Insurers, Local authorities, government agencies and universities	Access variable across different water companies.	Encouragement of data sharing arrangements through development of future SWMP and SFRAs.
Surface water risk	Insurers and local authorities	First generation mapping available under licence from JBA. Also surface water maps produced by various consultants for specific FRAs.	Continued development of nationally available second generation maps of flooding from other sources. Independent peer reviewing of models required.
Water depths at floods of given return periods	Insurers, surveyors and flood product providers	Not currently available for individual property level.	Creation of additional products by the Environment Agency which combine water level information and threshold data to provide indicative risk threshold.
Locations of properties which have been flooded and which emergency responders have attended	Many interest groups	Store in emergency response command and control centres and uploaded to national IRS database.	Future sharing of flood related emergency call information with professional partners (i.e. Central government departments and local authorities).

6.2 Profiles of future user requirements

The following section provides further details of the future requirements of stakeholders interviewed in this study.

6.2.1 Resource planning

Emergency responders use flood risk data to plan the resources required for future flood events. Local authority, police and fire service responders have a duty of care to respond as effectively as possible to their constituents. Improved access to flood risk data helps to balance the resource needs of flood response against competing responsibilities and to allocate the resources geographically. This is frequently carried out in a multi-agency forum where data may be shared at a high level.

Emergency responders interviewed also emphasised the importance of having good information on particularly important sites (i.e. utility assets, hospitals, schools etc) as well a good understanding of the general areas where flooding is likely to occur and it's likely severity. Information about the vulnerability residents than details of individual property threshold levels was also an important data source for this group

There is also the potential to tailor the data for this particular context, by interpreting and presenting the data in more user friendly visualisations of potential future flood events. For training purposes simulation of the impact of flood events in real time showing animations of the progression of flooding would be very useful.

6.2.2 Incident management

During a flooding incident in the immediate pre-planning stage and in the immediate aftermath, the rapid and targeted deployment of resources can help in preserving life, limiting damage and speeding up the recovery process. The interviews conducted with insurers, fire service and local authority emergency planners highlighted that they would like to see continued improvements and in some cases access to near-live flood risk information to support incident management.

When informing the public before a flood event, emergency warning systems should ideally be based on detailed property level data as residents can then be warned sequentially and will be subject to fewer false alarms or inadequate warnings. Data requirements vary from address based threshold levels for emergency warning requirements to more general area based depth information for emergency responders.

6.2.3 Informing property owners about risk

Engaging the public in actions which may protect themselves and their property is a key aim of current government policy. This is reflected in ongoing work by a variety of organisations (including the Environment Agency and national Flood

Forum) to inform floodplain residents about the risk to themselves and their property; and advice on appropriate flood resistance/resilience products (i.e. flood barriers, airbrick covers etc).

Provision of public information currently includes awareness campaigns undertaken by the Environment Agency and flood fairs undertaken by the National Flood Forum. Fire services also carry out house to house visits where they advise about fire and flood risks and leave advice leaflets. In addition, flood protection providers are also becoming more proactive in advising residents about potential mitigation measures.

At the present time, this advice is mostly generic in nature. Respondents suggested that personalisation of information is more likely to result in action being taken. These findings are supported by research (Waterstone 1978, Lamond and Proverbs 2009) Property level datasets would also be useful in targeting the effort at properties at the highest risk and for whom mitigation is most cost beneficial. This would help maximise the cost effectiveness of such campaigns,

6.2.4 Assessing the suitability of new development

The requirements of PPS25 to locate future development away from the functional floodplain places duties on property developers; their advisers and local authorities to assess the risk of flooding to any planned new development. Access to effective property level flood risk information for the purposes of PPS25 is therefore important.

The interviews undertaken in this study have shown that architects, surveyors and property developers would like to have access to more localised risk information for all sources of flooding. Access to this information would help to enable the suitability of new development sites to be assessed, thereby satisfying planning requirements for flood mitigation and to design buildings to cope with residual flood risk.

Although some interviewees did not favour complete access to detailed information, most comments indicated that access to such detailed information would be beneficial for residents located in flood risk areas and would help avoid ruling out viable development sites due to lack of information. For these purposes, the ideal data set would include an integration of all sources of flood hazard, likely frequency, depths and velocity of flooding.

Access to more detailed flood data will also assist with sustainable urban planning and design. Examples of forward thinking urban design can be found in the RIBA building futures project (Building Futures/ICE 2010) and the Life handbook (Building Research Establishment 2009) which combine innovative technologies with strategic level flood risk data. However implementation of such plans in practical terms requires access to high resolution site level data on current and future flood hazard.

A number of the stakeholders (including architects) interviewed also commented that for new developments, access to flood risk model assumptions and base level data would be very helpful during the iterative design process. This detailed information would help to fully understand risks involved and how appropriate design techniques could be used to create a development which was both sustainable and sensitive to flood risk issues.

6.2.5 Designing flood defences or property protection

The assessment of the benefits and costs of developing a new or upgraded an existing flood defence is outlined in the recently published Flood and Coastal Erosion Appraisal Guidance (FCERM-AG) (Environment Agency, 2010). This replaces the earlier Defra PAG Guidance (Defra 2000, 2004 and 2006a)

A key element of the FCERM-AG appraisal process is an assessment of the number of properties at risk of flooding which will be protected by the scheme. To undertake this assessment effectively, it is necessary to assess the frequency, depth and velocity of flooding for each property; the type and likely value of property at current risk; and the residual risk after the defence is built. These factors are currently assessed using the NPD 2008 and NaFRA datasets which has the benefit of consistency of approach and data quality.

Although this approach is well defined, a number of people interviewed during the course of the project indicated that access to detailed information about the type of property and the routes of water ingress would help improve the future appraisal required under the FCERM-AG process.

In the selection of individual level property flood protection, the decision process is less transparent and needs to consider economic cost/benefits but also a wide range of intangible benefits (including reduction of personal stress; reduction in time out of the property). These wider benefits have been considered in detail in a range of earlier research studies (see Harries 2007; Defra, 2008; Thurston *et al.* 2008; and Lamond and Proverbs 2009).

Property owners and residents may instigate investigation or they may be prompted or advised to take action by their insurer or other agency. The quality and quantity of flood risk assessment will therefore also vary. For a formal cost benefit analysis of property level flood protection, access to frequency, depth and velocity of likely future flooding are needed. This issues were investigated in detail in earlier Defra research (DCLG (2007) and Defra, 2008; Thurston *et al.* (2008).

However currently many surveyors, loss adjusters and flood product suppliers favour site surveys and word of mouth information over flood risk datasets in assessing the needs of property for flood protection and the appropriate method. One reason for this may be that it is usually the case for flood protection to be installed in a previously flooded property for which a detailed flood history is available and which may be seen as superior to any existing flood risk dataset.

A second reason is that it is necessary to carry out an on-site survey of the property to evaluate all points of water ingress. Modelled flood risk datasets will not be able to provide this level of detail.

The final reason is that a property owner may not be installing protection in order to avoid damages but rather to regain insurance cover if their insurer has refused to renew their policy. The cost benefit decision for the property owner is not governed by the expected damages but by the premium saved. The anticipated frequency of flooding is not needed for this evaluation. This situation is unlikely to change in the future unless the cost of property level flood risk information becomes negligible.

6.2.6 Improving dataset for high level policy assessments

Strategic flood risk management policy and damage assessments are directly informed by accurate estimates of the number of properties at risk and predicted levels damages to property. The effective of these assessments will be enhanced by accurate modelling based on detailed property level data.

Environment Agency flood management plans are informed by some sources of data which are not available to the public, such as the National Property Dataset (NPD 2008) and this data may often be provided on a confidential basis to organisations that assist in policy assessment. However, it would also be advantageous if this data were more widely available to researchers who may be pursuing studies not directly feeding into policy but building and developing models which will improve risk assessment in the future and which may provide an independent check on directly funded policy research.

Improvements suggested for the national property dataset (NPD 2008) which would enhance risk assessment include the distribution of insurance cover, details of any other mitigation measures, details of construction types, accurate threshold levels or point of entry data, services supplied to property, property condition, occupancy and socio economic profile of residents, flood damage history, velocity and speed of onset.

Although future development and wider accessibility of the NPD 2008 would be advantageous for the purposes of property level flood risk, the project team are mindful of the range of licencing issues which govern the use of the dataset. These issues were discussed fully in Section 5.5.

6.2.7 Insurance industry – Residential and commercial underwriting

The main interest of insurers is to access “fit for purpose” annual expected flood damage costs from all sources of flooding. This process includes obtaining details of the property at risk and models which translate the risk into expected damage costs. As part of this process, insurers are interested in obtaining “fir for purpose” flood risk information which indicates the underlying natural hazard and any mitigation to that hazard namely flood defences and property level flood protection.

The development of insurance damage models are based on flood depth and duration of flooding (Black and Evans 1999) and therefore likely depth and duration of flooding are the most requested attributes. Property details should include threshold levels, reconstruction costs and cost of contents. Improved evidence of the impact of property level protection on damage costs and therefore property repair costs will be of great benefit within this sector. Improved damage models in the future may generate demand for other flood attributes such as velocity and contaminants.

One of the key drivers for increasing sophisticated flood risk information has been the increased use of risk based pricing within the insurance industry and a resulting increased demand for flood risk information on an individual policy basis. Insurers, policy holders and their agents and intermediaries may all need to access data for this purpose.

A number of the people interviewed in the study stated that it would be preferable if all parties (i.e. homeowner and insurer) had access to the same risk information so that decisions to withdraw cover or charge high premiums or excess could be determined using the same baseline of information. However, these views do not consider the controlled nature of information which is held by the insurance industry for the underwriting of residential and commercial properties. These issues were considered in detail in Section 4 of this report.

The interview responses also revealed that the awareness of available data and the willingness to pay for information varied across insurers, brokers and policy holders. There is therefore potential to improve accessibility to existing data by raising awareness in this sector.

In terms of future access to information, the insurance respondents indicated that they were most interested in accessing information regarding pluvial flood risk (surface water, sewer flooding and reservoir failure); flood depth information, the location of properties which had installed flood resistance or resilience measures and any residual risk information. In terms of risk maps, insurers expressed particular interest in accessing pluvial flood risk maps which detailed vulnerable areas under different extreme rainfall events.

6.3 Assessment of overarching user requirements

The project team have also reviewed the detailed future requirements of users using a proforma questionnaire delivered during the workshop event described in Section 2.4. A copy of the questionnaire is included in Appendix A.

Twenty one questionnaire responses were returned, of which one was only partially completed and therefore excluded from the analysis. The respondents represented four insurance companies, seven from mapping organisations, one flood action group, two local authorities, four damage management companies, two consultants and one unidentified. These were grouped into non users (mapping companies and unknown) and users (insurance, flood action group, local authority, damage management and consultant).

Using the questionnaire responses, Figure 6.1 (overleaf) has been prepared to illustrate the current and future requirements of users for representative types of property level flood risk information. The figures details in % terms the numbers of users who are currently using the attribute (dark blue); the percentage of users who would like to use the information in the future (orange) and the percentage of users who have no interest in using this type of information in the future (light yellow).

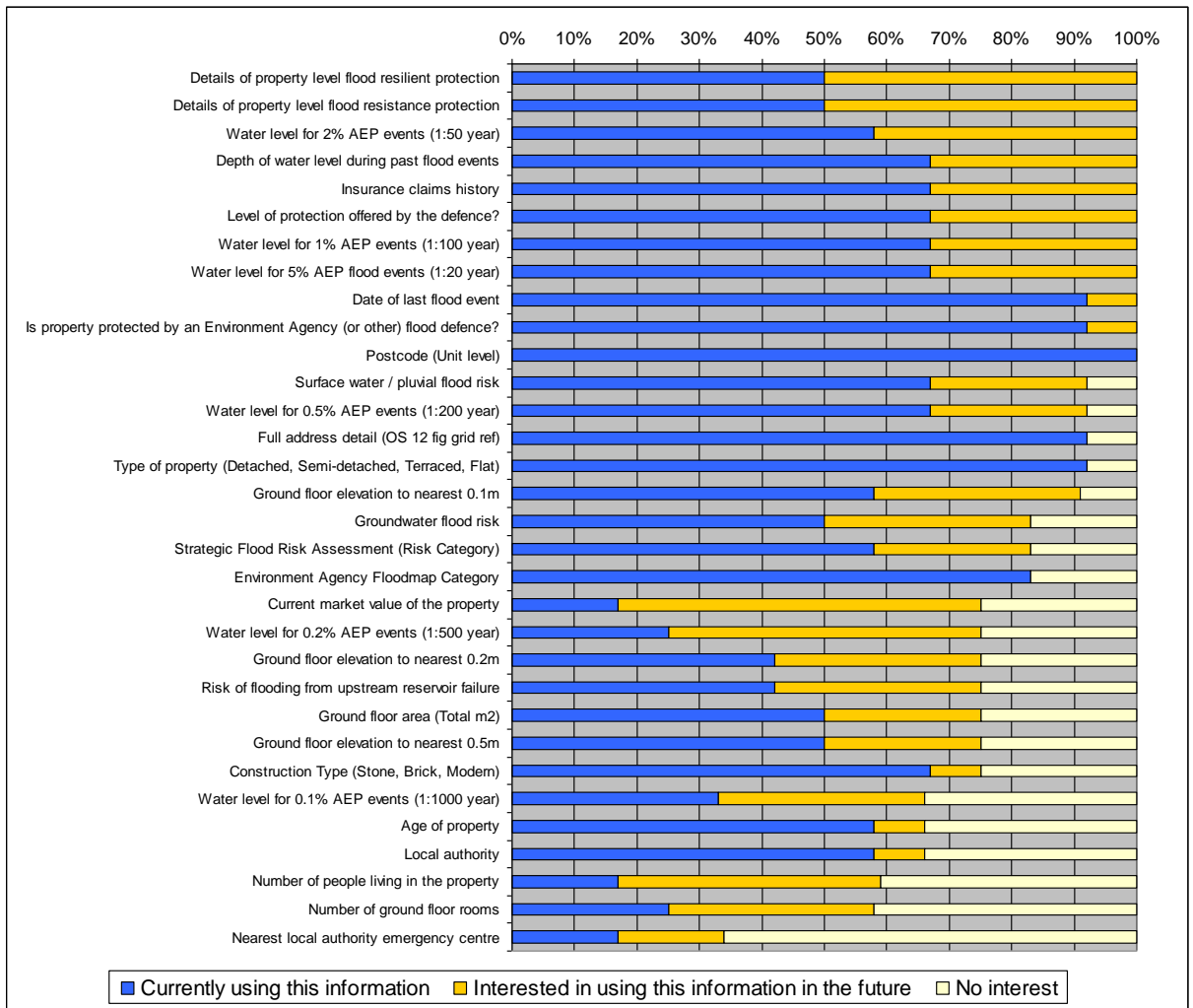
This figure shows that the data attributes which are most widely at present are postcode and address details (100%), the Environment Agency Flood Map Category; property type; basic defence situation and date of the last flood. Most users indicated that basic address/property details were most commonly derived from internal databases while flood risk information was derived from the Environment Agency Flood Map product.

Figure 6.1 also highlights the interest of users in accessing details of property level flood resistance and resilience installations (e.g. 50% use this information and 50% would like to use this information in the future). The questionnaire responses also indicated that more users would like to access information on predicted water levels/thresholds under different flood events and the water depth information (if recorded) of past flood events. This was reflected with around two thirds of users already using this type of information with the remainder of the sample wanting to access this information in the future. Comments received during the detailed interviews also reflected this general requirement.

Figure 6.1 also shows that specific property details such as the age, no of rooms and occupancy were less important to the users surveyed. However some of these items were of particular interest to insurers who require this information to help inform their underwriting practices.

Although the observations included in this section are based upon a small sample, it has highlighted a number of issues of relevance to the future capture, management and use of property level flood risk information. These issues have been considered in the development of remaining sections of the report and the suggested future actions outlined in Section 8.

Figure 6.1 Current and future requirements for property level flood risk information



7 Overcoming the barriers

To meet the future aspirations of users as outlined in Section 6 will require additional efforts to address and/or minimise the impact of the institutional, and data barriers which were outlined in Section 5. The following sections consider how this could be achieved in the future and provide the setting for developing the proposed actions outlined in Section 8.

7.1 Summary of potential solutions to barriers

From interpretation of the interviews and workshop responses, the project team has identified a range of potential solutions for improving the future access to datasets relating to property level flood risk. These are summarised below in Table 7.1.

Table 7.1 Summary of potential solutions to barriers

Barriers	Suggestions to overcome barriers	Suggested lead organisation(s)
1 - Institutional and legislative barriers		
Commercially sensitive data / commercial advantage	<p>Process required:</p> <ol style="list-style-type: none"> 1. Understand vested interests 2. Understand levels of sharing 3. Better understand reciprocal benefits of data sharing 4. Identify options to overcome 5. Memorandum of Agreements 6. Share information <p>Development of a central pool of data beneficial to all data providers.</p>	<p>Insurance companies, water companies, data providers and flood product providers.</p> <p>Supported and promoted by central agencies, government bodies, associations and institutions.</p>
Cost of information. Licensing large datasets entails a large cost, which has to be weighed up on a cost-benefit basis	Encouragement of the sharing of datasets between stakeholders for each organisation's mutual benefit. This should reflect government efforts to encourage wider data sharing (HM Government, 2006 and DCMS/DBIS, 2009)	Data providers (inc. Environment Agency) and central government departments (DCLG and Defra)
Data Protection Act Sharing of sensitive property-specific data may be prohibited, or the Data Protection Act may be used as a screen behind which commercial organisations hide behind to retain commercial advantage.	<p>The Flood & Water Management Bill should help clarify and improve some of data sharing requirements between professional partners. However the requirements of the Data Protection Act will still need to be followed.</p> <p>Depersonalisation of data could be a quicker way to bring about increased data sharing rather than more legislation.</p> <p>May take a leap of faith by forward thinking organisations to develop legal test cases where sensitive information is shared for the "greater good".</p>	<p>Central government bodies (DCLG, Defra)</p> <p>Environment Agency</p> <p>Supported / promoted by associations and institutions.</p>
Intellectual property rights	Model agreements required and case studies of success stories disseminated widely	All relevant organisations.

Barriers	Suggestions to overcome barriers	Suggested lead organisation(s)
<p>Licensing arrangements</p> <p>Feedback from commercial data providers indicates that licensing arrangements with the Environment Agency and other organisations such as Ordnance Survey can be problematic to arrange.</p> <p>Licensing agreements can often be overly complex and prohibitive.</p>	<p>A central list of the main data providers and their relevant contact details would help (including a nominated representative from each licensing organisation with contact details).</p>	<p>Central government bodies (DCLG, Defra)</p>
<p>Multiple sources of information and restrictions on access</p> <p>It can be difficult to know where to go for the information required due to the large number of stakeholders and large number of sources of data.</p> <p>Some relevant flood risk information has restrictions placed on it so that it cannot be used by all stakeholders who may find it useful for their operations.</p>	<p>Use of intermediaries to filter data for public.</p> <p>Production of freely available guidance targeted at, or with targeted dissemination to, specific stakeholder groups may help in this respect.</p> <p>Feedback from public and data users in general is important to understand user requirements.</p> <p>Development of a national metadata data portal to enable professional organisations to communicate the availability and accessibility of property level data</p> <p>Any developments would need to consider the additional barriers which might be introduced. These include cost implications and increased administration burdens.</p>	<p>Environment Agency in its “strategic overview” role under the Flood & Water Management Bill, plus each stakeholder organisation to keep their own information up-to-date.</p> <p>Supported / promoted by central agencies, government bodies, associations and institutions.</p>
<p>Perceived property blight</p> <p>This can often prevent property-owners from wanting to share information or inform authorities of flood incidents.</p> <p>Frequency of changes in property ownership is a related issue also.</p> <p>Understanding and interpretation of data / communication of data</p>	<p>Education is required to inform property owners of solutions to minimise the impact of flood events.</p> <p>Information on flood risk should form part of information provided by developers with new property in flood risk areas</p> <p>The benefits of doing this should be passed on to the property owner in the form of reduced insurance premiums.</p> <p>Solutions and benefits should be communicated in plain English and case studies of success stories presented showing how measures can be funded (and associated costs)</p>	<p>Association of British Insurers (ABI)</p> <p>Environment Agency</p> <p>Local Government Association (LGA)</p> <p>National Flood Forum (NFF)</p>

Table 7.1 (cont) Summary of solutions to barriers

Barriers	Suggestions to overcome barriers	Suggested lead organisation(s)
2 - Data barriers		
<p>Contradictory information and lack of consistency</p> <p>A lack of consistency in the collection, storage and sharing of data can cause numerous problems, particularly where data users receive contradictory information.</p> <p>This can also lead to a lack of confidence in the available data, regardless of the data source in question.</p>	<p>Flood & Water Management Bill should bring about better consistency of approach through the standardisation of working arrangements between local authorities, the Environment Agency and other stakeholders.</p> <p>Publication and dissemination of standards may also help in this respect.</p> <p>Templates for property-level flood risk assessments could help in the assessment / comparison of different levels of risk at property level and bring about a standardised approach. Would also help bring about increased uptake of resilience / resistance measures.</p>	<p>Data providers (inc. Environment Agency) and central government departments (DCLG, Defra)</p>
<p>Data quality, accuracy and credibility</p> <p>This includes the “fitness for purpose” of the data and at what scale it is appropriate to use it at (local, regional, national).</p> <p>Also different data is collected for different reasons so it may not be appropriate to use the information for something other than that which it was intended for.</p>	<p>Confidence in the data provided is paramount and appropriate data standards should be adopted.</p> <p>Uncertainties and limitations of various datasets should be clear communicated to the professional users of shared dataset. This should be achieved using established metadata/technical documentation standards.</p> <p>It must be communicated to the public in an easily understandable way so that they know that the best available data is being used.</p>	<p>Data providers (inc. Environment Agency)</p>
<p>Lack of understanding of data or misinterpretation of data</p> <p>Poor communication of data can lead to poor understanding by the client and so the benefits of available data is not maximised.</p> <p>Data providers not understanding user needs is a key issue.</p>	<p>Improved articulation of flood risk.</p> <p>Training on flood risk management required for some end users. This could include further extension of the Environment Agency Local Authorities River and Coastal Engineering Foundation Degree (see the Environment Agency website for further details)</p>	<p>Data providers (inc. Environment Agency) and central government departments (DCLG, Defra)</p>

7.2 Addressing the institutional barriers

From the information presented in Section 4 to 6, the project team has also considered the future policy drivers which will encourage different organisations to improve the quality of flood risk information collated at a property level or improve the access to information which is currently restricted. The discussion provides a context for the proposed actions arising from the study which are presented in Section 8.

7.2.1 Flood and Water Management Act and Flood Risk Regulations 2009

Floods and Water Management Act

The draft Floods and Water Management Bill (FWMB) published on the 21st April 2009 set out proposals for a new framework to help improve flood risk management; help the management of water more sustainably and improve water related services for the public in England and Wales. (Defra, 2009) The Act in its final form received Royal Assent in April 2010.

The Act prescribes a number of changes to the assessment and management of flood risk in England and Wales. These changes include defining new roles and responsibilities for flood risk management (including clarifying the Environment Agency's overview role on Flood Risk Management); continuation of the Environment's Agency role in producing and maintaining the main river map; assignment of lead responsibility for local flood risk management to county and unitary local authorities; encouragement of national design and performance standards for SuDs; and implementation of the Pitt Review recommendation to place a duty on relevant organisations to co-operate and share information.

This last point has the greatest relevance to this project. The Act places a legislative obligation for a range of authorities to provide information to the Environment Agency and local authorities to support the future delivery of fluvial and surface water flood risk maps. The relevant clauses of the Act are reproduced in Appendix F.

The approach outlined in Appendix F was accepted by around 50% of the 177 consultation responses to the consultation on the draft Bill (Defra, 2009b) with a further 25% of respondents having a neutral view on the issue. However a further 25% of respondents advocated the inclusion of water companies, sewage companies and internal drainage boards to the list of authorities with should share/provide information to local authorities for the purposes of local flood risk management. This approach has a number of merits, especially considering the growing need for these organisations to work towards the delivery of surface water management plans.

Many of the consultation respondents also highlighted the need to control information which was deemed to be sensitive or important for national security. These issues were predominately raised by water companies, regulators,

academics and consultants. This reflects the evidence which was collected in this study and reported in Sections 4 and 5.

In addition to this issue, the consultation also found that over 80% of the 150 respondents agreed that the Environment Agency and county/unitary authorities should be able to specify the format and standards for information to be shared between organisations. Many stakeholders believed this would help improve the transferability of information and make the sharing of data more cost-effective. This assumed that the formats and standards specified were reasonable and avoided unnecessary burden.

It is therefore expected that the Act will help to increase the level of data sharing which takes between relevant data holders. This should be encouraged and will ultimately help improve the overall accessibility and use of property level flood risk information.

Flood Risk Regulations 2009

The Flood Risk Regulations 2009 are the statutory instrument which transposes Directive 2007/60/EC of the European Parliament on the assessment and management of flood risks for England and Wales.

These regulations place a new duty upon the Environment Agency and local authorities to prepare preliminary flood risk assessment (PFRA) maps/reports about past floods in defined river basins and the possible harmful consequences of future floods from the sea, main rivers and reservoirs.

Although the outputs of the Flood Risk Regulations 2009 process are more strategic in nature, the regulations also set a legislative obligation for relevant authorities to provide information where reasonable to fulfil the requirements of the regulations. The named authorities in the regulations including the lead local flood authority, a district council for an area, an internal drainage board(s), a highway authority, water company, reservoir undertakers, navigation authority, Natural England, Historic Building and Monuments Commission for England, the Countryside Council for Wales and the Welsh Ministers.

These requirements are closely aligned to the data sharing commitments which will be implemented by the FWMB. These arrangements were outlined earlier in this section. Both of these legislative drivers will help to encourage greater levels of data sharing (include information relating to properties) in the future.

7.2.2 Climate change predictions

In 2009, the Environment Agency estimated that 5 million people live and work in the 2.4m properties in England that are at some risk of flooding and, at present, around £570m is spent every year building and maintaining the defences needed to protect them (Environment Agency, 2009). Half a million of those properties are in highest risk band, which means they are at risk of flooding due to extreme weather with a 1 in 75 chance of occurring in any year.

The latest UKCIP09 predictions also indicate that, by the 2080s, sea levels could be around 70cm higher around the southern parts of the UK, making serious storm surges and floods more frequent (Murphy et al, 2009). Using predictions from the UK Climate Impacts Programme, the Environment Agency also estimates that maintain the level of flood risk for the 2.4m at-risk homes for the next 25 years will cost £1bn per year by 2035 (Environment Agency, 2009).

The Environment Agency has also calculated that the annual cost of damage to residential and commercial property from flooding in England could rise from £2.5bn to £4bn by 2035 and that investing additional money in improved flood defences would save the country some £180bn over the next 100 years.

Based upon these predictions and experience of recent flood events (including the national floods of Summer 2007 and Cumbria 2009), it is likely that there will be increased interest from both the public and private sector to access and use property level flood risk information. This should help focus efforts from both government and commercial sector to improve the accuracy and availability of various flood related datasets.

7.2.3 Environment Agency FCRM Risk Mapping Strategy 2010-2015

The interviews conducted in this study have highlighted the importance of the Environment Agency's 2010-2015 five year FCRM Risk Mapping strategy in starting the process of assessing whether it is feasible, and if so how to present risk information at a property level. The key elements of the strategy are reproduced below in Table 7.1.

Table 7.1 Extract from the Environment Agency FCRM Risk Mapping Strategy 2010 - 2015

<p>"Principle 4: A greater range of the impacts of flooding and coastal erosion, and the risk of flooding to a property level, will be considered</p> <p>We need to look at the broad range of impacts that can occur from flooding or coastal erosion, both to help us get a better understanding of risk and to meet the requirements of the EU Floods Directive. This requires us (in the Preliminary Flood Risk Assessment) to look at 'the potential adverse consequences of future floods for human health, the environment, cultural heritage and economic activity'. Studies have shown that people want information about flood risk and coastal change to property level (i.e. their house) and often misinterpret our information as being property-specific already. We will assess whether we should now be mapping to that scale.</p> <p>We will:</p> <p>A4.1 develop a dataset that will include information about the sites affected by flooding and coastal erosion, including properties, significant environmental sites and sites of cultural interest. This dataset will be the single source which we will use to understand the impacts of flood and coastal risk.</p> <p>A4.2 investigate whether we can realistically assess risk to the property level in a cost-effective way, and, if so, determine whether we need to take a risk-based approach to the application of that method"</p> <p>(reproduced from the Environment Agency FCRM Risk Mapping Strategy 2010-2015)</p>

Part of the implementation of the FCRM Risk Mapping strategy is assessing whether future risk information products can and if so whether it should be aimed at assessing the risks for individual properties rather than larger land areas.

A key element of the implementation of the strategy will be the development of 'probabilistic' mapping products which will be used to replace the source of information currently used on Environment Agency What's in Your Backyard (WIYBY) web pages. These products may ultimately express the probability of a certain water level occurring at a certain location is x%, although the best means of communicating this risk information is still being investigated.

The development of these products may require the development of new modelling techniques and access to high quality digital terrain and property level information, although this is just one way of approaching the need to assess flood risk at a property level. The process of developing these approaches is at an early stage but may ultimately lead to the development of the methods to evaluate the relative flood risk of individual residential or commercial properties.

The FCRM Risk Mapping and Modelling strategies also highlight how uncertainty needs to be used in a positive way to improve our decision making, rather than over investing to try and reduce it, where it is not necessary.

7.2.4 Developments in the insurance industry

ABI statement of principles

The UK is unique in offering flood cover as a standard feature of household and most business policies and unlike much of Europe and worldwide, cover is widely available to the UK's 23.5 million householders. Less than 1% of all household properties currently fall into the unacceptably high-risk flooding category.

The wide availability of cover is based upon the Association of British Insurers (ABI) Statement of Principles, a partnership approach for flood risk management between the industry and the Government. This agreement was first reached in 2003, and had the primary aim to ensure that flood insurance remains widely available now and in the long term, despite increasing flood risk caused by climate change.

ABI undertook a review of the statement of principles on flood insurance with the Government in early 2008. This was concluded in July 2008 with a revised statement to ensure the long term availability of flood insurance by the Government and the insurance industry (Association of British Insurers, 2008).

The main features of the new agreement included action by a range of government agencies (including Environment Agency, Defra and DCLG) to:

- move away from a short term three-year approach, and the development of a long term plan (over the next 25 years) for flood risk management.

- extensive work to tackle surface water flooding, including the newly proposed Floods Bill;
- easier access to better risk data and Environment Agency five-year plans, together with a work plan for delivery of this and other supporting data to facilitate better communication of flood risk to insurers and the public;
- full published evaluation of planning policy by early 2009 to ensure the new planning rules are delivering at both strategic and practical levels commitment to review policy if necessary;
- excluding properties built from 2009 onwards from the statement so that it puts the onus on developers to ensure their development is insurable; and

In exchange, the insurance industry provided commitments to:

- Continue to make flood insurance for domestic properties and small businesses available as a feature of standard household and small business policies if the flood risk is not significant (this is generally defined as no worse than a 1.3% or 1 in 75 annual probability of flooding).
- Continue to offer flood cover to existing domestic property and small business customers at significant flood risk providing the Environment Agency has announced plans and notified the ABI of its intention to reduce the risk for those customers below significant within five years.
- The commitment to offer cover will extend to the new owner of any applicable property subject to satisfactory information about the new owner.
- Consider removal the statement of principles in 2013 with the market operating efficiently and freely thereafter

(Reproduced from Association of British Insurers, 2008)

As outlined above, the effective implementation of the ABI's revised Statement of Principles will rely on access to adequate flood risk information which can be used to effectively evaluate the risks to an individual property. This requirement will help to encourage the continued development of improved flood risk models/ datasets and potentially the greater sharing of data between the UK insurance industry and government departments in the future.

Development of risk based pricing

Over many decades, the UK private insurance market has proved a highly effective mechanism for providing comprehensive building and contents insurance cover for homeowners and business located in flood risk areas. This includes providing a mechanism for covering around £0.5-£1 billion worth of flood related claims per annum.

One of the key characteristics of the UK insurance market has been the provision of flood cover at relatively consistent costs. As a consequence, most individual's living in properties at a significant risk of flooding have benefited

from subsidised “non-risk based” insurance costs rather than paying the actual “risk based” price for buildings and contents cover.

Although this has been the historical nature of the UK insurance industry, the scale of recent major flood events (Carlisle, 2005, National Floods - Summer 2007 and Cumbria, November 2009) have led to concerns of the future costs of flooding to the insurance industry. Although cover is still provided to almost all properties, the increase in frequency and scale of claims has resulted in the changes by many insurance companies to use risk based information (i.e. flood risk model) to help inform the setting of insurance premiums and/or excess level which more accurately reflect the risks of a particular location.

This increased use of risk based pricing methods has also been reflected in the development of insurance companies who can offer customised insurance products for residential and business customers properties located in areas of significant flood risk or who are subjected to regular flooding. A list of specialist providers can found via the ABI or BIBA websites.

It is also likely that the specialist providers of flood risk insurance products, rather than mainstream insurance companies will become increasingly important collectors and managers of property based flood risk information. It is also hoped that in the future there will be more consistent approaches to the collection of information by these organisations. This issue is discussed in detail below.

Consistent collection of property level flood risk assessment information

During late 2009 and early 2010, the insurance industry and the Environment Agency/Defra have been working to develop a standard template for property level flood risk assessment. Although the format of this template is still under development, it is understood that the following attributes will be considered:

- What type of flooding presents the greatest risk?
- What is the annual exceedance probability of this type of flooding?
- What is the maximum anticipated depth of flood water relative to ground floor level (or, if more appropriate, basement floor level)?
- What is the source of the above information?
- What measures could be put in place to reduce the annual flood risk to '1 in 200 years' or less?
- If it is not practical to reduce the annual flood risk to '1 in 200 years', what could reasonably be done?
- Following any risk reduction measures proposed, what would the residual risk, if any, be?
- What mitigation measures and procedures could be put in place to manage the residual risk?

It is anticipated that finalisation of this template will help to standardise the collection of survey information for properties in flood risk areas and would also help provide more consistent information to be included in future Home

Information Packs. This important additional driver within the property conveyance market is discussed below.

7.2.5 Property Sales

From the 14th December 2007 until May 2010, it was necessary for a property seller to produce a Home Information Pack (HIP)¹⁰ to support the sale of the property. There are some exceptions, including mixed-use properties (such as a flat and shop being sold together), portfolio sales, or sales of properties with leases originally granted for less than 21 years.

The HIP process included the production of a number of mandatory documents including a Property Information Questionnaire (PIQ); Energy Performance Certificate (EPC) or a Predicted Energy Assessment (PEA); sustainability information (for new homes); sale statement and evidence of title. The seller could also include a number of optional documents covering issues such as flooding and/or ground stability.

This system has now been suspended following the formation of the new Conservative/Liberal Democrat government and it is expected that formal HIPs will be removed as a formal requirement for property vendors. This change is expected to place the emphasis on the property buyer rather than seller to assess the potential flood risks of an individual property.

As information regarding flooding was only an optional element of the HIP process, this change could result in more property buyers (and their agents) obtaining flood risk assessment reports. This is particularly true for locations which have experienced flooding in recent years and/or for which insurance cover is harder to obtain.

The use of more detailed flood risk reports in these situations should therefore be encouraged to ensure that both buyer and seller are fully aware of the flood risk situation during the sale process. It is also suggested that future research evaluates the takeup of detailed flood risk reports and the barriers to their wider use within the property selling process.

7.2.6 Collaborative working and data sharing

The Pitt Review (Cabinet Office, 2008) also developed a series of recommendations which encouraged greater collaborative working and data sharing, especially in relation to the assessment of surface water flood risks. These key recommendations were:

- Recommendation 5: The Environment Agency should work with partners to urgently take forward work to develop tools and techniques to model surface water flooding.

¹⁰ <http://www.communities.gov.uk/housing/buyingselling/homeinformation/>

- Recommendation 14: Local authorities should lead on the management of local flood risk, with the support of relevant organisations.
- Recommendation 15: Local authorities should positively tackle local problems of flooding by working with all relevant parties, establishing ownership and legal responsibility.
- Recommendation 16: 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.
- Recommendation 17: All relevant organisations should have a duty to share information and cooperate with local authorities and the Environment Agency to facilitate the management of flood risk.
- Recommendation 18: Local Surface Water Management Plans, as set out under PPS25 and coordinated by local authorities, should provide the basis for managing all local flood risk.
- Recommendation 36: The Environment Agency should make relevant flood visualisation data, held in electronic map format, available online to Gold and Silver Commands.
- Recommendation 55: The Government should strengthen and enforce the duty on Category 2 responders to share information on the risks to their infrastructure assets, enabling more effective emergency planning within Local Resilience Forums.

A key element of the delivery of these recommendations has been the encouragement of enhanced working arrangements and sharing of information between local authorities, water companies and the Environment Agency. This has been particularly evident in the work which is ongoing to develop the first generation of surface water management plans and recent SFRAs across England and Wales (see recommendation 18 of the Pitt Review).

In most of these SWMP studies, data relating to underground drainage networks is being provided (under licence) by the water companies and is being integrated with surface terrain and flood routing data collected by the Environment Agency and/or local authority. The integration of these datasets will ultimately help improve the assessment of surface water flood issues and the future assessment of risks posed to individual properties in urban environments.

Although the SWMP studies are an emerging process, the evidence collected in this study indicates that the historic barriers which have limited the sharing of data between water companies, local authorities and the Environment Agency are being challenged and in some cases being removed. This is especially true for the outputs of the SWMP studies which should provide benefits to all parties involved.

However it is important to note that access to this information in these studies is still tightly controlled through agreed licensing arrangement between the organisations and where relevant consultants involved. This process ensures that provision of the data remains secure and the information is not used for inappropriate applications.

It is anticipated that the future development of more SWMP studies will continue to promote opportunities for sharing of information relating to property level flood risk between the Environment Agency, the water companies, local authorities and potentially the UK insurance industry. These developments should help to improve the availability and under controlled conditions the use of the information for beneficial applications. These include improved assessment of future flood defence improvements; targeting of grants for flood resistance and resilience; combined solutions for surface water flooding issues and improved communication of current and future flood risk issues to vulnerable communities and individuals.

7.3 Addressing the barriers to data availability and quality

From the information presented in Section 4 to 7, the project team has considered a number of data specific actions which would help improve the access to information which is currently restricted and improve the quality of flood risk information collated at a property level. The discussion provides a context for a number of suggested future actions which are presented in Section 8.

7.3.1 Making the data more accessible

Awareness of available data was very variable among the users interviewed in the study. Data cannot be accessed by users who are not aware of it and many respondents were more concerned with spreading awareness of current data than in attempting to improve datasets. Suggestions included providing links from insurance company websites to the Environment Agency or commercial value added resellers as a way for residential and/or commercial policyholders to assess information sources.

Publication of a publicly available guidance document/metadata resource which provided details of all data sources (including access, costs and limitations) would be a useful addition to the services provided by the Environment Agency. This could be issued to those who requested property level information from the Agency. However the document would be subject to frequent updating and would need a long term resource commitment from the Environment Agency.

In terms of allowing access to datasets, web platforms were frequently mentioned as the most easily accessible form of data. Web portals offer easy instantaneous data transfer and can be subject to password protection or payment restrictions. Although these were suggested routes for improving data access, it was acknowledged that development of new web based means of data storage and retrieval would be expensive and difficult to achieve due to the various barriers outlined in Section 5. It should also be recognised that not all individuals have internet access and paper versions of all reports should be available via traditional routes.

Readers should note that the development of flood related metadata system has been explored in a number of earlier research projects, including Defra

2006b and SNIFFER 2007. A number of additional systems for recording environmental metadata have also recently emerged, including the Data.Gov¹¹ and Project Atlantis¹² website. Any future work to provide this information to the professional and the public should be closely linked to these systems. A proposed action relating to this issue is detailed in Section 8 of this report.

Widening the access to existing data which is regarded as too sensitive to release to the either professional partners or the general public could be achieved by sharing of best practice where organisations have overcome the perceived barriers to access. Views put forward at the workshop included the opinion that data gathered using public money should be available to the public.

Also widespread in the workshop group was the view that increasing data access will lead to better flood risk management. Organisations holding data could use the expertise of data resellers to filter sensitive information for dissemination to the public under stringent confidentiality agreements.

7.3.2 Making the data more user friendly

A number of the people interviewed in the study highlighted that the outputs of many flood risk datasets was complex and that specialist knowledge (i.e. understanding of return periods and probabilities) was required to fully interpret the risk potential to an individual property. This was also reflected in the workshop where a flood action group member appealed for straightforward information for lay people.

As a consequence, most interviewees requested that future property related flood risk products should be produced in a format which enabled interested professional parties to assess risk in greater detail but which could also be expressed in terms which members of the public and partners could readily understand. In reality, this is unlikely to be satisfied by one set of products and may require many tailored outputs presenting the same risk information for different users (Hagemeier-Klose and Wagner 2009).

For example, emergency responders all have a similar requirement to access simulations of real time flood patterns for possible future flood events for planning and training purposes. If these simulations could combine flood risk with property information, such as number of properties likely to require evacuation or assistance with moving items, or those installing defence products, then this would be valuable for resource planning and training purposes. Velocity and speed of onset was also key information for this group.

For property owners, communication which personalises the information and stresses impacts and potential self protection would be valued. These views are indicated by previous research and confirmed by this study. This might include the increased use of alternative methods of communicating risk. Visualisation, simulation or personal testimony is likely to be effective in

¹¹ <http://data.gov.uk/>

¹² <http://www.projectatlantis.net/>

communicating to the public but must be backed up by technical information which provides possible solutions.

Examples might include a click through facility on the flood map showing an image of a property and illustrating the potential impacts of water levels under different flood events. Use of aerial photographs or familiar maps may also help property owners identify their location relative to flood scenarios (Hagemeier-Klose and Wagner 2009). The use of flood depths either at gauge boards or well known local buildings or even pictures from floods of similar return periods may also help locals to contextualise flood risk information.

Examples of approaches taken by other governments are detailed in Meol et al (2009) and include depth, velocity, damage and vulnerability information. However, this research did highlight that some users were concerned that simplifying the presentation of information too much would be counterproductive and would mean that uncertainty could not be conveyed effectively to the end user.

7.3.3 Updating the information more regularly

Regular updates were seen as important by most of the users interviewed so that the best possible risk information was available for use at all stages.

Insurers in particular were concerned that difficulties in accessing information on future flood defences and property level protection would be a factor which would influence the future assessment of the risk posed to individual properties. This view was echoed by responses received at the study workshop, where people advocated the encouragement of wider data sharing.

Factors which would require updates were seen as including any changes that might affect flood risk such as the completion of new flood defences or a more recent flood event. Climate change was also considered to be a major factor which would necessitate regular modifications to available flood risk maps.

7.3.4 Cross checking the modelled data with other sources of data

Some users called for additional independent reviews of data sources. These views were particularly directed at the accuracy of the models and datasets produced by the Environment Agency. However, discussions with the Environment Agency have highlighted the range of checks which are undertaken to calibrate the inputs and outputs of the flood risk models produced. Much of this information is also available to users through the detailed flood risk products outlined in Section 4.

A number of other people interviewed also questioned the reliability and use of commercial flood risk models within reports intended for the assessment of property level flood risk. Some users called for an independent review of procedures used to calibrate some of these models to ensure the best possible methods were being used.

A number of people interviewed also suggested that the differences between predicted and actual number of properties flooded should be investigated more closely following major flood events to help calibrate and enhance the flood risk modelling outputs which are currently available. This work should ideally call upon information held by emergency responders and (where possible) insurers.

7.3.5 Using more detailed data when available

As shown in Section 4, detailed topographical surveys are undertaken for some properties located in floodplain areas and those which have been flooded. This information is collected by a variety of organisations including developers, surveyors, loss adjusters, flood product producers and damage management specialists.

A number of people interviewed in the study advocated that non-sensitive information collected in these surveys should be made available to the Environment Agency and this information should be used to help calibrate and improve the accuracy of official flood risk datasets.

Most of those who expressed an opinion advocated a two way flow of free and open information which would have the dual benefits of improving the national assessment of risk and reducing the duplication of effort in surveying sites for different purposes. Potential options for the management of additional data are considered next in Section 8 of this report.

8 Future vision and suggested actions

8.1 Developing five year goals (2010-2015)

The discussion presented in Section 6 highlighted a number of key requirements for the future use of property level flood risk data. Some of the most important elements identified by users were: access to flood risk information for other sources of flooding; flood event history; water level information for different flood events; and a dataset showing the location of properties which have installed flood resistance and resilience measures

However, there are still barriers which limit the availability and uses of information relating to property level flood risk. These include: number of organisations collecting information; data costs; costs of primary data collection; commercial and contractual concerns; data licensing; liability and data protection issues and public perception and property blight issues. These issues were discussed in detail in Section 5.

Although many of these barriers will remain in the short term, changes in government flood management policies (including the Flood and Water Management Act and Flood Risk Regulations 2009); operation of the UK insurance industry; climate change pressures; personal interests in accessing property level information will help to promote access to and use of property level information (See Section 7.2). Additional suggestions for improved management and use of available data were also outlined in Section 7.3

From the information presented in the earlier sections of this report, the project team has identified a number of strategic goals to improve the current landscape of data availability and use. These goals are:

- Develop methods to ensure that information relating to individual properties is collected in a consistent manner and managed securely;
- Development of new data products (including surface water, groundwater, sewer flooding and reservoir failure flood risk maps) each to an appropriate scale relevant to the assessment of property level flood risk;
- Promote the increased sharing of non-sensitive information between government departments and external stakeholders (see HM Government, 2006 and DCMS/DBIS, 2009);
- Increasing the awareness of available data sources across all stakeholder groups;
- Development of report tools relating to property level flood risk data which are relevant to the needs of users.

To achieve these broad goals, the project team has developed a series of suggested actions to be addressed by government agencies and external stakeholders over the next five years (2010-2015). These actions are outlined below in Section 8.2.

8.2 Future actions

The project team have identified **16 proposed actions** which are designed to help to improve the availability and use of property level information over the next five years (2010 – 2015). These are:

1 Improving the collection and management of information

- Finalisation and active use of a consistent survey method/template for the survey/loss adjuster and insurance industries.
- Continued development of nationally available maps of flood risk from other sources (i.e. surface water, groundwater and reservoir inundation maps) which can be shared directly with professional parties.
- Development of national fluvial and tidal flood risk maps which delimit vulnerability for high frequency return periods
- Creation of an adapted national property level dataset (based on the OS Address Layer 2) which includes additional attributes relating to flood potential for all sources of flooding and flood history.
- Consistent recording of property level flood risk information using a standardised address format. This would ideally be based upon the address structures contained within the NLPG or Ordnance Survey Addresspoint / Address Layer 2 products.
- Assessment of the potential use of the Environment Agency's National Property Dataset or National Flood and Coastal Defence Database (NFCDD) to store future property level flood risk information recorded directly by government agencies (i.e. the Environment Agency, Defra and DCLG) and/or supplied by other agencies.
- Future storage of all details of all properties which have been protected by the Defra flood resistance and resilience grant scheme in a central database system – potentially using the Environment Agency NPD 2008 data structure.

2 Improving the sharing of property level flood risk information

- Security controlled supply of claims data between the insurance industry and Government departments (Environment Agency)
- Direct access by the Environment Agency flood risk mapping team to relevant flood event information held on the DCLG Incident Recording System
- Actions to encourage all water companies to share (where possible) relevant flood risk datasets with professional partners.
- Encouragement of local authorities to supply details of the location of previously flooded properties to the Environment Agency

3 Improving the accessibility and use of property level flood risk information

- Use of existing internet web portal/guidance to manage metadata details of sources of property related flood risk information, including their routes to access, costs and limitations. Examples might include Project Atlantis¹³ or data.gov.uk¹⁴ websites.
- Increased actions by relevant professional bodies to communicate the availability of existing sources of information to their members.
- Enhancement of the Environment Agency 'What's in my backyard' website to include national surface water and/or groundwater flood risk maps.
- Development of an enhanced report tool on the Environment Agency What's in my backyard website to report fluvial, coastal, surface water and groundwater risks.
- Enhancement of the Environment Agency existing FRA products to include data layers covering other sources of flooding.
- Encourage individuals seeking to purchase a property in a significant flood risk area to obtain a detailed flood risk report
- Development of spatial data layers which detail (a) all (rather than some) areas which currently benefit from flood defences and (b) locations where defences are currently being built.

Although the future delivery of these actions will be the responsibility of government agencies (including the Environment Agency, Defra and DCLG), many of the actions also have direct relevance to the full range of stakeholders consulted in this study. This includes a range of actions which will encourage the collation of more consistent data; improved data sharing; development of collaborative working and development of new products relevant to property level flood risk.

Table 8.1 provides additional information regarding who should be involved in their future execution; details of the relative benefits; barriers which need to be addressed and the specific future actions which will be required to develop and deliver this vision.

¹³ <http://www.projectatlantis.net/>

¹⁴ <http://data.gov.uk/>

Table 8.1 FD2637 – Availability and use of Property Level Flood Risk Information - Future action plan

Improving the collection and management of property level flood risk information					
No	Proposed action	Organisations involved	What will be the long term benefit?	What are the main barriers?	What is the future action needed?
1A	<p>Finalisation and active use of a consistent survey method/template for the survey/loss adjuster and insurance industry.</p> <p>This template should be designed to capture more consistent property level flood risk assessment and post event survey information. It is expected that a preliminary template will be finalised in spring/summer 2010 following work by the ABI, individual insurance companies and the Environment Agency on this issue.</p>	<p>Active promotion of the template by the ABI and individual insurance companies.</p> <p>Active implementation by the loss adjuster and survey industry.</p>	<p>This action would help to provide greater consistency within the industry and help promote the potential future sharing of non sensitive data to professional partners such as the Environment Agency.</p>	<p>Difficulty of getting all relevant parties (including surveyors, loss adjusters and local authorities) to adopt and implement the template.</p> <p>Potential cost of changing business process and IT systems of organisations.</p>	<p>Encouragement for the insurance industry to adopt a standard format for the future collection of information relating to household and commercial claims.</p> <p>It is noted that issues of data capture and sharing are currently being discussed by a working group of insurance company representatives, the ABI and the Environment Agency. It is anticipated that this will ultimately lead to future improvements in capture and sharing of property related flood risk information.</p>
1B	<p>Continued development of nationally available maps of flood risk from other sources (i.e. surface water, groundwater and reservoir inundation maps) which can be shared directly with professional parties.</p>	<p>Environment Agency</p>	<p>Assist the development of future national flood risk appraisals and assist professional partners to identify locations of greatest flood risk management need.</p>	<p>Future availability and licencing arrangements of flood risk maps for other sources.</p> <p>Licensing arrangements for third party data layers used in the production of future datasets.</p>	<p>Continued work by the Environment Agency to work with its strategic partners to develop nationally available maps of flood risk from other sources (i.e. surface water, groundwater and reservoir inundation maps) which can be shared directly with professional parties. These products should incorporate detailed local information and historic data on flooding which are provided by local authorities, utilities and others.</p>
1C	<p>Development of national fluvial and tidal flood risk maps which delimit vulnerability for high frequency return periods</p>	<p>Environment Agency and others</p>	<p>Help improve the identification of locations/properties which were most vulnerable and thereby support effective decision making and investment planning (e.g. future funding of the Defra flood resistance/resilience grant scheme funding).</p>	<p>Technical complexity of modelling and confidence in the final outputs produced.</p> <p>Inappropriate use of the final outputs.</p>	<p>Continued work by the Environment Agency to work with its strategic partners to develop flood risk maps for high frequency return periods and consider appropriate methods of communicating information to users.</p>
1D	<p>Creation of an adapted version of the national property level dataset (based on the OS Address Layer 2) which includes the following</p>	<p>Environment Agency</p>	<p>Production of a consistent dataset which can be used by the Environment Agency and strategic partners for the future</p>	<p>Future availability and licencing arrangements of flood risk maps for other sources</p>	<p>Further work (potentially as part of the development of the Environment Agency's National Receptor Dataset) to explore the format and requirements for this product.</p>

Improving the collection and management of property level flood risk information					
No	Proposed action	Organisations involved	What will be the long term benefit?	What are the main barriers?	What is the future action needed?
	<p>attributes¹⁵:</p> <ul style="list-style-type: none"> - flood potential for a series of defined (10%, 1% and 0.1%) fluvial, coastal, surface water and groundwater flood risk events - water level information for a series of defined (10%, 1% and 0.1%) fluvial, coastal, surface water and groundwater flood risk events/flood history. - property threshold levels (where recorded) <p>This dataset would not include VO Focus rating information to simplify licencing arrangements.</p>		collection of information relating to property level flood risk. This would build upon an established data source used for National Flood Risk Appraisals.	<p>Availability and accuracy of water level/depth information</p> <p>Availability of property level threshold data</p> <p>Volume of overall database and OS licensing arrangements</p>	
1E	<p>Consistent recording of property level flood risk information using a standardised address format.</p> <p>This would ideally be based upon the address structures contained within the NLPG or Ordnance Survey Addresspoint / Address Layer 2 products.</p>	All parties collecting information relating to property level flood risk (including the insurance and survey industry)	The use of a standardised address referencing system would help to improve the future sharing and integration of information relating to property level flood risk. The OS Addresspoint / Address Layer 2 structure is integral to the Environment Agency's National Property Dataset and many of GIS and database management systems used by central government agencies	The key barrier to this action is the established IT and data collection practices used by the organisations collecting property related flood risk information. The adoption of new method for data capture is likely to improve over time but this will be a slow and gradual process.	Further work (potentially as part of the development of the Environment Agency's National Receptor Dataset) to explore the format and requirements for this product
1F	Explore the future use of the Environment Agency's National Property Dataset or National Flood and Coastal Defence Database (NFCDD) to store future property	Environment Agency	Improved centralised management and use of information relating to property level flood risks	<p>Adaptation of the existing NPD 2008 and/or NFCDD datasets could be technically challenging.</p> <p>Long term resource commitment to update and maintain the</p>	Detailed consideration of the current architecture and system capabilities of these current database systems.

¹⁵ This action reflects user interests in accessing this type of information – see Section 6.3

Improving the collection and management of property level flood risk information					
No	Proposed action	Organisations involved	What will be the long term benefit?	What are the main barriers?	What is the future action needed?
	level flood risk information recorded directly by government agencies (i.e. the Environment Agency, Defra and DCLG) and/or supplied by other agencies.			dataset.	
1G	<p>Future storage of all details of all properties which have been protected by the Defra flood resistance and resilience grant scheme in a central database system – potentially using the Environment Agency NPD 2008 data structure.</p> <p>The information recorded should include the location, nature (i.e. type of measures installed), cost and performance of resistance and resilience measures.</p>	Defra and the Environment Agency	The recording of this information would aid the development of more sustainable flood management strategies within the UK and potentially (subject to the owners permission) and inform the insurance industry that a home was adequately protected and therefore subject to normal insurance terms as defined under the ABI Statement of Principles. A potential extension of this proposal would be the potential for owners of residential / commercial properties with flood resistance and resilience to self register on the database. This action was also proposed in an earlier Defra research report (Defra, 2008 and Thurston et al, 2008).	Potential data protection issue relating to information held on the system and resources for managing and adding new information	<p>Further work to identify the technical options for recording future information regarding flood resistance and resilience installations at a central level</p> <p>This might be facilitated through standard forms provided by installers of protection products granting (or refusing) permission to register the installation on the database.</p>

Improving the sharing of property level flood risk information					
No	Proposed action	Organisations involved	What will be the long term benefit?	What are the main barriers?	What is the future action needed?
2A	Security controlled supply of claims data between the insurance industry and Government departments (Environment Agency).	ABI, insurance companies and the Environment Agency	Aid the future improvement of the Environment Agency's flood risk maps and assessment of risk levels for detailed flood risk strategies.	Commercial concerns of some insurance companies to supply data. Need to ensure that the information is securely provided and used only for purposes of FRM and that the use of the information does not infringe the requirements of the Data Protection Act.	Further work to finalise the scope and licensing arrangements for sharing of non-sensitive information between professional partners.
2B	Direct access by the Environment Agency flood risk mapping team to relevant flood event information held on the DCLG Incident Recording System.	Environment Agency and the DCLG	Aid the future improvement of the Environment Agency's flood risk maps and assessment of risk levels for detailed flood risk strategies.	Database has only recently gone live and further developments (including reporting capability) are still being progressed. Further work will be needed to assess the potential use of the information held in the database for Flood Risk Management purposes.	It is suggested that additional work is undertaken by government agencies (including Environment Agency, Defra and DCLG) to investigate the benefits of using the information held in the recently developed DCLG IRS system to help improve the calibration of nationally approved flood risk models and maps. This includes assessing the potential for relating the information collected within the DCLG IRS with the information contained in the Environment Agency National Property/Receptor Dataset. The delivery of this action will require future discussions between relevant specialists in the Environment Agency and the DCLG to evaluate potential arrangements for sharing of the data contained in the IRS. This will need to cover relevant data protection, technical delivery and update needs.
2C	Actions to encourage all water companies to share (where possible) relevant flood risk datasets with professional partners.	Water companies and the Environment Agency	Improved assessment of risk and development of improved property level flood risk assessments.	Reluctance by some companies to release data due to commercial and privacy concerns.	Finalisation of ongoing discussions between the Environment Agency and UK water industry to formalise future data sharing arrangements. This should link to the final responsibilities outlined in the Floods and Water Management Bill.
2D	Encourage local authorities to supply details of the location of previously flooded properties to the Environment Agency.	Local authorities	This development will assist the assessment of future FRM actions and/or development of enhanced flood risk models.	Number of local authorities involved and the format/quality of data holdings. Available resources within local authorities to collect new data or provide data to other parties. Concerns regarding potential property blight and is-use of the datasets.	Work by the DCLG and the Environment Agency to encourage the sharing and use of local authority information. This might include the development of a nationally approved memorandum of understanding regarding data sharing and licensing arrangements.

Improved access to available information					
No	Proposed action	Organisations involved	What will be the long term benefit?	What are the main barriers?	What is the future action needed?
3A	Use of existing internet web portal to manage metadata details of sources of property related flood risk information, including their routes to access, costs and limitations. Examples might include Project Atlantis ¹⁶ or data.gov.uk ¹⁷ websites.	Environment Agency and Defra with contributions of other key stakeholders.	Provide a consistent structure for users to access basic details of datasets	The cost of creating a new dedicated website could be expensive. Long term resource commitment to update and maintain the dataset.	Evaluation of existing systems of metadata storage and retrieval which could be used host details of available sources of information. Examples include the Project Atlantis or data.gov.uk data sharing initiatives
3B	Increased actions by relevant professional bodies to communicate the availability of existing sources of information to their members.	Professional bodies representing stakeholders interviewed in the study.	Improve the awareness of sources of property level information and thereby enhance the assessment of flood risk issues.	Action by professional bodies to increase the awareness and use of relevant flood risk datasets.	Action by the Environment Agency to increase the awareness of Environment Agency products and commercially available environmental constraint reports via the internet. In terms of the public, communication is probably best serviced by Environment Agency Area staff who can communicate the information which is currently available. It is also proposed that a direct link is provided from the "More about flooding" section of the Environment Agency "What's in your backyard" Flood Map to currently available Environment Agency flood risk assessment products. The provision of this link would help to increasing the awareness of currently available information relating to property level flood risk.
3C	Enhancement of the Environment Agency What's in my backyard website to include national surface water and/or groundwater flood risk maps	Environment Agency	All professional partners and members of the public would have direct access to the information relating to flood risk from all sources.	Negotiation of licensing terms and/or costs to publish the existing maps online or development of a new set of surface water flood maps by the Environment Agency. Licensing of existing BGS maps for online publication or development of new set of groundwater flood risk maps by the Environment Agency. Interpretation of risk information could be open to misuse or mis-	Evaluation of the financial costs, licensing needs and caveats required for publication of national surface water and/or groundwater datasets via the EA website

¹⁶ <http://www.projectatlantis.net/>

¹⁷ <http://data.gov.uk/>

Improved access to available information					
No	Proposed action	Organisations involved	What will be the long term benefit?	What are the main barriers?	What is the future action needed?
				<p>interpretation.</p> <p>Potential concerns regarding quality of mapping and potential for property blight.</p>	
3D	Development of an enhanced reporting tool on the Environment Agency What's in my backyard website to report fluvial, coastal, surface water and groundwater risks.	Environment Agency	Professional partners and members of the public will have basic access to the information relating to flood risk from all sources.	<p>Availability of relevant data layers and agreement for use on the Environment Agency's website.</p> <p>Technical development of the tool.</p> <p>Interpretation of risk information could be open to misuse or mis-interpretation.</p> <p>Potential concerns regarding quality of mapping and potential for property blight.</p>	Assessment of the technical options and costs for any future enhancement of the "What's in my backyard" website reporting tool.
3E	Enhancement of the Environment Agency existing FRA products to include data layers covering other sources of flooding.	Environment Agency	Development of improved products for detailed flood risk assessment.	<p>Availability and licensing arrangements needed to integrate surface water and groundwater layers into the FRA products</p> <p>Development of products which fully consider the accuracy of different surface water and groundwater layers</p>	<p>Availability and licensing arrangements needed to integrate surface water and groundwater layers into the FRA products.</p> <p>Development of products which fully consider the accuracy of different surface water and groundwater layers.</p>
3F	Encourage individuals seeking to purchase a property in a significant flood risk area to obtain a detailed flood risk report	Property professional – including property conveyance solicitors, mortgage lenders and Estate Agents	This greater use of these reports would help to clarify the flood risk issues at an early stage of the selling process, and potentially avoid unnecessary costs for both parties later in the process.	<p>Obtaining a detailed flood risk report is not a current legal requirement of the property sale process</p> <p>Potential cost of report but relatively small compared to the average house price sale</p>	Additional efforts to communicate the benefits of obtaining a detailed flood risk report for property transactions in significant flood risk areas. Efforts particularly aimed at property professionals - including property conveyance solicitors, mortgage lenders and Estate Agents.

Improved access to available information					
No	Proposed action	Organisations involved	What will be the long term benefit?	What are the main barriers?	What is the future action needed?
3G	Development of spatial data layers which detail (a) all areas (rather than some) which currently benefit from flood defences and (b) locations where defences are currently being built.	Environment Agency	<p>These layers were seen alongside improved mapping of other sources of flooding (including surface water, groundwater and reservoir failure) as the most important requirements for the future assessment of risk to individual properties. It is also suggested that future efforts are directed (where possible) at increasing the availability of these sources of information for professional partners.</p> <p>Insurance companies would like to access this type of information and development of these data layers could benefit a variety of other users – including local authority</p>	Future availability and currency of this information	Further work to consider the benefits and costs of developing this spatial dataset

9 Conclusion

The overall aim of this research project has been to provide a clear assessment of the current availability, requirements and uses of flood risk information relating to residential and small and medium enterprise (SME) commercial properties and to develop a series of actions to help improve how this information is collected and used in the future.

To address this overall project aim, this study had the following four key objectives:

1. Assess the current uses and requirements of information relating to residential and commercial property level flood risk, history and mitigation measures;
2. Evaluate the availability of information concerning residential and commercial property level flood risk, history and mitigation measures;
3. Assess the future requirements and uses for information relating to residential and commercial property level flood risk, history and mitigation measures;
4. Evaluate how the accessibility and use of information relating to residential and commercial property level flood risk, history and mitigation data can be improved.

These objectives were approached using structured telephone interviews, a review of web sources and other literature and a stakeholder workshop. A summary of how each of these objectives is outlined below.

9.1 Assessment of Current Uses and Requirements

The study found that there are many different uses and requirements for property level flood risk information as currently used by a wide range of different interest groups including architects, damage management specialists, property owners, insurers and local authorities.

For example, in planning new commercial or residential developments architects / designers need to access information on flood risk and the impact brought about by the proposed development. Local Authorities need to assess the suitability of new development proposals following the PPS25 government guidance when considering planning applications. The Environment Agency has a statutory responsibility to reduce flood risk to people and property and produce a range of information relating to flood risk. Emergency responders are required to develop an understanding of flood risk to inform long-term resource planning and the deployment of resources during flood events. Insurers must undertake an assessment of flood risk when providing buildings and contents insurance to property owners. Loss adjusters and surveyors also use flood risk information in assessing damage and recommending adaptation and mitigation

measures that might be considered. Property owners, a key focus for the study, would like to use information relating to flood risk but find it hard to do so due to access and difficulty in understanding the different sources. It is anticipated that the demand and use of such information is likely to increase in the future as flooding events become more frequent and intense.

9.2 Availability of Property Level Flood Risk Information

The Environment Agency is the main provider of flood risk information for coastal and fluvial flooding in England and Wales. A range of products is available including the Flood Map, historical flood event outlines, National Property Dataset (NPD 2008), National Flood Risk Assessment (NaFRA) products and flood risk assessment (FRA) products. The availability of this information varies and includes information that is freely available (such as the Flood Map), information that is shared with others (such as NaFRA) and other information that is used only by the EA (such as NFCDD).

The insurance industry is another major owner and user of property level flood risk information. A number of major companies have developed in-house flood risk models and / or make use of information purchased from the EA. Agents acting for insurers, such as loss adjusters, also collect information about flooded properties. Much of this information remains confidential and is only available internally within the individual organisation concerned.

Water companies have a responsibility under DG5 “At Risk Registers” to record the number of properties that have flooded from sewers and are at risk of flooding again. This information remains confidential to each company albeit there are signs that companies are willing to consider sharing this information to others such as local authorities.

Sources of information on other sources of risk include the JBA surface water flood risk map, the BGS groundwater survey and the JBA reservoir failure dataset. Additional information about flood history is collected by other organisations such as local authorities and emergency responder registers but tends to be only collected for isolated events and is geographically variable in coverage and quality.

Value added resellers often combine the information available from these original sources to provide comprehensive risk assessments for a variety of end users.

The study found a wide range of barriers to making property level flood risk information more widely available including the awareness and understanding of the data, commercial sensitivity of the data, costs of data collection, data protection and liability issues, licensing arrangements, a fear of property blight, and concerns over the accuracy and reliability (i.e. quality) of the information.

9.3 The future requirements and uses for information

Future user requirements of property level flood risk information include a range of functions including resource planning, incident management, informing property owners about risk, assessing the suitability of new development, designing flood defences or property protection, informing government policy, and providing more accurate flood risk and flood damage models.

Most of the current users of this information are looking for enhancements to what they see as useful data which helps them to deliver their business plans. Rather than identify new uses, it seems as a general rule that users are looking for more detailed flood risk information than is currently available. For example, information on the depth of future flooding is seen to be important for many while more transparency about risk models is required by others.

For those who currently do not use many of the data sources the issue of accessibility and cost were the main perceived problems. Many of these individuals would like to see less costly, preferably free, access for all to data which is currently restricted by insurers and other professional partners. A desire to see more contextualisation of data is widely felt with a wider variety of reporting formats requested. This includes the production of sequential flood risk maps and translation of flood risk into maps and information on expected damages.

9.4 Improving the accessibility and use of information

It is anticipated that there will be an increased interest in the use of property level flood risk information in the future. This interest will be driven by a number of factors including predicted increases in flood frequency and magnitude due to climate change. It is also expected that the Flood and Water Management Bill and Floods Directive will encourage data sharing and a demand for detailed information. The Environment Agency FCRM Risk Mapping Strategy 2010-2015 was also seen as an important mechanism which will lead to the development of future products relevant to the assessment of property level flood risk.

The insurance industry clearly has a major role to play in continuing to provide affordable insurance to property owners located in flood risk areas. It is essential that the agreements made under the ABI Statement of Principles with the Government are met and that this relationship helps to encourage wider and co-operative sharing of access to flood risk data for the wider good.

The development of more collaborative working and data sharing between the EA, local authorities and water companies is seen as a logical development that could help improve the availability of property level flood risk information. There is plenty of evidence that these sorts of relations are being established in developing the new Surface Water Management Plans across England and Wales. It is anticipated that future developments in regard to collaborative working might well extend to the insurance industry. The use of good practice examples can be of assistance in encouraging such developments across all professional partners.

10 References

- Association of British Insurers (2008) *Revised statement of principles on the provision of flood insurance*. London: Association of British Insurers available from <http://www.abi.org.uk>
- Black, A. R. and Evans, S., A (1999) *Flood Damage in the UK. New insights for the insurance industry*. University of Dundee Geography Department.
- Building Flood Research Group (2004) *The impact of flooding on residential property values*. Royal Institution of Chartered Surveyors Foundation Report London: Royal Institution of Chartered Surveyors.
- Building Futures/Ice (2010) *Facing up to rising sea-levels: retreat? defend? attack?* London: RIBA.
- Building Research Establishment (2009) *Life handbook. Long-term initiatives for flood-risk environments*. Bracknell: BRE.
- Cabinet Office (2007) The Pitt Review - Learning lessons from the summer 2007 floods – Interim report, December 2007
- DCLG (2007) Improving the flood performance of new buildings: Flood resilient construction
- DCMS/DBIS (2009) Digital Britain. Final Report. June 2009. Report prepared by the Department for Culture, Media and Sport, and the Department for Business, Innovation and Skills
- Defra (2009a) Flood and Water Management Bill, Consultation Paper, April 2009
- Defra (2009b) Summary of responses to the consultation on the draft Flood and Water Management Bill from 21 April 2009 - 24 July 2009
- Defra (2008) Developing the Evidence Base for Flood Resistance and Resilience. R&D Technical Report FD2607/TR. June 2008
- Defra (2006a) Flood and Coastal Defence Project Appraisal Guidance –FCDPAG3 Economic Appraisal – Supplementary Note to Operating Authorities – Climate Change Impacts, October 2006
- Defra (2006b) Improving data and knowledge management for effective integrated flood and coastal erosion risk management. R&D Technical Report FD2323. Produced September 2007
- Defra (2005) Taking forward a new Government strategy for flood and coastal erosion risk management in England. March 2005
- Defra (2004) Flood and Coastal Defence Project Appraisal Guidance – FCDPAG3 Economic Appraisal – Supplementary note to operating authorities July 2004
- Defra (2000) Flood and Coastal Defence Project Appraisal Guidance – FCDPAG3 Economic Appraisal – January 2000
- Environment Agency (2010) Flood and Coastal Erosion Risk Management Appraisal (FCERM-AG), March 2010

- Environment Agency (2009) Investing for the future: Flood and coastal risk management in England. A long-term investment strategy
- Environment Agency (2008) Case Study Report. Collection of Pluvial and Fluvial Flood Data Summer Flood 2007 West Midlands. Report produced by RAB Consultants and Flood Management Support Services Ltd
- Environment Agency/Department of the Environment Food and Rural Affairs (2005) *The appraisal of human related intangible impacts of flooding*. Technical Report FD2005/TR: Environment Agency/Department of the Environment Food and Rural Affairs.
- Hagemeyer-Klose, M. and Wagner, K. (2009) Evaluation of flood hazard maps in print and web mapping services as information tools in flood risk communication. *Natural Hazards and Earth Systems Science*, **9**, pp.563-574.
- Harries, T. (2007) *Householder responses to flood risk, the consequences of the search for ontological security*. Unpublished PhD Thesis, Middlesex University.
- HM Government (2006) Information Vision Sharing Statement, September 2006 - <http://www.foi.gov.uk/sharing/information-sharing.pdf>
- Kenney, S., Pottinger, G., Plimmer, F. and Yasmin, P. (2006) *Flood risk and property, impacts on commercial and residential stakeholder's strategies*. Reading: College of Estate Management.
- Lamond, J. (2009) *Flooding and Property Values*. Findings in Built and Rural Environments (FiBRE) London: Royal Institution of Chartered Surveyors.
- Lamond, J. and Proverbs, D. (2009) Resilience to flooding: learning the lessons from an international comparison of the barriers to implementation. *Urban Design and Planning*, 162(2), pp.63-70.
- Lamond, J., Proverbs, D. (2008) Flood insurance in the UK a survey of the experience of floodplain residents. *First international conference on Flood Response Innovation and Recovery (FRIAR)*, 2-3 July 2008, London. ISSN 1-84564-132-0.
- Lamond, J., Proverbs, D & Antwi, A. (2007) The impact of flood insurance on residential property prices : towards a new theoretical framework for the UK market. *Journal of the Financial Management of Property and Construction*, 12, 129-137.
- Moel, H. D., Alphen, J. V. and Aerts, J. C. J. H. (2009) Flood maps in Europe – methods, availability and use. *Natural Hazards and Earth Systems Science*, **9**, pp.289-301.
- Moel, H. D., Alphen, J. V. and Aerts, J. C. J. H. (2009) Flood maps in Europe – methods, availability and use. *Natural Hazards and Earth Systems Science*, **9**, pp.289-301
- Murphy M, Sexton D, Jenkins G, Boorman P, Booth, Brown K, Clark R, Collins M, Harris G and Kendon L (2009) Climate change projections June 2009 Met Office Hadley Centre. ISBN 978-1-906360-02-3
- Pitt, M. (2008) *The Pitt Review: Learning lessons from the 2007 floods*. London: Cabinet Office available from <http://archive.cabinetoffice.gov.uk/pittreview/thepittreview.html>.

- SNIFFER (2007) Development of a methodology (and identification of responsible parties) for capturing information and data after a flood event in Scotland, June 2007
- Thurston, N., Finlinson, B., Breakspear, R., Williams, N., Shaw, J. and Chatterton, J. (2008) *Developing the evidence base for flood resistance and resilience*. FD2607/tr1: Defra Flood management Conference, July 2008.
- Waterstone, M. (1978) *Hazard mitigation behaviour of urban flood plain residents*. Working Papers WP35 Boulder Colorado: Institute of behavioural sciences.

11 Acknowledgements

The authors of the report would like to thank the contributions of the members of the study's project board – Claire Wilding (Defra); Daniel Johns (Defra), Tim Humphreys (ABI) and Paul Wyse (Environment Agency).

In addition, the authors of the report would also like to acknowledge the contributions of the 60 individuals who were interviewed during the course of the project and/ or attended the project workshop on the 2nd March 2010. These organisations are listed in Appendix B.

The comments received from the interviews and workshops were particularly helpful in developing this final study report.

Appendix A Interview questions

Defra Flood Management: FD2637
Availability and use of property level flood risk information

Questions for owners of property level flood risk data and information

- Please can you summarise the reasons why your organisation collects and/or owns property level flood risk information?
- Please can you provide details of the property level flood risk datasets which you own?
- Please can you summarise the type of organisations who licence/access property level flood risk datasets which you own?
- Please can you provide details of the access / licencing arrangements used to provide your property level flood risk datasets to other organisations?
- What processes/procedures do you have in place to collect, store and archive property level flood risk datasets?
- Please can you provide further technical / metadata information for the property level flood risk datasets which you own using the accompanying template?
- Please can you outline any barriers which currently limit the collection of property level flood risk information/datasets by your organisation?
- What are the main barriers which currently restrict the use of the property level flood risk information/datasets which you own by a wider audience?
- Do you have any plans to increase the accessibility of the property level flood risk information which you own? If YES - what do you plan to do and by when?. If NO - what would encourage you to make your data more accessible?
- Are you aware of other organisations who own and/or licence property level flood risk datasets? Any examples would be helpful

Questions for users of property level flood risk data and information

- Please can you describe the applications / business needs which require you to use property level flood risk datasets?
- Please can you provide details of the property level flood risk datasets which you regularly use to support your business activities?
- Please can you describe the key benefits of using property level flood risk datasets within your organisation?
- From your perspective, what are the current barriers which restrict your current use of property level flood risk information?
- What type of property level flood risk information would you ideally like to access to fully address your business/ organisational needs?
- Do you have any suggestions on how property level flood risk datasets relevant to your activities could be made more accessible? Any examples would be particularly helpful.
- Do you have views on how the quality of current property level flood risk datasets/reports could be improved?
- What do you think will drive future changes in the availability and usefulness of property level flood risk datasets and who should take ownership of this task?

Appendix B List of organisations consulted

Association of Home Information Pack Providers
Association of Drainage Authorities
Ambiental Technical Solutions Ltd.
Anglian Water
Association of British Insurers
Aviva Insurance
AXA Insurance
Baca Architects
Barnsley Metropolitan Borough Council
Bradford Metropolitan District Council
British Insurance Brokers Association (BIBA)
Broom Flood Action Group
Cambridgeshire County Council
Chartered Institute of Loss Adjusters
Cumbria County Council
Cumbria Fire and Rescue Service
Environment Agency (Five respondents)
Equity and General Insurance Services Ltd
FIND Mapping
Flood Management Support Services
Floodconsult
FloodGuards Plc
GAB Robins
Gloucester Fire and Rescue
Gloucestershire County Council
Groundsure
Herefordshire County Council
HR Wallingford Ltd
Hydrologic
Landmark Information Group
Leeds City Council
Littlestock Brook Flood Action Group
London Borough of Barking and Dagenham
Maltby Land Surveys Ltd
Merlin Claims
Mouchel
Munters Limited
National Flood School
Newark & Sherwood District Council
Newcastle University
Ordnance Survey
Oxford Flood Alliance
Powick Flood Forum
Property Care Association
RBS/Directline Insurance
Risk Management Solutions Ltd.
Royal Institute of British Architects
RSA Insurance
Severn Trent Water
Society for the Protection of Ancient Buildings (SPAB)
Telford and Wrekin Council
Thatcham Flood Forum
Total Flood Solutions & Flood Protection Association
United Utilities
University of Dundee
Water Environment and Resources Management (WERM) Ltd
Watertight International Ltd
West Sussex Fire and Rescue
Zurich Insurance

Appendix C User case studies

Case Study 1 United Utilities	
Current requirements of this user group	<p>United Utilities (UU) has a regulatory requirement to collect and record details of incidents related to the public sewerage system. One of the focus areas is related to flooding of property or areas as a result of hydraulic inadequacy (thereby providing information for the DG5 register).</p> <p>UU also require property level flood risk information in order to manage, protect and ascertain the performance of their assets. The DG5 register does not do this as it does not provide a true level of risk.</p> <p>The information also plays a part in identifying the risk of UU assets to flooding. There are other risks associated with pluvial, fluvial and tidal flooding. The Carlisle floods in 2005 and West Cumbria 2009 were particular examples of these other risks.</p>
Datasets owned or used	<p>UU own and use GIS datasets that detail the following:</p> <ul style="list-style-type: none"> • Locations of individual properties on the DG5 Register; • Locations of other flooding events; • Results from hydraulic models related to the sewer system, including pipes and manholes. A range of storm return periods are covered in these models; • Details of the sewer network including the locations of pipes and manholes together with their sizes; • Other asset information for pumping stations, CSO's, detention tanks etc.
Benefits of using property level flood risk information	<p>To manage flooding appropriately and in an integrated manner, it is necessary to understand the detailed nature of the problems and causes of flooding. Property level information is the nth degree of detail and is an essential requirement in urban areas. However, Sewer models are only part of the system and to get the maximum holistic benefits from flooding information UU require information for the whole drainage system, not just part of it.</p>
Barriers to increasing access to data owned by this user group	<p>The UU board has ratified the provision of flooding information and expert input to Local Authorities for the production of SWMP, SFRA or WCS. UU is the one of the first water company to do this and the company has developed a licensing agreement that will be used when distributing this information.</p> <p>The issue of how much of this data can be put into the full public domain is still to be resolved, but the intention is to make as much as possible fully available to everyone. Resources are a huge problem for UU, and this will put a limit on the amount of expertise and to some extent data, that can be input into each project.</p> <p>Others barriers include Ofwat's high expectations of how data should be collected and stored, and also the public's reluctance to provide information about being flooded in order to remain off the DG5 register, due to the fear of property blight. This has proven to be a huge problem as if specific property level flood information gets into the public domain then property prices may decrease whilst insurance premiums may increase.</p>
Main interests in future	<p>UU are already heavily involved in the SWMP process (initially led by their Strategy team with growing support and involvement from their Catchment and operational teams) and UU will provide the following, all free of charge:</p> <ul style="list-style-type: none"> • UU asset data • DG5 register at a property level • Incident data (from their SIRS/WIRS databases) • Model results • Expertise in interpreting the above data • Expert input to the entire process <p>UU are also interested in the future development and provision of LIDAR data. This data is not freely available at the moment, and those that do supply the data currently issue complex licensing agreements. UU feel that Ordinance Survey should manage this data, thereby making it more accessible.</p> <p>Finally, UU feel that the FWMB must be enforced, and in order for this to happen, a few high profile test cases need to take place so that the availability of flood information becomes publicly available.</p>

Case Study 2 – Barnsley Metropolitan Borough Council

Current requirements of this user group	<p>The key requirements for property level flood risk information by this user are:</p> <ul style="list-style-type: none"> • Understanding the location of properties which have been flooded. This will inform the level and scale of emergency response required, including information on which social care properties have flooded, whether evacuation plans need to be enacted and rest centres prepared (need to know the number of people displaced and who need to be catered for). • Assessing in broad terms the potential costs of any future flooding events for the authority. This includes evaluating the potential costs of recovery efforts and potential damage to the local economy. Information on flood risk etc is required to inform costs for the authority's business plan.
Datasets owned or used	<p>The council has a MapInfo GIS system which holds a variety of datasets including historically flooded properties; information gathered from new flood events and external Environment Agency local flood risk maps. The council also uses internally produced plans to assess potential surface water and groundwater flooding risks as these are not covered on the current version of the Environment Agency flood map.</p> <p>Information gathered and stored in the GIS system is used solely for internal purposes. Some information is shared with partners (eg through Local Resilience Forums or for SFRAs), but it is not shared with the general public (apart from directly affected property-owners).</p>
Benefits of using property level flood risk information	<p>Information relating to property level flood risk is used in future land use planning through Local Development Frameworks. This is undertaken at two levels:</p> <ul style="list-style-type: none"> • Strategic level looking forward through development of, and updates to, Strategic Flood Risk Assessments (SFRAs) • Individual local property development applications – identifying where mitigation measures may be required. <p>The GIS system is also used to assess likelihood of these properties experiencing further flooding. This can then help target resources to reduce / manage flood risk through flood alleviation works, including capital schemes and operational maintenance (eg cleaning of trash screens).</p>
Barriers to data provision and/or use of external information	<p>The reliability of available dataset and flood risk is seen by the council as one of the primary barriers to wider access of its own data. The council undertakes its own surveys during and after flood events, however limited resources to undertake this task is an additional barrier.</p> <p>Limited resource for data input into the MapInfo GIS system is another barrier. This is an important issue as the council does not have handheld computers for its staff to upload information directly.</p> <p>Regarding information owned by third parties, there are a plethora of different loss adjustors and insurance companies, many of whom may not want to share property-specific information with the council (customer confidentiality issues). Loss adjustors and/or insurers are not included in the list of professional partners with which the council engages. The council does not want to have to provide the same information in a multitude of different formats to meet the insurers needs, nor vice versa.</p>
Main interests in future	<p>There is a lack of understanding of the different purposes for using property-level flood risk information and a lack of understanding of how to use it. The council would like to share much of its data however the "rules of engagement" would have to be agreed up front and the data would have to be used responsibly.</p> <p>The council's work would benefit from:</p> <ul style="list-style-type: none"> • Increased access to more accurate flood models • Better engagement between data owners and users <p>Ownership of the task of increasing the availability and usefulness of property-level flood risk datasets should not be given to a single organisation but should be shared between organisations with clear guidance on responsibilities of different parties. Currently the situation is that there are lots of different local authorities doing their own SFRAs. The council also believed that the Agency's anticipated strategic role under the Floods and Water Management Bill will help to bring this work together.</p>

Case Study 3 - Insurance Industry	
Current requirements of this user group	<p>The insurance industry requires property level information to identify individual properties, understand the potential flood risk to each property and in order to calculate the financial cost of a flood event. This information is then used to price and underwrite accordingly for this exposure to flood risk, the degree of automation in assessing the level of flood risk being dependent on the size of risk to be insured.</p> <p>Location specific flood risk information is used to assess the hazard level at the location of each property presented for insurance cover relative to the level at other locations. On this basis potential customers may be accepted or declined, with the flood risk element of the insurance cost being calculated to inform the overall price and excess levels required. The development of an effective understanding of risk exposure also allows insurance companies to maintain their loss ratios (the ratio between premiums received and claim amounts paid for losses) to a manageable level.</p>
Datasets owned or used	<p>The key datasets used by this group are: NaFRA, the Environment Agency's flood zone modelling, datasets from JBA Consulting, Risk Management Solutions, the British Geological Survey and the Centre for Ecology and Hydrology, as well as historic flood claims data are also used to inform the assessment of risk. In addition to hydrological/geographic datasets, information on the construction materials and flood resilience of a property is used to understand the potential costs of reinstatement.</p>
Benefits of using property level flood risk information	<p>The two key benefits of using property level flood risk information within the insurance industry are:</p> <ul style="list-style-type: none"> • aiding the assessment of risks posed to individual properties and thereby improve the setting of insurance premiums using risk based information. • enabling insurers to more effectively assess risk exposure for a portfolio of properties and thereby evaluate the level of reinsurance cover required.
Barriers to data provision and/or use of external information	<p>The cost of licensing national datasets can also be prohibitive and difficulties involved in licensing and obtaining this information, appropriate IT systems are required alongside training and in-house expertise to use the information effectively. Licensing costs are important, as flood risk is but one of many perils that insurers have to price for. If the licensing costs compare poorly with the potential reduction in losses through better knowledge of flood risk then it is difficult to make a business case for the acquisition of this data.</p>
Main interests in future	<p>The insurance industry would also like to see more segmentation in the information supplied by the Environment Agency, for example the supply of NaFRA outputs split into ten risk bands rather than the current three bands. Whilst allowing particularly high risk properties to be identified, a ten point scale would alleviate a current issue whereby from assessment to assessment some areas move between the significant/moderate/low classifications, making the consistent pricing of risk difficult. More frequent updates would also be desirable to reflect the changes in risk due to the construction of new flood alleviation schemes and new flood risk knowledge as a consequence of flood events, with flood extents amended accordingly – i.e. areas thought to be at risk but shown not to have flooded and areas thought not to be at risk but shown to have flooded.</p> <p>There is a need for more data on other sources of flood risk, currently the risk from surface-water runoff/inundation during heavy rainfall and the performance of drainage infrastructure, as well as the risk from dam and reservoir failure has been flagged as a particular concern by several insurers. Only limited information is available for these risks, with no equivalent consistent national coverage and area specific datasets being available as there is for fluvial flood risk. Information contained in CFMPs and SFRAs could be made available in a more accessible format. Better flagging of areas of broad scale and detailed flood modelling in the Environment Agency's flood zone map would allow better judgements on data accuracy.</p> <p>Making more information on flood risk publicly available (i.e. flood depths as well as flood zones) would assist the public in taking action to reduce their risk of flooding. Overall higher quality information on all sources of flooding and associated hydrological/geographical factors (accuracy, resolution and presentation in formats readily integrated with existing spatial and database systems) would allow insurers to make improved assessments of risk to properties. However, the lack of consistent credible information that is comparable between locations is the key current issue with regards to differentiating levels of risk.</p>

Case Study 4 - Emergency Responders

<p>Current requirements of this user group</p>	<p>Emergency responders use flood risk datasets to plan allocation of resources, inform planning and inform the public. They require data on areas at risk and the vulnerability of property and people at risk from flood events of different magnitudes. They also require access to information regarding the probability of those incidents and the changing patterns of flooded areas over time during incidents.</p> <p>Detail about damage to property is not as important to this group as the vulnerability of people therefore knowing at which addresses dangerously deep or fast flowing water is likely to occur and when is their main data need.</p>
<p>Datasets owned or used</p>	<p>Emergency responders use a combination of Environment Agency, local authority and their own datasets. They are usually supplied directly with data by the agencies or local authorities and share high level knowledge, experience and interpretation through resilience forums. They don't have the budget to use commercial data sources and probably don't need to.</p> <p>Emergency responders also typically collect data on their attendance at incidents for statutory reporting purposes. For example fire services record their call outs against a 6 figure ordnance survey reference. The type of callout is recorded, time of call and details of the actions taken. This data is also collected in the recently developed national DCLG Incident Reporting System.</p>
<p>Benefits of using property level flood risk information</p>	<p>Use of property level and other flood risk and history data enables responders to provide a better service to the public during times of spate, saving lives and property. It also serves to makes the services more cost effective and to assist in informing the public about their individual risk and mitigating actions.</p>
<p>Barriers to increasing access to data owned by this user group</p>	<p>This group is highly amenable to sharing information among professional partners and to sharing information with the public at risk. A further barrier to accessing this data is the cost of providing data in appropriate formats which would be useful for partners and the resources to disseminate information to the public. Improving the usefulness of this data would be possible if operatives were trained to better record features of flooding incidents.</p> <p>A pilot project is currently ongoing involving data sharing of Fire service data with the local Environment Agency offices to improve Environment Agency flood predictions.</p>
<p>Main interests in future</p>	<p>Emergency responders have highlighted that access to property level flood risk information data makes a considerable contribution to operational effectiveness. However this group has also highlighted that there could be improvements in contextualising and visualising the flood risk into forms that more directly address resource requirements. This group is also very concerned about data formats which can be used to communicate risk to the public.</p>

Case Study 5 – The Environment Agency

As the NaFRA (2008) states: *“The Environment Agency plays a central role in managing flood risk from rivers and the sea. We have the strategic overview role for flood risk management from all causes of flooding, including rivers, the sea, groundwater, reservoirs and surface water. [...]*

Flooding is a part of nature. It is neither technically feasible nor economically affordable to prevent all properties from flooding. The Environment Agency’s aim is to reduce flood risk and minimise the harm caused by flooding. We take a risk-based approach to achieve the best results possible using the budget and resources available. We are working to reduce both the likelihood of flooding and the impacts of a flood when it happens.

[...]

This investment provides tangible benefits. Between 2003-2004 and 2007-2008, improvements by the Environment Agency, local authorities and Internal Drainage Boards reduced the risk of flooding to over 176,000 households, and of these, 156,000 are attributable to the Environment Agency’s flood defence improvements.

Investment in flood risk management represents good value for money. Most new flood defence schemes now built reduce expected damage by at least £8 for every £1 spent, significantly above the 5 to 1 target set by central government.”

Without sufficient property level data it is difficult to assess accurately how many properties are at risk of flooding internally so as to provide a targeted flood warning service and to invest in the flood risk management schemes offering the best value for money. In some cases properties located in areas of flood risk may have threshold levels raised sufficiently above local ground levels so that they are only at risk of flooding internally from more extreme flood events, or even not at all, but all properties within the floodplain may still be affected by access and other issues due to flooding. More detailed threshold information would allow a more detailed understanding of flood risk in different scenarios.

When assessing the benefits of schemes using the Multi-Coloured Manual, property threshold levels provide a key means of estimating the annual average damage that would be prevented by a flood defence scheme. Therefore, ensuring a good understanding of property level flood risk is important when identifying, promoting and designing flood risk management schemes. For example in two similar potential flood risk management schemes where similar numbers of properties have been identified as being at risk, property level information, amongst other considerations, will help to determine the level of benefits associated with each scheme.

The Environment Agency collects data to help target its operations efficiently. After a flood event, data is collected and archived for use in assessments of flood risk. This may also include subsequent survey of threshold levels which can be used to inform flood risk management operations. In addition, where appropriate, data is shared with local authorities and the emergency services in order to assist these organisations with their operations.

Following the flooding of 2007 the Agency’s role was strengthened to a strategic overview of all sources of flooding. Property level information has become of even greater importance to those involved in the management of flood risk from all sources. Flood risk from other flood risk sources such as surface water flooding is even more closely linked to the elevation of a property’s ground floor. Since flooding from surface water tends to be shallow, a property raised even marginally above ground level may avoid flooding whilst another property with ground floor elevations level with adjacent ground levels will be at a greater risk of flooding.

Property level information can help inform new developments, for example, the proposed threshold levels for new properties on development applications help ensure planning measures taken are appropriate to the residual risk.

When considering how to assess property level flood risk, it does not necessarily involve more accurate data, but might involve a different way of using data already available.

Case Study 6 Lincolnshire Multi-Agency Flood Response Plan (MAFRP)

Following the floods of 2007 and the release of guidance by the Civil Contingencies Secretariat, Defra and the Environment Agency, the Lincolnshire Local Resilience Forum (LRF) set up a multi agency flood response planning group; led jointly by Lincolnshire County Council and the Environment Agency. The planning group comprises representatives from Cat 1 and Cat 2 responders and has flexibility to include others as and when required. One of the key outcomes from the group is to compile a MAFRP to assist the joint management of future flooding events in Lincolnshire, having regard to national guidance but ensuring it is locally viable. Historically, the council has a Generic Flood Response Plan in place and this requires updating following use during the 2007 floods, lessons learned by various organisations during and after these flooding events, and in the light of new Government guidance.

Development of the Lincolnshire MAFRP has highlighted the need for improved flood data capture and sharing between councils and other Cat 1 and Cat 2 responders and as part of the LRFs programme of work, a data management project has been formed to provide data management and tools (including GIS maps), serving both the LRFs emergency planning and response needs, and to assist routine operations of the county council and district/borough councils in their flood risk and drainage management, development control, spatial planning and regeneration etc. roles and responsibilities.

Particular data, tools and mapping interdependencies have been recognised between the MAFRP, SFRAs, SWMPs, Lincolnshire Flood Risk & Drainage Management Framework and the Highways Asset Management System. It is proposed that data and information provided will also assist local authorities exercise their new roles under the draft Floods and Water Management Bill and be available to a number of different partners and stakeholders through the LRF, including Cat 1 (eg emergency services) and Cat 2 (eg utility companies) responders. Likewise, useful information (data and maps), relating to property-level flood risk held by these partners and stakeholders will also be made available wherever possible.

The set-up being formulated by Lincolnshire County Council, involving the development of a multi-agency flood response plan and the provision of central management and tools for useful data, maps and information, is one which could be, and indeed is already being, replicated across the UK.

Appendix D Environment Agency Data Products for FRAs

Table D1 Environment Agency data products for flood risk assessment

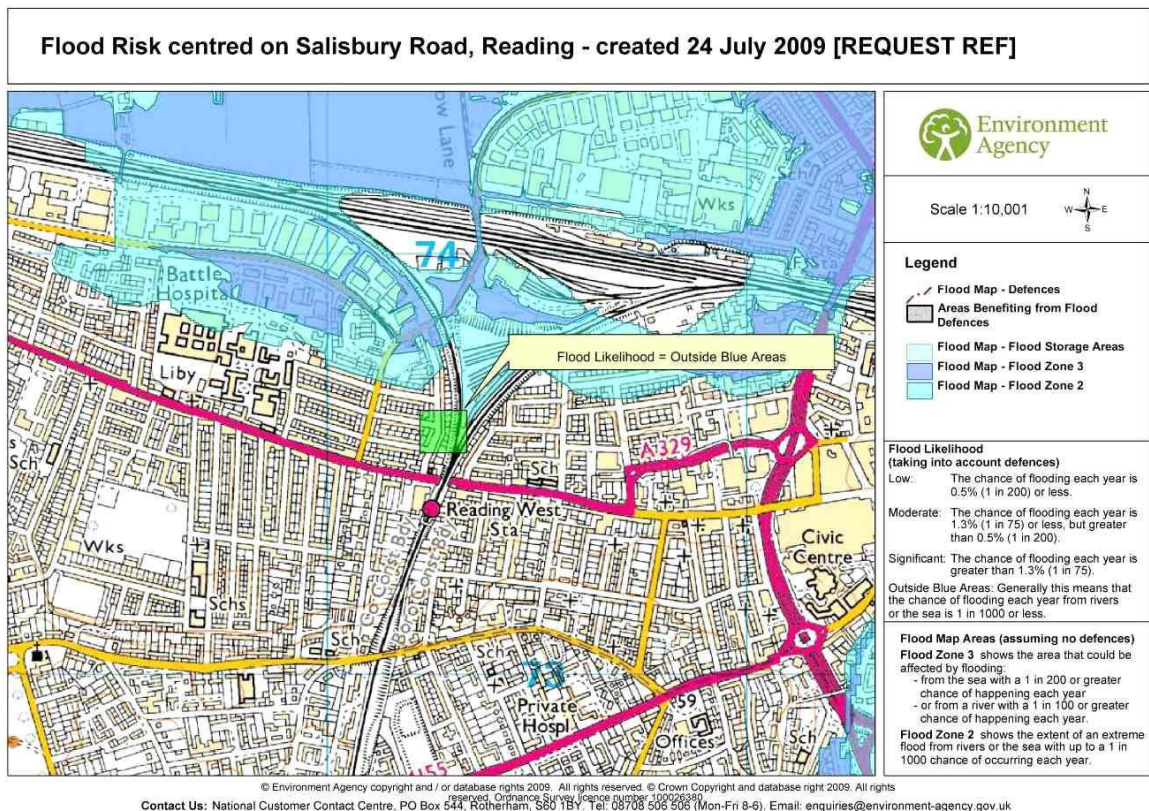
Products	Description	Target Audience
Product 1 (Flood Map)	1:10000 scale map showing 1:25k basemap, Flood Zones, NFCDD flood defences, areas benefiting from flood defences and flood storage areas	<p>Members of the public requesting information concerning their current property;</p> <p>Members of the public and developers where the Environment Agency provides only low risk permeable paving advice in England (and equivalent developments within Wales), namely: 'Non-domestic extensions with a footprint of less than 250 sq metres; and all domestic extensions' in Flood Zone 1 (within the new Flood Risk Standing Advice) 2;</p> <p>Developers of all development scales in Wales seeking to demonstrate that their proposal is located in Flood Zone 1 representing low flood risk for the purposes of the Code for Sustainable Homes.</p>
Product 2 (Flood Risk)	As product 1 but including NaFRA risk category	As Product 1
Product 3 (Basic FRA/FCA Map)	As product 1 but including the three nearest model nodes, water levels and JFLOW depths; statutory main river and bank top eplanning tool	<p>Developers in England where: the Flood Risk Standing Advice provides advisory comments, namely:</p> <ul style="list-style-type: none"> - 'Non-domestic extensions with a footprint of less than 250 sq metres; and all domestic extensions' in Flood Zones 2 and 3 (that is, where electing to set floor levels 300 mm above the known or modelled 1-in-100 annual probability river flood (1%) or 1-in-200 annual probability sea flood (0.5%) in any year); and all applications with a site area less than 1 ha in Flood Zone 1 (identification of dry islands). - FRA Guidance Note 1 applies: 'All applications with a site area greater than 1 ha' in Flood Zone 1 (and Critical Drainage areas less than 1 ha) for identification of dry islands. - FRA Guidance Note 2 applies: Minor extensions with cumulative impact in Flood Zones 2 and 3; and 'All applications with a site area less than 1 ha' in Flood Zone 2 which are: more vulnerable; less vulnerable; water compatible development (no accommodation); or essential accommodation for water compatible developments. <p>Developers in Wales for: non-domestic extensions with a footprint of less than 250 sq metres; and all domestic extensions in Flood Zones 2 and 3 to enable floor levels to be set and all applications with a site area less than 1ha in Flood Zone 2 which are for less vulnerable development.</p>
Product 4 (Detailed FRA/FCA Map)	As product 3, but including extents of available detailed models, FRA/FCA site boundary and historical flood event outlines where available. The product also includes table detailing model information, flood defence attributes and historical flood event outlines.	<p>Developers in England where Flood Risk Standing Advice FRA Guidance Note 3 applies. This includes 'all applications in Flood Zone 3, other than non-domestic extensions less than 250 sq metres; and all domestic extensions'; and 'all applications with a site area greater than 1 ha' in Flood Zone 2.</p> <p>Developers in Wales for all applications: in Flood Zone 3; with a site area less than 1ha in Flood Zone 2 which are for emergency services or highly vulnerable development; and with a site area greater than 1ha in Flood Zones 2.</p>
Product 5 (Reports)	Provision of any additional flood modelling reports (e.g. Section 105), hydrology reports and modelling guidelines used.	Developers and flood risk management consultants

Table D1 (cont) Environment Agency data products for flood risk assessment

<p>Product 6 (Model output data)</p>	<p>Product 5 plus the supply of key modelling output data, including model X/Y coordinate locations, levels and flows; 2D flood model grid data, hydrographs, breach location and widths etc</p>	<p>Developers in England where: Flood Risk Standing Advice FRA Guidance Note 3 applies: 'all applications with a site area less than 1 ha' in Flood Zone 3; and 'all applications with a site area greater than 1 ha' in Flood Zones 2 and 3.</p> <p>Developers in Wales for all applications: in Flood Zone 3; with a site area less than 1ha in Flood Zone 2 which are for emergency services or highly vulnerable development; and with a site area greater than 1ha in Flood Zones 2.</p>
<p>Product 7 (Calibrated and Verified Model Input Data)</p>	<p>Developers or their consultants for Model Output Data (6) and CaVMID (7) (includes pre-defined Special Data charges/content).</p>	<p>Developers in England where:</p> <p>Flood Risk Standing Advice FRA Guidance Note 3 applies³⁴: 'all applications with a site area less than 1 ha' in Flood Zone 3; and 'all applications with a site area greater than 1 ha' in Flood Zones 2 and 3.</p> <p>Developers in Wales for all applications: in Flood Zone 3; with a site area less than 1ha in Flood Zone 2 which are for emergency services or highly vulnerable development; and with a site area greater than 1ha in Flood Zones 2.</p>

An example of Product 2 is shown below in Figure C1

Figure D1 Environment Agency Data Products - Product 2 Example



Imagery courtesy of the Environment Agency

Further examples of Product 3 and 4 are provided overleaf.

Appendix E Commercial flood risk models

Table E1 Reinsurance and insurance based flood risk models – representative examples

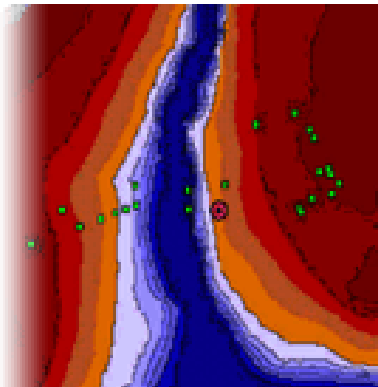
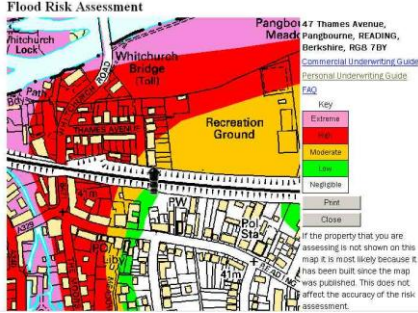
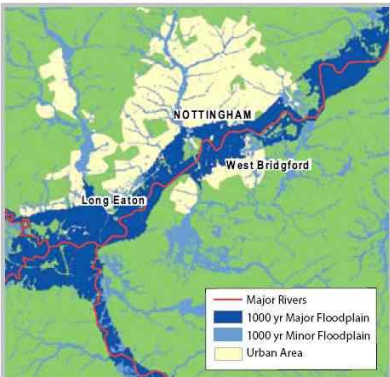

Name of dataset	Description	Example of product	Availability and uses of the map/model
Norwich Union Flood Map	<p>This model provides a property-based flood risk for all residential properties within the UK.</p> <p>The model includes Ordnance Survey's Address-Point data to locate each individual address, before running an algorithm to assign individual properties a flood-risk rating and insurability assessment.</p> <p>There are four levels of flood risk included in the model. These are: High - Property has a flood risk more frequent than a 1 in 75 year event. Medium - Property has a flood risk between a 1 in 75 year and 1 in 250 year event. Low - Property has a flood risk between a 1 in 250 year and 1 in 1000 year event. Negligible - Property has a negligible risk of flooding, or is not on a flood plain.</p> <p>In addition, each property is assigned one of 7 insurability assessments dependant upon the risk of flooding.</p>		<p>The Norwich Union flood map is not available for purchase in the commercial market or shared with government organisations.</p> <p>Outputs of the Aviva (Norwich Union) models are available in a number of Value Added Reseller products. These include:</p> <p>Landmark HomeCheck and SiteCheck reports</p> <p>FloodSearch UK Ltd – Whatsmyfloodisk.com</p>
Royal Sun Alliance (RSA) Flood Model	<p>Over a number of years, RSA has developed an in-house geographical information system, which uses a national mapping system to display unique details at property level associated with topography, contours and other features associated with all watercourses and tidal zones in the UK.</p> <p>The development of the flood model has involved a variety of detailed data gathering tasks, including gathering of information about the catchment area of all watercourses; understanding the volume of water that can flow through the normal channel; ensuring the accurate position of these watercourses; an understanding of tidal systems and tidal changes due to variation of climatic conditions; the impact of wave heights under storm conditions; understanding surface water drainage systems in urbanised areas and how they perform in flood events; and the combination of all these aspects, overlaid with property address information.</p> <p>The end result is an accurate flood risk assessment at property level which our underwriters now use to determine whether the flood risk is within acceptable limits, and at what terms the risk should be underwritten.</p>		Internal dataset only

Table E1 (cont) Reinsurance and insurance based flood risk models – representative examples

Name of dataset	Description	Example of product	Availability and use
<p>RMS UK Inland Flood Model</p>	<p>The 2008 update of the fully probabilistic RMS® U.K. Inland Flood Model is used by a range of UK insurers to price and underwrite policies and manage portfolio accumulations. The latest version of model employs numerical modelling approaches to cover all sources of flood risk on and off the major floodplains, physical modelling of major rivers, minor rivers and temporary streams, surface water flow, the impacts of rising groundwater levels, and drainage overflow in urban areas. Around 1 million kilometres (over 600,000 miles) of river and surface water flow are physically modelled on the latest digital terrain model of 10m resolution.</p> <p>The RMS model calculations are performed on a variable resolution grid (VRG) of up to 50-metre resolution allowing high-level differentiation of flood risk. Damage functions relate the level of insurance loss to the depth of floodwaters using a component-based approach derived from engineering and flood studies, and several years of flood survey experience, and collecting claims and damage information after the major events of 1998, 2000 and 2007. Damage can be differentiated by 12 risk modifiers including the ability to assess losses by individual floors. If detailed risk information is lacking, the model falls back on a detailed building inventory which captures regional variations in building characteristics and applies the most appropriate damage function dependent on the risk location.</p>		<p>The outputs of the RMS inland flood model are integrated into RMS Risk Link risk portfolio assessment toolkit. This tool is used by a number of UK insurance and re-insurance companies in their assessment of risk portfolios</p> <p>Selected layers of the RMS model are also included in Landmark's HomeCheck and SiteCheck reports</p>
<p>AIR The AIR Inland Flood Model for Great Britain</p>	<p>The AIR Inland Flood Model for Great Britain incorporates a river network extending more than 300,000 km. For on-floodplain flooding, a hydraulic model is employed to explicitly model stream links with a contributing area of more than 10 km². Off-flood-plain flooding is modelled according to the physical properties of more than 15,000 smaller catchments. The model also includes a number of additional features including: rainfall generation module that uses the results of numerical weather prediction modelling to produce rainfall patterns in space and time, and across seasons; physically-based hydraulic modelling of detailed river networks; flood defences accounted for in routing and hydraulic modelling; defence failure is probabilistically modelled in loss estimation; models off-floodplain losses to capture a major source of insured flood losses. The model was also calibrated with detailed loss experience data for both residential and commercial lines from the 2007 floods, representing approximately 30 percent of the industry exposure</p>		<p>The AIR Inland Flood Model for Great Britain is only available in CLASIC/2™ AIR's catastrophe risk modelling system for individual risk underwriting and portfolio analysis.</p>

Appendix F

**Environmental constraint
reports**

Table F1 Sample environmental constraint reports for flood issues

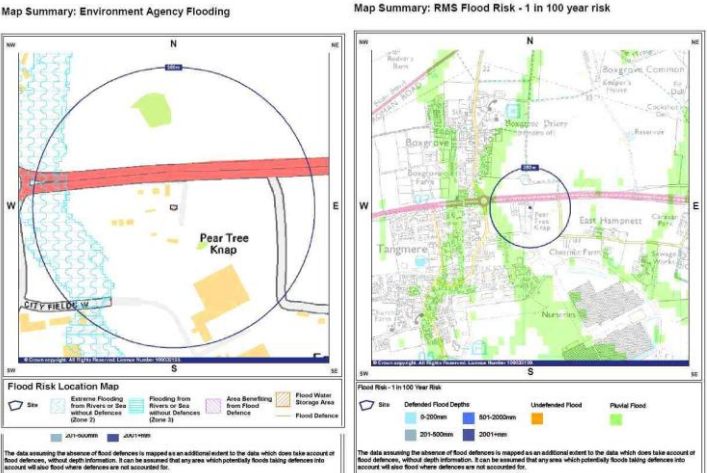
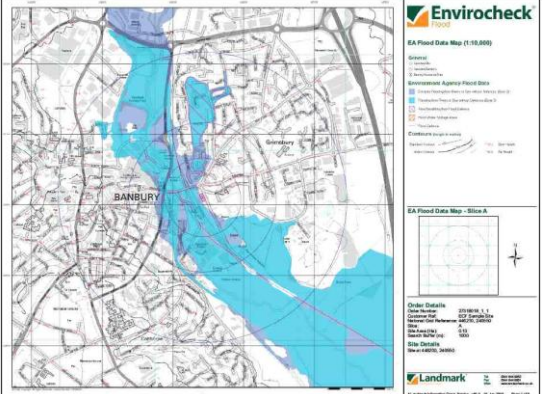
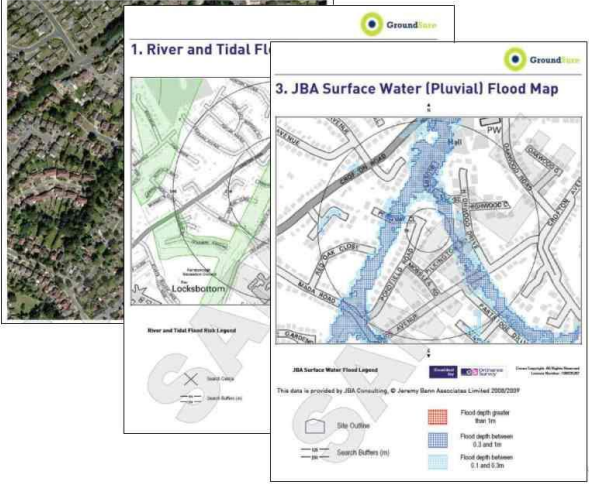
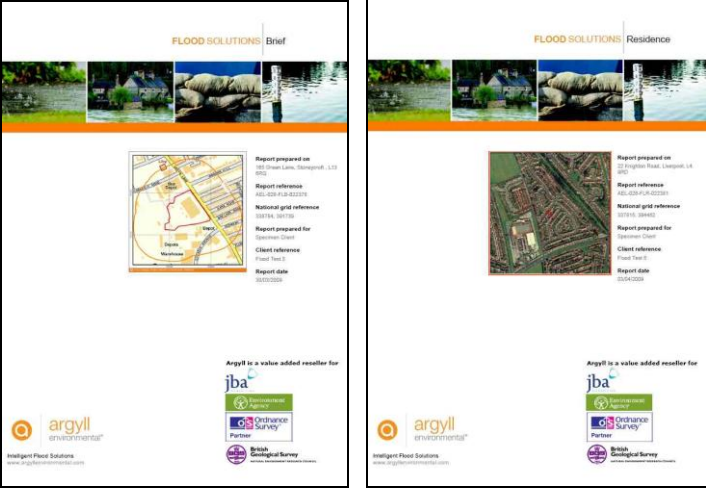
Environmental Constraint Report	Example of product outputs																																																																																																																														
<p>Landmark</p> <p>Homecheck Flood Report</p> <p>Risks assessed up to 250m from site location and includes the following data layers</p> <p>Environment Agency (EA) Flood Map. Including Zone 2 and 3 flooding from rivers or sea without defences, Areas benefiting from flood defences, EA flood defences and EA flood water storage areas.</p> <p>RMS inland flood risk model</p> <p>RMS surface water flood risk dataset</p> <p>BGS Groundwater flooding datasets.</p> <p>Norwich Union flood risk rating and insurability</p> <p>Crawford's Flood Risk. Postcode sector based dataset on flood insurance claims.</p> <p>Cost is around £19 (exc. VAT) for basic report</p>	 <p>The first map, 'Map Summary: Environment Agency Flooding', shows a site location map with various flood zones: Extreme Flooding from Rivers or Sea without Defences (Zone 1), Flooding from Rivers or Sea without Defences (Zone 2), Areas Benefiting from Flood Defences, Flood Water Storage Areas, and Flood Defences. The second map, 'Map Summary: RMS Flood Risk - 1 in 100 year risk', shows risk levels: Site, Defended Flood Depths (0-200mm, 201-500mm, 501-2000mm, 2001+mm), Undeveloped Flood, and Pluvial Flood. Both maps include disclaimers about the absence of flood defences.</p>																																																																																																																														
<p>Landmark</p> <p>EnviroCheck Flood Screening Report</p> <p>More detailed report searching up-to 1km from site</p> <p>Reports includes the following datasets:</p> <p>Environment Agency (EA) Flood Map. Including Zone 2 and 3 flooding from rivers or sea without defences, Areas benefiting from flood defences, EA flood defences and EA flood water storage areas.</p> <p>RMS inland flood risk model</p> <p>RMS surface water flood risk dataset</p> <p>BGS Geological Indicators of Flooding dataset</p> <p>BGS Groundwater flooding datasets</p> <p>Norwich Union flood risk rating and insurability</p> <p>Crawford's Flood Risk. Postcode sector based dataset on flood insurance claims.</p> <p>Cost is £100 for standard sites of up to 10ha area or 1400m perimeter</p>	 <p>The report includes a map of Banbury showing flood zones and a detailed data table. The table is as follows:</p> <table border="1"> <thead> <tr> <th>Data Type</th> <th>Page Number</th> <th>On Site</th> <th>0 to 250m</th> <th>251 to 500m</th> <th>501 to 1000m</th> </tr> </thead> <tbody> <tr> <td colspan="6">EA / CEH Flood Data</td> </tr> <tr> <td>Extreme Flooding from Rivers or Sea without Defences</td> <td>pg 1</td> <td>1</td> <td></td> <td>n/a</td> <td>n/a</td> </tr> <tr> <td>Flooding from Rivers or Sea without Defences</td> <td>pg 1</td> <td></td> <td>3</td> <td>n/a</td> <td>n/a</td> </tr> <tr> <td>Areas Benefiting from Flood Defences</td> <td>pg 1</td> <td></td> <td>2</td> <td>n/a</td> <td>n/a</td> </tr> <tr> <td>Flood Water Storage Areas</td> <td></td> <td></td> <td></td> <td>n/a</td> <td>n/a</td> </tr> <tr> <td>Flood Defences</td> <td></td> <td></td> <td></td> <td></td> <td>n/a</td> </tr> <tr> <td colspan="6">RMS Flood Data</td> </tr> <tr> <td>RMS 75 year Flood Return</td> <td>pg 2</td> <td>1</td> <td>6</td> <td>n/a</td> <td>n/a</td> </tr> <tr> <td>RMS 100 year Flood Return</td> <td>pg 2</td> <td>1</td> <td>6</td> <td>n/a</td> <td>n/a</td> </tr> <tr> <td>RMS 1000 year Flood Return</td> <td>pg 2</td> <td>1</td> <td>13</td> <td>n/a</td> <td>n/a</td> </tr> <tr> <td colspan="6">BGS Flood Data</td> </tr> <tr> <td>BGS Geological Indicators of Flooding</td> <td>pg 4</td> <td></td> <td>1</td> <td></td> <td>1</td> </tr> <tr> <td>BGS Groundwater Flooding Susceptibility</td> <td>pg 4</td> <td></td> <td>1</td> <td></td> <td>7</td> </tr> <tr> <td colspan="6">EA Detailed River Network Data</td> </tr> <tr> <td>Detailed River Network Lines</td> <td>pg 5</td> <td></td> <td>10</td> <td>2</td> <td>16</td> </tr> <tr> <td>Detailed River Network Nodes</td> <td>pg 9</td> <td></td> <td>6</td> <td>2</td> <td>15</td> </tr> <tr> <td>Detailed River Network Offline Drainage</td> <td>pg 10</td> <td></td> <td></td> <td></td> <td>1</td> </tr> <tr> <td colspan="6">Flood Insurance Risk Data</td> </tr> <tr> <td>Property based Flood Risk</td> <td>pg 11</td> <td>1</td> <td>n/a</td> <td>n/a</td> <td>n/a</td> </tr> <tr> <td>Postcode Sector Flood Insurance Claim Ratings</td> <td></td> <td>1</td> <td>n/a</td> <td>n/a</td> <td>n/a</td> </tr> </tbody> </table>	Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m	EA / CEH Flood Data						Extreme Flooding from Rivers or Sea without Defences	pg 1	1		n/a	n/a	Flooding from Rivers or Sea without Defences	pg 1		3	n/a	n/a	Areas Benefiting from Flood Defences	pg 1		2	n/a	n/a	Flood Water Storage Areas				n/a	n/a	Flood Defences					n/a	RMS Flood Data						RMS 75 year Flood Return	pg 2	1	6	n/a	n/a	RMS 100 year Flood Return	pg 2	1	6	n/a	n/a	RMS 1000 year Flood Return	pg 2	1	13	n/a	n/a	BGS Flood Data						BGS Geological Indicators of Flooding	pg 4		1		1	BGS Groundwater Flooding Susceptibility	pg 4		1		7	EA Detailed River Network Data						Detailed River Network Lines	pg 5		10	2	16	Detailed River Network Nodes	pg 9		6	2	15	Detailed River Network Offline Drainage	pg 10				1	Flood Insurance Risk Data						Property based Flood Risk	pg 11	1	n/a	n/a	n/a	Postcode Sector Flood Insurance Claim Ratings		1	n/a	n/a	n/a
Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m																																																																																																																										
EA / CEH Flood Data																																																																																																																															
Extreme Flooding from Rivers or Sea without Defences	pg 1	1		n/a	n/a																																																																																																																										
Flooding from Rivers or Sea without Defences	pg 1		3	n/a	n/a																																																																																																																										
Areas Benefiting from Flood Defences	pg 1		2	n/a	n/a																																																																																																																										
Flood Water Storage Areas				n/a	n/a																																																																																																																										
Flood Defences					n/a																																																																																																																										
RMS Flood Data																																																																																																																															
RMS 75 year Flood Return	pg 2	1	6	n/a	n/a																																																																																																																										
RMS 100 year Flood Return	pg 2	1	6	n/a	n/a																																																																																																																										
RMS 1000 year Flood Return	pg 2	1	13	n/a	n/a																																																																																																																										
BGS Flood Data																																																																																																																															
BGS Geological Indicators of Flooding	pg 4		1		1																																																																																																																										
BGS Groundwater Flooding Susceptibility	pg 4		1		7																																																																																																																										
EA Detailed River Network Data																																																																																																																															
Detailed River Network Lines	pg 5		10	2	16																																																																																																																										
Detailed River Network Nodes	pg 9		6	2	15																																																																																																																										
Detailed River Network Offline Drainage	pg 10				1																																																																																																																										
Flood Insurance Risk Data																																																																																																																															
Property based Flood Risk	pg 11	1	n/a	n/a	n/a																																																																																																																										
Postcode Sector Flood Insurance Claim Ratings		1	n/a	n/a	n/a																																																																																																																										

Table F1 (cont)

Sample flood related environmental constraint reports

Environmental Constraint Report	Example of product outputs
<p>Groundsure Flood Reports</p> <p>Two reports available (Floodrisk and Risk) and include different levels of analysis and mapping of the following datasets</p> <p>Environment Agency (EA) Flood Map. Including Zone 2 and 3 flooding from rivers or sea without defences, Areas benefiting from flood defences, EA flood defences and EA flood water storage areas.</p> <p>British Geological Survey (BGS) Groundwater flooding datasets.</p> <p>JBA Surface Water (Pluvial) flood risk rating</p> <p>Costs ranging from £5.50 (no mapping) - £17.50 (plus VAT)</p>	
<p>Argyll FloodSolutions Reports</p> <p>Three levels of report (Residence, Brief and Commercial) available Reports include different levels of analysis and mapping of the following datasets</p> <p>Environment Agency (EA) - Flood Map. Including Zone 2 and 3 flooding from rivers or sea without defences, Areas benefiting from flood defences, EA flood defences, EA flood water storage areas, EA NaFRA data and EA historical flood event datasets</p> <p>British Geological Survey (BGS) Groundwater flooding datasets.</p> <p>JBA Surface Water (Pluvial) flood risk rating</p> <p>Cost ranging from £16.15 (plus VAT) to £120 (plus VAT), with turnaround of 24 hours to 96 hours depending of type of report required,</p>	

Appendix G

Draft Flood and Water Management Bill – Clauses relating to data sharing

Draft Flood and Water Management Bill 2009

25. Environment Agency: power to require information

- (1) An authority in England listed in subsection (2) must comply with any reasonable request of the Environment Agency to provide information which the Agency reasonably requires in connection with its flood and coastal erosion risk management functions.
- (2) The authorities are –
 - (a) a lead local flood authority,
 - (b) a district council for an area for which there is no unitary authority,
 - (c) an internal drainage board,
 - (d) a water company,
 - (e) a highway authority,
 - (f) a reservoir manager (within the meaning of Part 3),
 - (g) a navigation authority (within the meaning given by section 219 of the Water Industry Act 1991),
 - (h) a harbour authority (within the meaning given by section 313 of the Merchant Shipping Act 1995),
 - (i) a person responsible for anything designated under Part 2 and situated in England,
 - (j) the Historic Buildings and Monuments Commission for England, and
 - (k) any other relevant public body under section 23(2).
- (3) The information must be provided –
 - (a) in any form or manner specified in the request, and
 - (b) within the period specified in the request.
- (4) A requirement imposed under subsection (1) must be consistent with any guidance issued by the Agency under section 27.

26. Lead local flood authorities: power to require information

- (1) An authority in England listed in subsection (2) must comply with any reasonable request of a lead local flood authority to provide information reasonably required in connection with the lead local flood authority's flood risk management functions.
- (2) The authorities are –
 - (a) a relevant authority,
 - (b) a reservoir manager,
 - (c) a navigation authority,
 - (d) a harbour authority,
 - (e) a person responsible for anything which is designated under Part 2 and situated in England,
 - (f) the Historic Buildings and Monuments Commission for England, and
 - (g) any other relevant public body under section 23(2).
- (3) The information must be provided –
 - (a) in any form or manner specified in the request, and
 - (b) within the period specified in the request.
- (4) A requirement imposed under subsection (1) must be consistent with any guidance issued by the Agency under section 27

