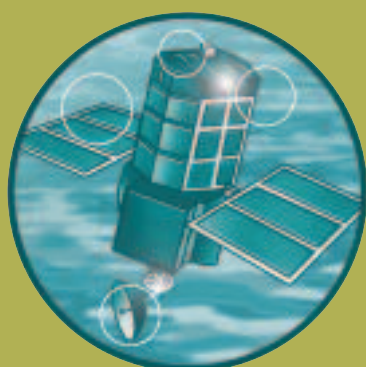


Flood Risk Assessment Guidance for New Development

R&D Project Record FD2320/PR1



**Defra / Environment Agency
Flood and Coastal Defence R&D Programme**

**Flood Risk Assessment Guidance for New
Development**

R&D Project Record FD2320/PR1

October 2005

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Statement of use

This report describes how the project was undertaken, including the review of R&D, consultation exercises and general approach to creating the framework, guidance and tools. It also provides recommendations for communication, implementation, monitoring and review of project outputs.

Dissemination Status

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Contract Statement

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EXECUTIVE SUMMARY

This research and development (R&D) project has been carried out as part of the Joint Defra/Environment Agency R&D Programme for Flood and Coastal Defence, under the theme of Risk Evaluation and Understanding Uncertainty.

The aim of this project was to provide guidance on the assessment of flood risk (and the mitigation of that risk) to assist with the regulation and planning of new developments in England and Wales.

The immediate objectives of this project were the following:

1. To define what is an appropriate assessment of flood risk for use at all scales of development planning (from national scale planning down to individual planning applications for development sites) and all types of development;
2. To provide guidance on how to carry out ‘strategic’ flood risk assessments (SFRAs) and site-specific flood risk assessments (FRAs), including selection and use of data and tools;
3. To provide guidance on how to audit FRAs and how to interpret the results from a FRA to assist with planning decisions;
4. To provide simple tools (if required) based on robust science to support the development of SFRAs and FRAs;
5. To provide guidance regarding analysis of flood risk management methods within SFRAs and FRAs;
6. To provide a plan for communicating guidance and tools effectively to users; and
7. To provide a plan for monitoring and reviewing the successful uptake of the guidance and the impact that it has on reducing inappropriate development.

The longer-term objectives and intended benefits of this work are:

- A contribution to the Government’s policy of flood risk reduction
- A consistent risk assessment approach used by the Environment Agency (EA) and planning authorities for setting planning policies and development control;
- An ability to quantify the change in risk due to new development, including climate change, and to quantify risk of both existing and proposed development (people and properties);
- A clear risk based understanding for Defra and the EA regarding what is considered to be “appropriate and inappropriate” development in flood risk areas;
- An appreciation of the tiered approach to the assessment of flood risk and implications of development plans at various scales (although to a certain extent this can only be considered as general guidance due to individual circumstances);

- An understanding of integrated flood risk management requirements such as drainage planning by the development industry and regulators;
- The development of appropriate integrated approaches for flood risk limitation; and
- Input into ongoing R&D initiatives, such as Risk Assessment for flood and coastal defence for Strategic Planning (RASP), Performance based Asset Management System (PAMS), Catchment Flood Management Plans (CFMPs) and Shoreline Management Plans (SMPs).

The project was split into two Phases:

- Phase 1 was a scoping study and consisted of a review of current policies, processes and science; consultation with practitioners and other stakeholders (via two workshops held in March 2004); and production of a detailed scope for Phase 2. The first phase was completed in July 2004.
- Phase 2 consisted of providing the framework, guidance and tools, based on the assessed needs in Phase 1. This was completed by the end of March 2005.

Following on from this, there was a project extension to undertake dissemination activities within the Environment Agency. This was completed by the end of December 2005.

This document is the Project Record, which forms part of the final deliverables for Phase 2. These being:

- Technical Report 1 (TR1) – Framework and guidance for assessing and managing flood risk for new development – An overview
- Technical Report 2 (TR2) – Framework and guidance for assessing and managing flood risk for new development – Full documentation and tools
- Project Record 1 (PR1)

As part of the project extension the following additional deliverables have also been provided:

- A trial dissemination workshop, which was held at the Environment Agency offices in Exeter on 18 May 2005.
- A training presentation for Environment Agency Regional and Area staff involved in Development Control and Planning Liaison, based on feedback from the trial dissemination workshop.
- A website version of the framework, guidance and tools.

This document provides the following:

- An overview of related R&D projects and initiatives, which have either contributed to the project or might benefit from the project;

- Details of stakeholder consultation undertaken in both Phases 1 and 2 of this project;
- A summary of the approach adopted to carry out the project;
- A summary of the project deliverables;
- A communication and implementation plan, which provides recommendations regarding the future actions required to enable adoption of the project outputs;
- A monitoring and review plan, which provides recommendations regarding future actions required to determine how successfully the framework and guidance have improved practices both within the EA and beyond;
- Conclusions from Phase 2 of the project, including future R&D requirements;
- Details of the feedback received at the trial dissemination workshop.

ACKNOWLEDGEMENTS

Project Team

The core Project Team members were the following:

Suresh Surendran	Environment Agency (Client Project Manager)
Richard Kellagher	HR Wallingford (Contractor Project Director)
Helen Udale-Clarke	HR Wallingford (Contractor Project Manager)
Bernard Dyer	HR Wallingford
David Ramsbottom	HR Wallingford
Marianne Scott	CIRIA
John Packman	CEH Wallingford

An extensive team of technical staff at HR Wallingford supported the core team members.

Project Board

The Project Team was supported by a Project Board, which comprised of the following:

Attending Members (at one or more meetings)

Mervyn Pettifor (Environment Agency) (Chair of Project Board)
Richard Ashley (Sheffield University)
John Blanksby (Sheffield University)
Dave Brook (ODPM)
John Goudie (Defra)
Matthew Kean (Environment Agency)
Ian Meadowcroft (Environment Agency)
David Murphy (Environment Agency)
Jim Pithouse (Worcester City Council)
Paul Wyse (Environment Agency)

Corresponding Members

Andrew Whitaker (House Builders Federation)
Peter Bide (ODPM)

Consultees

This project also benefited from a large group of consultees, who participated in several consultation activities (described later in this report).

Acknowledgement here or in the appendices does not imply endorsement of the comments or conclusions drawn in this report or the other project deliverables.

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1. ABOUT THIS REPORT

1.1 Background

This research and development (R&D) project was carried out as part of the Joint Defra/Environment Agency R&D Programme for Flood and Coastal Defence, under the theme of Risk Evaluation and Understanding Uncertainty.

There are a number of R&D studies or initiatives that have been recently completed or are still in progress that cover various aspects of flood risk assessment and flood risk management. The most pertinent of these in relation to this project are described in Section 2 of this report. As these come on-line, it is becoming apparent that there is a need to bring all of the current policies, processes and science together to produce a framework for assessing flood risk for new development, covering national, regional, local and site-specific scales that can work effectively within the planning process.

1.2 Project Aim

The aim of this project was to provide guidance on the assessment of flood risk (and the mitigation of that risk) to assist with the regulation and planning of new developments in England and Wales.

1.3 Project Objectives

The immediate objectives of this project were the following:

1. To define what is an appropriate assessment of flood risk for use at all scales of development planning (from national scale planning down to individual planning applications for development sites) and all types of development;
2. To provide guidance on how to carry out SFRAs and FRAs, including selection and use of data and tools;
3. To provide guidance on how to audit FRAs and how to interpret the results from a FRA to assist with planning decisions;
4. To provide simple tools (if required) based on robust science to support the development of SFRAs and FRAs;
5. To provide guidance regarding analysis of flood risk management methods within SFRAs and FRAs;
6. To provide a plan for communicating guidance and tools effectively to users; and
7. To provide a plan for monitoring and reviewing the successful uptake of the guidance and the impact that it has on reducing inappropriate development.

The longer-term objectives and intended benefits of this work are:

- A contribution to the Government's policy of flood risk reduction;
- A consistent risk assessment approach used by the EA and planning authorities for setting planning policies and development control;

- An ability to quantify the change in risk due to new development, including climate change, and to quantify risk of both existing and proposed development (people and properties);
- A clear risk based understanding for Defra and the EA regarding what is considered to be “appropriate and inappropriate” development in flood risk areas;
- An appreciation of the tiered approach to the assessment of flood risk and implications of development plans at various scales (although to a certain extent this can only be considered as general guidance due individual circumstances);
- An understanding of integrated flood risk management requirements such as drainage planning by the development industry and regulators;
- The development of appropriate integrated approaches for flood risk limitation; and
- Input into ongoing R&D initiatives (such as RASP, PAMS, CFMPs, SMPs).

This project does not define where development should or should not take place, as flood risk is only one of the issues that have to be taken into account in planning policies and decisions and this is the responsibility of planning authorities. However, this project provides guidance to assist planning authorities and the Environment Agency in deciding what might be considered appropriate or inappropriate development from the perspective of flood risk and also provide guidance regarding the management of that risk.

1.4 Project Structure

The project was split into two Phases:

- Phase 1 was a scoping study and consisted of a review of current policies, processes and science; consultation with practitioners and other stakeholders (via two workshops held in March 2004); and production of a detailed scope for Phase 2. The first phase was completed in July 2004.
- Phase 2 consisted of providing the framework, guidance and tools, based on the assessed needs in Phase 1. This is to be completed by the end of March 2005.

Following on from this, there was a project extension to undertake dissemination activities within the Environment Agency. This was completed by the end of December 2005.

1.5 Scope of Phase 2

During Phase 1, the following tasks were defined for Phase 2 of this project:

Stage 1

1. Develop a framework for assessing flood risk
2. Develop a method for quantifying¹ flood risk indicators

¹ During an early stage of Task 2, it was determined that guidance on the quantification of flood risk indicators is already being developed as part of other R&D projects. However, there is a pressing need to

Stage 2

3. Develop decision guidance for assessing flood risk and the management of that risk (including the development of additional tools where appropriate)
4. Develop a communication and implementation plan
5. Develop a monitoring and review plan

1.6 Project Deliverables

This Project Record is one of five project deliverables, as listed below.

- Phase 1 Interim Report (FD2320/IR)
- Phase 2 Technical Report 1 (FD2320/TR1) – Framework and guidance for assessing and managing flood risk for new development – An overview²
- Phase 2 Technical Report 2 (FD2320/TR2) – Framework and guidance for assessing and managing flood risk for new development – Full documentation and tools
- Project Record (FD2320/PR1)
- Technical Summary (FD2320/TS)

Further details are provided in Section 5 of this report.

As part of the project extension the following additional deliverables have also been provided:

- A trial dissemination workshop, which was held at the Environment Agency offices in Exeter on 18 May 2005.
- A training presentation for Environment Agency Regional and Area staff involved in Development Control and Planning Liaison, based on feedback from the trial dissemination workshop.
- A website version of the framework, guidance and tools.

Details of the feedback from the trial dissemination workshop are provided in Appendix G of this report. The training presentation and website have been provided separately.

1.7 Report Readership

This report is intended for anyone who wishes to understand the following:

- how this project was undertaken,
- who was involved,

understand which indicators should be used when and how to apply them. This has been reflected in the guidance provided by this project.

² The draft TR1 was produced December 2004 and consisted of a description of the framework and flood risk indicators. This format has been superseded due to the recognition of a more appropriate format.

- how the outputs from this project might be adopted
- how this project fits into recently completed and ongoing R&D, and
- what future R&D is required.

1.8 Report Structure

This report is divided into the following sections:

- Section 1 About this report
- Section 2 Review of other research and development
- Section 3 Consultation process
- Section 4 Project approach
- Section 5 Project deliverables
- Section 6 Communication and implementation plan
- Section 7 Monitoring and review plan
- Section 8 Project review

Extensive appendices support the main report, as follows:

- Appendix A A list of R&D projects and initiatives, plus summary details of each project or initiative to accompany Section 2
- Appendix B A list of people involved in the consultation process described in Section 3, plus results from each of the main consultation activities
- Appendix C Supporting material for the communication and implementation plan described in Section 6
- Appendix D Supporting material for the monitoring and review plan described in Section 7
- Appendix E Project terms of reference
- Appendix F A summary of a review of downstream impacts of urbanisation on flooding
- Appendix G Feedback from the trial dissemination workshop undertaken as part of the project extension

2. REVIEW OF RESEARCH AND DEVELOPMENT

A review of research and development (R&D) projects and initiatives (i.e. not specific R&D projects, but concerted efforts to develop/improve practices) has been carried out to determine those that have a relevance to this project. These are listed in Table A.1 (found in Appendix A) giving completion dates, if available. Details of these projects and initiatives have also been provided in Appendix A.

2.1 Technical Themes

Table A.1 shows key themes of the project/initiatives that have a bearing to this project. Eight themes have been used. These being the following:

Mapping

A large proportion of projects/initiatives includes the use of mapping to a certain extent. Only those projects/initiatives where mapping technologies or outputs form a significant part of the deliverables have been highlighted.

Modelling

Modelling in this context refers to the use of tools that provide the analysis of physical parameters associated with flooding, such as river models, drainage models, wave models, etc.

Engineering and Design

Design in this context refers to the process that is gone through to determine suitable infrastructure and/or mitigation measures for a new development, such as drainage, SuDS, flood defences, etc.

Sustainability and Policy

Arguably, all projects/initiatives should be working under the umbrella of sustainability. Only projects/initiatives that have a specific requirement to improve understanding of sustainability have been highlighted in the table.

Asset Performance and Reliability

Asset performance and reliability has an obvious link to risk and in that respect all projects/initiatives that are looking at risks associated with flooding would need an understanding of asset performance and reliability. Only projects/initiatives that have a specific requirement to improve understanding of the performance of assets have been highlighted here.

Risk, Uncertainty & Probability

Risk, uncertainty and probability are considered to some extent in every project/initiative listed. Only projects/initiatives that have a specific requirement to deliver answers in the form of risk, uncertainty or probability have been highlighted.

Climate Change

Again, it can be argued that all projects/initiatives should be taking climate change into consideration. Only projects/initiatives that have a specific requirement to improve understanding of climate change have been highlighted in the table.

Data and Information Management

Information management is a very broad term and is really a tool to be applied to all projects. Only projects/initiatives that are proposing changes/improvements to the data and information management processes currently taking place in a particular field have been highlighted here.

2.2 Risk Model Components

The same projects/initiatives can also be re-categorised in the context of the Government's standard risk management model: Sources, Pathways, Receptors and Consequences (SPRC). Definitions of these elements are given below.

Sources (or Loadings)

These are the initial conditions that can lead to a hazard and subsequent risk being realised, which cannot be controlled, these being precipitation (affected by temperature) and the sea (relative sea levels, storm surges, tides and waves).

Pathways (or Barriers)

These are the means by which the source can impact the receptor, which have the scope for management. Pathways include rivers, fluvial floodplains, catchments (including overland flow and groundwater), drainage systems, storage reservoirs, flood banks, tidal barrages, coastal defences, coastal floodplains, coastal morphology and sediment supply, urban infrastructure, etc. These have been grouped into three main areas:

- Rivers, floodplains and defences
- Drainage, storage and urban infrastructure
- Estuary and coastal processes and defences

Receptors

These are the targets that will be threatened by harm from the hazard and fall into the general categories of people, property and environment.

Consequences

These are the impacts that will be experienced by the receptors should a risk be realised. These fall into the general categories of economic, social or environmental.

By categorising the projects/initiatives into these elements, it will become possible to map them onto the overall framework. Table A.1 shows the elements that each project/initiative is investigating. Table 2.1 gives a generalised list of the elements that make up the SPRC model.

Table 2.1 Sources – Pathways – Receptors - Consequences

SOURCES	PATHWAYS ¹			RECEPTORS	CONSEQUENCES
	Fluvial/Natural Drainage	Artificial Drainage	Estuaries & Coast		
<ul style="list-style-type: none"> • Precipitation • Sea Levels • Tides • Waves • Storm Surges • Geological Crust Movement • Climate Change ² 	<ul style="list-style-type: none"> • Runoff • Catchments • Overland flow • Groundwater • Rivers • Fluvial floodplains • Washlands • River defences 	<ul style="list-style-type: none"> • Runoff • Catchments • Overland flow • Groundwater infiltration • Foul/combined sewerage systems • Surface water drainage systems • Water supply systems • Urban watercourses (incl. culverts) • Storage ponds • Reservoirs • Canals • Above ground urban infrastructure 	<ul style="list-style-type: none"> • Tidal barrages • Sea defences ³ • Coast protection (man-made or natural) ⁴ • Coastal floodplains • Coastal morphology & sediment supply 	<ul style="list-style-type: none"> • People ⁵ • Property • Environment 	<ul style="list-style-type: none"> • Social • Economic • Environmental

Notes: 1 It should be noted that there can be overlap between the 3 groups of pathways, e.g. urban drainage performance can be undermined by river levels, rivers can erode natural coastal protection, etc.

2 Not explicitly a source, but impacts on sources

3 Protection of low-lying coastal areas against flooding from sea or tidal waters (sometimes also provide coastal protection)

4 Protection of land from erosion or encroachment by the sea (sometimes also act as sea defences)
People can also be considered as pathways, due to intervention/actions

2.3 Key Projects and Initiatives

Project and initiatives contributed to this project in a number of ways. These being:

Completed projects or initiatives:

- that shaped this project, by identifying a need or providing the ground work
- that provided the science behind the guidance produced by this project
- that resulted in guidance that is referred to in the framework produced by this project

Ongoing projects or initiatives:

- that will provide science that would result in the guidance being updated or require new guidance
- that will provide new guidance that can be referred to directly in the framework

The key projects and initiatives are listed below.³

2.3.1 Influencing R&D

The following is a list of the main projects and initiatives that have influenced/shaped this project.

Projects

- Defra/EA R&D project FD2302 *Risk, performance & uncertainty in flood & coastal defence* (Sayers *et al.* 2002)
- Defra/EA R&D project W5B-030 *Risk assessment for flood and coastal defence for strategic planning (RASP)* (HR Wallingford 2004a)
- Defra/EA R&D project FD2314 *Position review of data & information issues within flood & coastal defence* (McCue *et al.* 2004)

Initiatives

- The EA's Flood Mapping Strategy
- The National Flood and Coastal Defence Database (NFCDD)

2.3.2 Existing Science R&D

The following is a list of the main projects that have provided science for the guidance produced by this project.

- Defra/EA R&D projects FD2317 and FD2321 *Flood risks to people* Phase 1 (HR Wallingford 2003a) and Phase 2 (Ramsbottom *et al.* 2004) respectively
- Defra/EA R&D project W5B-029 *UKCIP02 Climate Change Scenarios: Implementation for Flood & Coastal Defence* (HR Wallingford 2003b)
- *Foresight* flood & coastal defence project (Office of Science and Technology 2004)

2.3.3 Existing Guidance

The following is a list of key projects and their guidance documents that are directly referred to in the guidance and, therefore, contribute to the overall framework.

- CIRIA guidance C624 *Development and flood risk: Guidance to the construction industry* (Lancaster *et al.* 2004)
- Defra/EA R&D project W5-074 - Preliminary rainfall runoff management for developments (HR Wallingford 2004b)
- Guidelines for the Yorkshire Region *At risk? Planning for Flood Risk in Yorkshire and Humber* (Environment Agency *et al.* 2004a)
- Guidelines for the North West Region of England *Meeting the Sequential Flood Risk Test* (Environment Agency *et al.* 2004b)
- Catchment Flood Management Plans (CFMPs) (Environment Agency *et al.* 2004c and 2004d)

³ Note that further information on these is provided in Appendix A.

- Shoreline Management Plans (SMPs) (Defra 2001)
- The Modelling and Decision Support Framework (MDSF) (HR Wallingford 2003c)

2.3.4 Future Science R&D

The following is a list of the main projects that will produce new science that should be incorporated into updated or new guidance, as part of the overall framework in the future.

- Defra/EA R&D project FD2318 *Performance and reliability of flood and coastal defence structures*
- Building Knowledge for Climate Change project *Adaptable urban drainage: addressing change in intensity, occurrence and uncertainty of stormwater (AUDACIOUS)*
- Sustainable Urban Environment Initiative project *Water cycle management for new developments (WaND)*
- Defra/EA R&D project *Environmental Consequences of Flooding* – although at this stage this is only a scoping study, it is anticipated that follow on phases will be undertaken
- Flood Risk Management Research Consortium (FRMRC)
- Integrated flood risk analysis and management methodologies (FLOODsite)

2.3.5 Future Guidance

The following is a list of future guidance that should be referred to and contribute to the overall framework once they are available. All of the following are due for completion in 2005.

- FLOWS (Floodplain land use optimising workable sustainability) WP1biii project *Guidance on Strategic Flood Risk Assessments for Low-lying Areas*
- FLOWS WP1biii project *Modelling and Mapping of Flood Risk*
- Defra/EA R&D project FD2308 *Joint probability - dependence mapping and best practice*
- Defra/EA R&D project FD2015 *Sustainable Flood and Coastal Management, Technical Report, Part 1: Handbook*

2.3.6 R&D for the Future Framework

The following is a list of the main projects that will potentially add to the framework in the future.

- Defra/EA R&D project FD2323 *Improving Data and Knowledge for Effective Integrated Flood and Coastal Erosion Risk Management*
- Defra/EA R&D projects W5-070 and W5-0205 *Performance based asset management systems (PAMS)* (Phases 1 and 2 respectively)

3. CONSULTATION PROCESS

3.1 Objectives

The consultation process was intended to enable the following:

- Focus the project on the key issues regarding development and flood risk;
- Ensure that the deliverables meet the requirements of the customer;
- Ensure that the project has synergy with policies and processes currently in place or planned within the customer organisations; and
- To receive buy-in from individuals and organisations for the adoption of the project outputs.

3.2 Consultees

Those that were able to attend the consultation activities are listed in Appendix B.1.

In total 81 people were involved in the consultation activities, including members of the Project Team (who also provided experience and expertise in discussions). Half of these people are EA staff, but also included are representatives from Defra, ODPM, regional and local authorities, consultants and the R&D community.

A further 15 people expressed an interest in the project, but were unable to participate due to other commitments.

3.3 Consultation Activities

The following consultation activities were undertaken during the project:

- Project Board Meetings
- Phase 1 workshops (to refine scope of work):
 - Workshop 1 – Consultation with practitioners
 - Workshop 2 – Consultation with policy makers
- Phase 2 workshops (to ensure project meeting user requirements):
 - Workshop 3 – Consultation with EA staff involved with Thames Gateway
 - Workshop 4 – Consultation to define requirements beyond the project end
- Meeting to review initial draft project outputs
- Meetings with individuals

3.4 Project Board

A Project Board was set up during Phase 1 comprising key policy and process owners and practitioners, with the purpose of ensuring that:

- The project successfully met the terms of reference
- The project outputs are accurate, appropriate and useable

Members of the Project Board are identified in Appendix B.1.

The Project Board met on the following dates:

- 26 May 2004
- 14 October 2004
- 24 January 2005

At the time of writing this initial draft, it is undecided whether a fourth board meeting will be held.

3.5 Phase 1

3.5.1 Workshop 1

Workshop 1 took place on 8 March 2004 and focused on the practitioners, i.e. regulators, developers and consultants.

There were 198 items raised during Workshop 1, although there was some duplication. These are listed in Appendix B.2. These have been summarised into 33 key issues, based on those ranked most highly by the consultees.

Following on from the workshop, an initial attempt at defining whether the need was Research Science, Development of Application, Business Process or Policy was carried out. Also, an initial review of which issues were covered by other work and which could be covered by Phase 2 of this study was also carried out.

3.5.2 Workshop 2

Workshop 2 took place on 19 March 2004 and focused on the higher level of policy development.

The key issues from Workshop 1 were discussed and additional issues were raised. The consultees were also given the opportunity to agree or disagree with the needs identified (Research Science, Development of Application, Business Process or Policy) and with the selection of issues for Phase 2. The final task was to rank the issues in order of importance.

A spreadsheet of the results is provided in Appendix B.3. Details of the discussions during Workshop 2 are provided and the results of the ranking are discussed in Appendix B.4.

3.5.3 Stakeholder Perspectives

The results from both workshops have enabled the Project Team to get a clear understanding of the issues associated with assessing flood risk and applying this to development planning. These will form an important element of the information

management system we will use to develop the framework. These are summarised below.⁴

ODPM

The attendees from ODPM would like to see the assessment of flood risk being appropriate for the requirements of the area being considered. In this context ‘appropriate’ means the necessary scale, level of detail, etc. to make an informed decision. To this end, they see the adoption of a similar approach to all assessments as advantageous.

They would like to see closer liaison with other government departments, to enable a better balance between different aspects of sustainable development/community needs.

Defra

The attendee from Defra is keen to see the ‘appropriate’ use of FRAs to determine planning decisions. The project should avoid moving towards a box ticking exercise whereby the existence of a FRA will automatically result in approval. Defra sees that there will always be a need for dialogue, as well as guidance, and improvements in the current levels of dialogue are needed.

These Consultees would also like to see methods for monitoring the FRA process and the assessment of flood risk in general.

Environment Agency

The attendees from the EA see the introduction of Standing Advice as a useful means by which they can spend more time looking at the more complex FRAs. It is these more complex FRAs that pose the difficulties in producing a flexible, but robust national guidance and framework.

The attendees from the EA would like to see greater use of SFRAs by local authorities, as they see SFRAs as the best means for assessing appropriate future development proposals in line with the sequential test identified in PPG25 and for enabling policies to be identified to minimise and manage flood risks. The EA members are willing to act in an advisory role, as well as providing necessary data.

Regional Planning Bodies

The attendees from the regional planning bodies would like to encourage the increased use of SFRAs by local authorities to assist with the implementation of Regional Planning Guidance.

They recognise that a partnership is needed between themselves and the LPAs when taking a strategic approach to development planning and flood risk.

Local Planning Bodies

The attendees from Local Planning bodies can see the need for SFRAs, but best practice is currently being developed ad hoc, usually in the areas of greatest need (such as fenland regions). It is recognised that there is a lack of in-house expertise to carry out

⁴ Reference should be made to FD2320 Guidance Note S2.4 Stakeholder Engagement for details of the roles and responsibilities that each stakeholder carries out.

SFRAs. Greater and more consistent guidance from the EA is needed regarding SFRAs. Guidance is also needed regarding how CFMPs or SMPs can be of benefit to the SFRA or to the planning process in general. Obtaining information, maps and plans from the EA is currently seen as an obstacle.

There is concern over the changing role of local planning bodies with the introduction of FRA Standing Advice from the EA. This includes the appropriate use of the Standing Advice by the local planning bodies and the feedback/control mechanism for the EA so that they can manage effectively and consistently the use of that advice.

It is recognised that there is a lack of in-house expertise to review FRAs even with the Standing Advice.

Developers

The attendees representing the Developers need, above all, a clear specification for how to carry out a FRA, which will be considered appropriate by the local planning body and the EA. In this instance ‘appropriate’ means the information and analysis required to make an informed decision regarding flood risk.

They see a marked difference in FRA requirements in different regions of the country. This is sometimes a reflection of the specific flooding issues in a region, but is often due to the local interpretation of policies or guidelines.

In order for Developers to be able to carry out appropriate FRAs, the timely provision of the relevant information from other organisations (principally the EA and the local planning body) is necessary. Once a clear specification is in place, it will be easier to define the information that is required and to create more generic practices for providing the information to Developers.

The attendees view was that Developers can only be expected to consider flood risk within the development area or in the immediate vicinity. They also thought that Developers can only be expected to consider the impact of their development on the existing environment, unless the local planning body provides them with specific information on a future scenario that they must consider. This would usually be the result of a SFRA or more unusually a CFMP or SMP.

3.5.4 Information from Other Initiatives

Similar consultation processes have taken place as part of other initiatives involved in planning and flood risk. The following three initiatives have been taken particularly into consideration:

- Select Review of Regional Planning Guidance (RPG12) for Yorkshire and the Humber: Flood Risk, led by the Regional Planning Body for the Yorkshire and Humber Assembly. This included consultation with all 24 LPAs in the region and provided useful insight into SFRAs from the perspective of the LPAs.
- CIRIA Research Project 627 Sustainable Water Management – Planning for new developments. This included consultation with representatives from LPAs and their consultants.

- CIRIA Research Project 675 Development and Flood Risk: Guidance for the Construction Industry. This included consultation with representatives from the principal stakeholders for FRAs and provided particularly useful insight into FRAs from the perspective of the Developers.

The results from these initiatives support and in some areas expand the findings of our consultation process. These consultations have also been taken into consideration when determining the needs of this project.

In particular, CIRIA Research Project 627 found that Planners were not looking for new checksheets, etc. as they already have their own systems in place. In practice, they would prefer to take the relevant information, guidance, methods, etc. and incorporate them into their procedures.

3.5.5 Impacts of Phase 1 Consultations on Scope of Work

Framework

The consultation process has reinforced the already recognised need for a framework for assessing flood risk and appropriate guidance regarding the hierarchical risk assessment methodology. However, specific issues that will need consideration that were not highlighted in the original terms of reference (provided in Appendix G) include the following:

- The framework needs to have flexibility to incorporate future science, etc. This may include interim guidance regarding specific issues before the full R&D can come online.
- The framework needs to be able to link to the new statutory requirements associated with Strategic Environmental Assessments (SEAs) and the Water Framework Directive (WFD).
- Within the framework, the assessment process needs to be mirrored by an audit procedure that can monitor and control all aspects of the assessment process.

Quantification of Risk Indicators

Defining ‘appropriate’ development and risk criteria were given high priority in the consultation process. The practicalities of applying risk indicators to the following issues were of particular concern:

- A workable definition of a functional floodplain,
- A definition of standard of protection,
- Redevelopment of brownfield sites,
- Developments in areas already defended,
- Development life and changes in risk (such as due to climate change).

Development of Tools

Few specific tools have been highlighted from the consultation process. This has been mainly due to the vague definition of a tool compared to guidance. In general, tools were interpreted as software and other calculation methods. In this respect, most of the Research Science has either already taken place or is ongoing as part of a different initiative. In general, the tools identified are related to the Development of Application (as defined in Section 4.5) and, therefore, the distinction between tools and guidance becomes less clear.

Decision Guidance for Risk Assessment

There is clearly a need for substantial guidance to accompany the framework. This was given high priority by the Consultees. The top issue from the consultation process (and possibly the issue that encapsulates most of the other issues raised) was the need for further guidance to enable practical implementation of SFRA and FRA. The advice currently available is considered too general and, although a substantial amount of the Research Science has been carried out, this has not been translated into practical/usable advice.

The new guidance also needs to take into consideration the guidance that is currently available within the EA or is in the process of being written.⁵

The following gaps in guidance have been highlighted as high priority by the consultation process:

- Quantifying risk for developments behind or near defences.
- Determining the hydraulic area of influence of a development.
- Considering hydraulic impact of infill developments and urban creep.

The following gaps in guidance were recognised as needs, but were not ranked so highly during the consultation process.

- Applying climate change (for developers).
- Determining the sensitivity of floodplains due to pinch points.
- Applying joint probability and coincidental flooding.

It was recognised at this stage that the full extent of the needed guidance could only be determined once the framework was complete. Therefore, it was anticipated that during Phase 2 of the study additional guidance needs might be identified. The intention was to provide an active, manageable framework that could be updated, as appropriate.

Decision Guidance for Risk Management

The Consultees did not give specific risk management issues high priority. However, a number of issues grouped under risk assessment have risk management implications.

⁵ A list is provided in FD2320 Information Chart.

Communications and Implementation Plan

The Consultees confirmed that a communication and implementation plan, as set out in the original terms of reference, was required. However, the consultation process highlighted no new issues associated with dissemination of the outputs from this project.

Clearly outputs need to be designed to suit the users and the dissemination of those outputs will be key to the success of the project.

Monitoring and Review Plan

In general, although the Consultees recognised a need for this, it was considered to be a Business Process issue and, therefore, this project should only be expected to present generalised recommendations.

Additional Tasks

One group from Workshop 2 suggested that the development of the framework and guidance would benefit greatly from a pilot study or studies. It was recognised that this was beyond the timescale and budget available for this project, but would be a recommendation for the follow on stage.

3.5.6 Issues Raised Covered by Other Projects

Several issues raised by the Phase 1 consultation activities were identified as being covered (at least in part) by existing R&D projects. These are summarised below.

- **Accuracy of the Indicative Floodplain Map and the use of Flood Zones** was being reviewed as part of the *Flood Mapping Strategy* and R&D Project W5-057 *Reducing uncertainty in estimation of flood levels (river conveyance)*
- **Adequacy of the NFCDD** is being reviewed as part of the PAMS project (W5-070, W5-0205)
- **SuDS adoption and performance and maintenance issues** were being considered as part of the CIRIA Research Project RP697 *SUDS – Updated Guidance on Technical Design and Construction*
- **The role of CFMPs compared to SFRA**s had already been described in the Defra/EA R&D project FD2010 *Flood Plain Management Manual (Phase 1)*
- **The impact of the Water Framework Directive** had already been considered in the CIRIA Research Project RP627 *Sustainable water management and land use planning*
- **The perceived conflict between PPG3 and PPG25** is being partially covered by the Department of Trade and Industry R&D project *Use of SuDS in High Density Developments*
- **Urban creep and increasing impermeability** had already been investigated by Severn Trent Water (Cutting 2003)

- **Practical implementation of SFRAs** was partially undertaken by the North West Regional Assembly guidance on undertaking the sequential flood risk test (Environment Agency *et al.* 2004b) and is being developed for low-lying areas as part of the FLOWS project⁶
- **Practical implementation of FRAs** was described in CIRIA guidance C624 (Lancaster *et al.* 2004)
- **Climate change considerations for developers** is being considered as part of the AUDACIOUS project
- **Embankment failure and breaching** is being considered in the Defra/EA R&D project FD2319 *Performance and reliability of flood and coastal defence structures*

3.6 Phase 2

3.6.1 Workshop 3

Workshop 3 took place on 28 September 2004. It had a number of purposes. These being:

- To consult with EA staff involved with Thames Gateway and the issues particularly facing them,
- To receive feedback regarding the first part of the deliverables for Phase 2. These being the framework and flood risk indicators.
- To update EA staff regarding other R&D projects, namely:
 - FD2321 Flood Risks to People Phase 2 (due for completion March 2005)
 - FD2308 Joint Probability – dependence mapping and best practice (due for completion February 2005)
 - W5B-029 UK Climate Impacts Programme 2002 Climate Change Scenarios: Implementation for Flood and Coastal Defence (completed)
- Work underway on behalf of the EA looking at defining acceptability of risk⁷

A summary of the feedback is provided in Appendix B.5.

3.6.2 Review Meeting

A meeting of EA Flood and Coastal Defence Regulation Engineers and Development Control staff took place on 20 January 2005. Those attending were issued with a digital copy of TR2 a few days earlier and asked to provide feedback at the meeting. The purpose being to determine whether the project outputs (principally the guidance and tools) were likely to be of value to their work and start the process of dissemination.

Valuable feedback was provided at the meeting and minutes are provided in Appendix B.6.

⁶ FLOWS WP1biii project *Guidance on Strategic Flood Risk Assessments for Low-lying Areas*

⁷ Referring to separate work being undertaken by RPA Consultants.

The need for trialling was emphasised. Therefore, it was proposed that those present would look at applying the guidance and tools to two real-life cases: a site-specific FRA and a SFRA.

Feedback on the trialling was to be provided to the Project Team by 15 February 2005, if it was to result in changes to the project outputs. Feedback after this date would only be recorded in this report. At the time of writing this initial draft, no feedback has been provided.

3.6.3 Workshop 4

Workshop 4 took place on 1 February 2005. It had two main purposes. These being:

1. To increase awareness of the project outputs with those who:
 - contributed to the consultation process
 - are involved in related R&D
 - may be required to apply them in the future
2. To enable discussion/feedback regarding:
 - the project outputs
 - their implementation
 - ongoing and future R&D

A summary of the feedback is provided in Appendix B.7.

4. PROJECT APPROACH

4.1 The Need for an Information Management Method

In order to develop a framework for assessing flood risk, it was necessary to recognise that the problem to be solved was effective information management.

The information management method needed to be able to encompass all aspects of the work including the definition of the following:

- policy, plan and project lifecycles,
- supply chains (i.e. the links between stakeholders and the information that is transferred between these stakeholders)
- statutory requirements, and
- roles and responsibilities of stakeholders.

To this end, the “Business Elements Method”, that is being developed at the London School of Economics, in conjuncture with HR Wallingford, was adopted. The method incorporates sound tools and techniques that have been successfully applied in many settings.

4.2 The Business Elements Method

Organisations function internally and with the larger business community by means of manual and automated systems communicating with each other, but always by means of sharing or exchanging information. The right technologies, including the communication network, need to be put in place and the strategic advantages need to be specified for sharing or exchanging information across whole supply chains. These advantages should reduce duplication and accelerate the movement and availability of information.

Order and structure are necessary to manage information effectively and to ensure that users are able to address usability, interoperability and both technical and organisational issues. Imposing a method provides a framework and discipline for managing projects, and developing best practice for delivering products and services.

The “Business Elements Method”, is a generic method for managing information. It can be applied to managing information related to projects, or for delivering any type of product or service, to ensure that the information will fit effectively into a given environment. The method is flexible, customisable and incorporates clearly defined events and procedures which take place throughout the information lifecycle. A systematic approach is adopted.

4.3 Business Modelling

Understanding how the organisations involved with flood risk and development planning operate requires models showing the functions or activities of the organisations and how they connect to the supply chain.

If organisations are to be able to analyse and anticipate the effects of the assessment of flood risk upon their organisation, then business modelling is an essential prerequisite before information management can be implemented.

There are various modelling techniques that may be applied to provide different and comprehensive views of the business activities.

Models to represent:

- Activities within the organisation (such as the EA)
- Activities of the organisation and its partners, customers, etc. (looking from the perspective of the EA these would include Defra, LPAs, UAs, developers, general public, etc.)
- Application of technologies
- Information resources and flows

Document processes for:

- Work procedures and tasks
- Roles and responsibilities of personnel
- Audit and control points

Two examples of the types of models that can be developed, the entity model and the supply chain model, are presented later in this section.

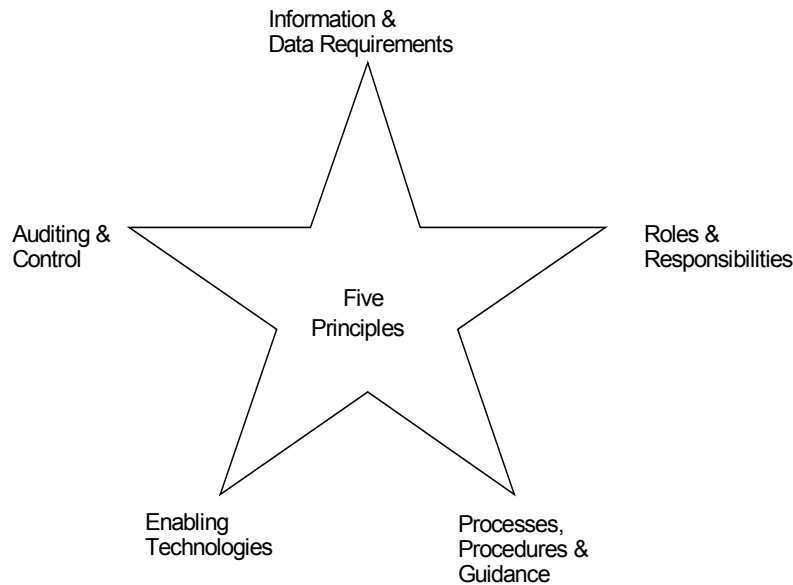
4.4 The Five Principles of Information Management

The five principles, as defined in the R&D project FD2314 *Position Review of Data and Information Issues within Flood and Coastal Defence*, underpin the modelling described above and are intended to serve as guidelines for those involved in assessing flood risk, irrespective of the methods currently employed. The principles bring together everything from high-level policy issues to detailed analysis. They are intended to provide a framework within which all those involved can develop comprehensive procedures.

The five principles take the form of a set of statements of objectives for information management. These are:

- Recognise and understand all types of information
- Understand the legal issues and execute “duty of care” responsibilities
- Identify and specify processes and procedures
- Identify tools and enabling technologies to support processes and procedures
- Monitor and audit processes and procedures

These 5 principles are illustrated in Figure 4.1 and formed the bases of the brainstorming and discussion sessions carried out during Workshop 1 of the consultation process described in Section 3.5.1 of this report.



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Figure 4.1 The Five Principles of Information Management

4.5 Relationships between R&D, Business Process and Policy

To aid understanding of those issues that could be tackled as part of Phase 2 of this project and those that could not, it was decided to split issues into the following four categories:

Research Science

This is the part of R&D that focuses on the science (and engineering) behind assessing flood risk, such as understanding the physical processes associated with flooding, the determination of risk, the analysis of consequences, production of flood outlines, etc. This category may include issues that would be investigated during this project.

Development of Application

This is the part of R&D that focuses on translating the science (and engineering) into usable applications for making decisions regarding flood risk, effectively implementation of the science. For example, this could be the interpretation of the science of embankment failure into a guidance that will tell you how far a development needs to be from the embankment (such as being carried out as part of the *Flood Risks to People* project). Alternatively, this could be the development of the framework, which allows the effective application of available science and guidance. This category was, therefore, the main area of work for this project.

Business Process

This is the process by which organisations can carry out their duties with regard to assessing flood risk. This is beyond the remit of this project, but recommendations have been provided in Sections 6 and 7 regarding how this might be undertaken.

Policy

This covers government or organisational policies that drive the need for assessing flood risk. This is beyond the remit of this project.

The figure below shows the relationships between these four elements. Research Science and Policy can drive each other; sometimes the Policy comes first, sometimes the Science. Business Processes are shaped by the Policies that have to be implemented. Development of Application requires the input of Research Science, but it is also shaped by the Business Processes and vice versa.

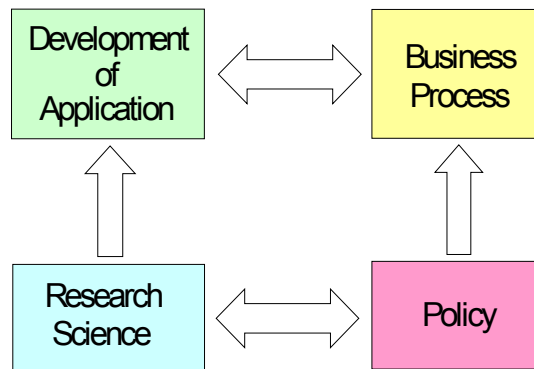


Figure 4.2 Relationships between R&D, Business Process and Policy

4.6 Entity Model

Entity models specify the relationships between such entities as people, processes and information within and between organisations. They are used to brainstorm or when working from a fresh start to resolve organisational issues and to define corporate information structures.

They are not flow charts and should not be read as such. The relationship between one entity and another is indicated by the text written beside the arrows. For example, *Flood Risk Assessments are specified in Guidance Documents, which are driven by Research & Development.*

The idea behind using entity models is to try to encapsulate the essence of the problem under consideration in a brief, but complete, form. The model shown on the following page has been used to illustrate which aspects of flood risk assessments are covered by the four categories described above.

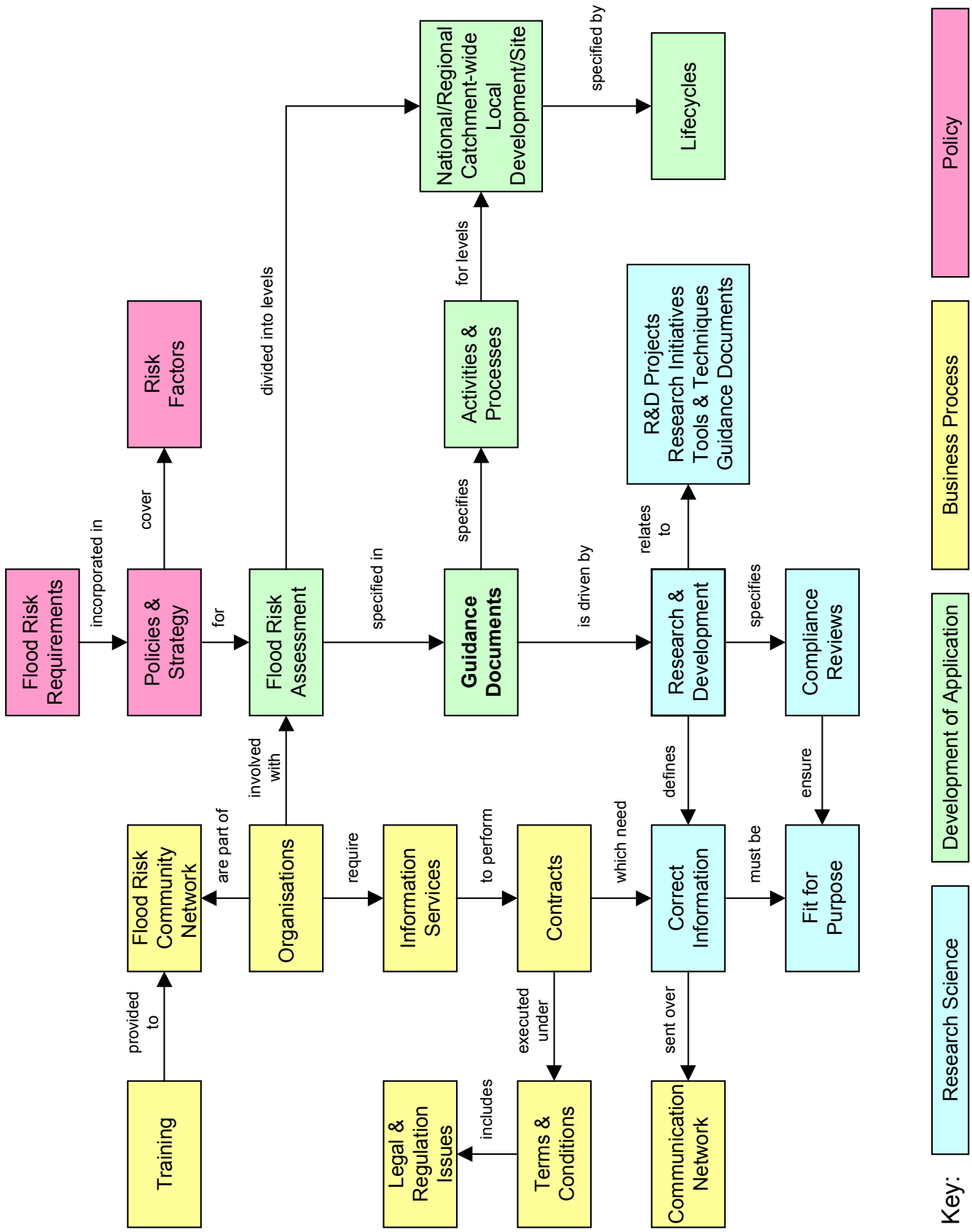


Figure 4.3 Entity Model for Assessing Flood Risk

4.7 Supply Chain Model

Figure 4.4 shows a very simplified representation of the main stakeholders involved in the assessment of flood risk and development planning. This generalised supply chain model can be overlaid with individual supply chains for information flows, document flows, financial flows, decision making processes, etc. By analysing individual supply chains, it was then possible to develop the framework and guidance.

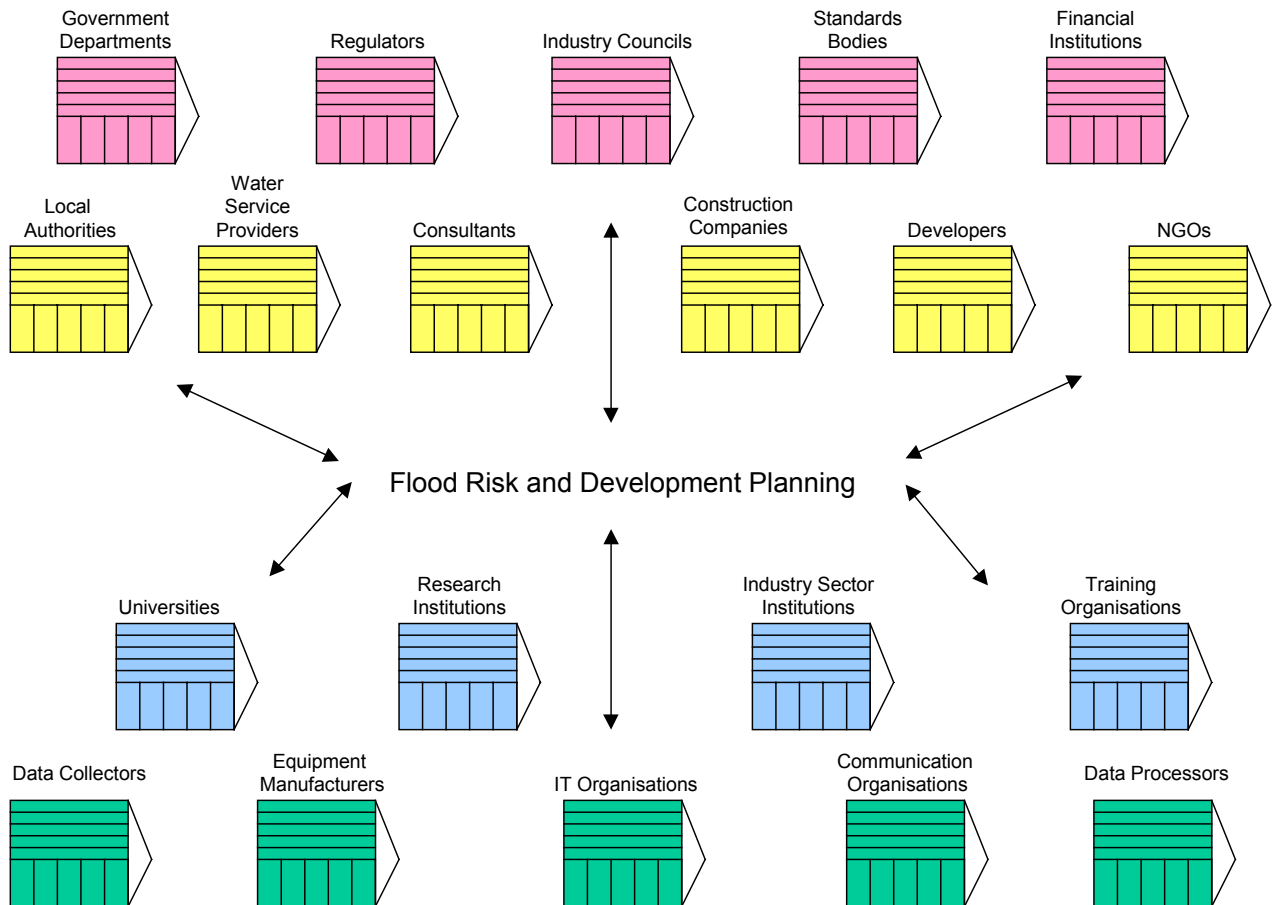


Figure 4.4 Supply Chain of Flood Risk and Development Planning

4.8 The Framework

4.8.1 What is the framework?

The framework is the means by which the links between aspects of assessing and managing flood risk for new developments are identified and explained.

These aspects include:

- Decision scales (i.e. national, regional, sub-regional, local or site-specific),
- Assessment types (e.g. NaFRA, CFMP, SMP, SFRA or FRA),
- Research and development,
- Guidance (whether existing or to be provided by this R&D project), and

- Tools (whether existing or to be provided by this R&D project).

4.8.2 Why is a framework needed?

Based on the consultation exercises carried out as part of this project, at first it appears that the lack of guidance and tools is the cause of difficulties in appropriately assessing and managing flood risk. However, there are many guidance documents and tools available and more are constantly being rolled out as and when R&D projects permit. The overriding problem is understanding the whole picture.

The framework is needed to:

- Provide context and links between everything that is already available;
- Define a Generic Approach that can be applied in all contexts (enabling those carrying out assessments to determine how to carry out an appropriate assessment and enabling those reviewing assessments to determine whether the assessment has been carried out appropriately, i.e. auditing);
- Enable the user to find what they are looking for in the way of guidance and tools; and
- Identify gaps in the guidance and tools, which will be filled, where possible, by the follow-on part of this project or subsequent R&D projects.

4.8.3 What is the framework based on?

It was decided to base the framework around a Generic Approach and this has been based on *Guidelines for Environmental Risk Assessment and Management* (DETR 2000), also known as Green Leaves 2. The report is generally recognised within the UK as the best practice approach to assessing and managing risk in any context. Therefore, it can be applied to flood risk equally well as environmental risk.

This approach has already been adopted and refined by the Risk Assessment for Strategic Planning (RASP) methodology (Sayers *et al.* 2002), which in turn has been adopted as the best-practice approach for NaFRA, CFMPs and SMPs and has also been successfully applied to coastal SFRA. Therefore, the basis of the framework is wholly consistent with current Environment Agency practices.

This Generic Approach is also consistent with the HM Treasury Principles of Managing Risks to the Public⁸.

4.8.4 Framework Structure

In order to develop a framework for assessing flood risk for new development, it is necessary to recognise the problem of effective information management. The information management method that has been adopted is able to encompass all aspects of the work, including supply chains, roles and responsibilities, monitoring and control procedures, as well as data handling and assessment methods. The method incorporates sound tools and techniques that have been successfully applied in many settings (Millard and Sayers 2000).

⁸ http://www.hm-treasury.gov.uk/media/C87/A1/risk_principles_180903.pdf

The framework has five parts:

- The Generic Approach
- Activity Chart
- Guidance Documents
- Information Chart
- Tools

The relationships between these parts have been defined/developed using the Business Elements Method and are illustrated in Figure 4.5.

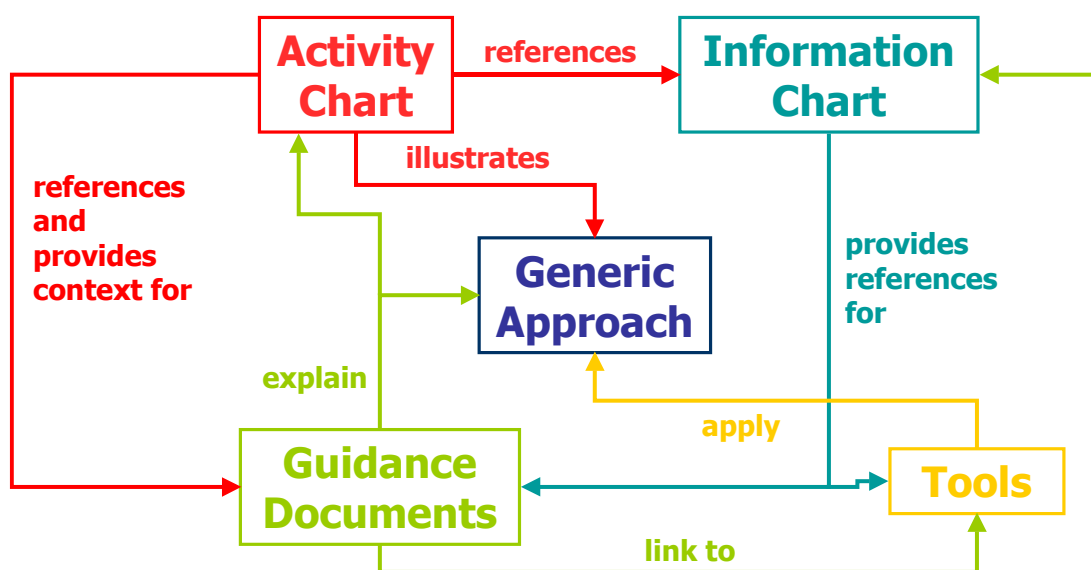


Figure 4.5 Relationships between Framework Parts

These parts have been created in MS Word, Excel and Powerpoint and form a demonstration structure that could be adapted into a website with a structure similar to that illustrated in Figure 4.6.

As part of the consultation feedback, it has been suggested that it would be helpful for different types of users to be able to have their own versions of the framework with links to relevant guidance. One suggested solution is to have a mechanism for the website to ask a number of questions to determine the users' requirements. An alternative (and simpler) approach would be to have a similar structure to the Planning Portal⁹ where the main page has 3 options and users are invited to select which user type matches their needs. These being: General Public, Planning Professionals, Government Users. A substantial proportion of the information under each page is generic, but it might be presented in different orders and with different introductions. The user groups for this framework might be, for example, EA, Planners and Developers or Policy Makers, Planners and Developers.

⁹ <http://www.planningportal.gov.uk/>

A full list of the framework elements is provided in Section 5.3.1.

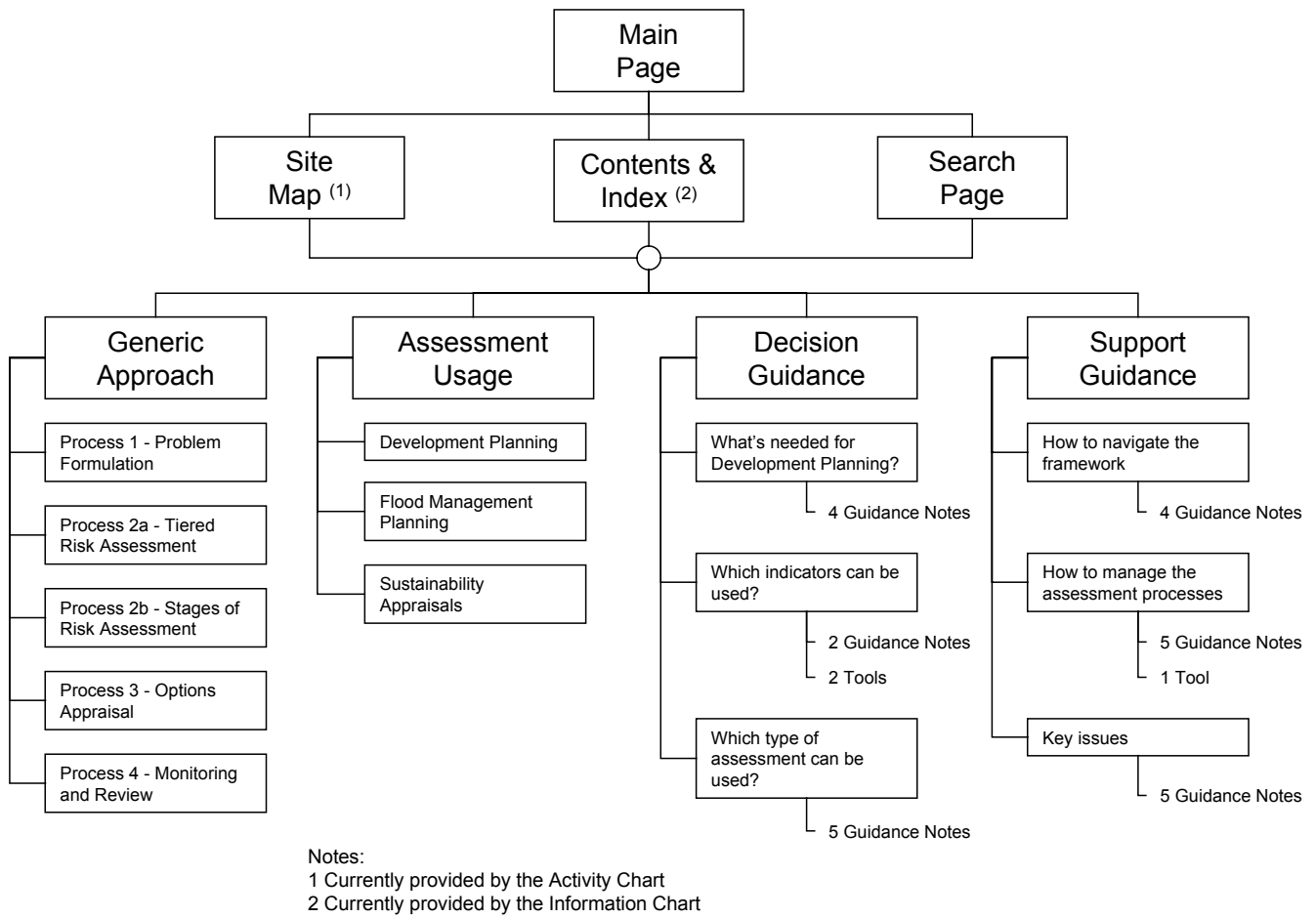


Figure 4.6 Example of Website Structure

As part of the project extension to FD2320, a website has been developed based on a similar structure to one illustrated above.

5. PROJECT OUTPUTS

This section provides a brief description of the other project outputs apart from this report.

5.1 Interim Report (IR)

An Interim Report was produced at the end of Phase 1. This contained the following information:

- Project overview, including aim, objectives and definitions of different types of assessment of flood risk
- A review of existing practices related to development and flooding
- A review of relevant research and development (which has subsequently been updated in this report)
- Details of the method proposed for developing the framework (which has subsequently been updated in this report)
- Details of the Phase 1 consultation process (which has subsequently been updated in this report)
- A detailed scope of work for Phase 2
- A description of the proposed deliverables (which have subsequently been superseded with agreement from the Client Project Manager and Project Board and are described below)
- An updated programme and budget breakdown

This was initially drafted in April 2004 and reviewed by the Project Board. The final draft was put onto the HR Wallingford website in August 2004.

5.2 Technical Report 1 (TR1)

The initial draft of Technical Report 1 entitled *Framework for Assessing and Managing Flood Risk for New Development and Flood Risk Indicators* was issued in October 2004. This was reviewed by the Project Board and the revised draft was put onto the HR Wallingford website in December 2004.

This report was split into two parts, which contained the following information:

- **Part 1** presented the framework that was agreed with the Project Board, following on from a consultation workshop (Workshop 3) held on 28 September 2004.
- **Part 2** presented draft guidance on the use of flood risk indicators within the assessment process.

It was subsequently decided that this report would be superseded by an alternative report, which is still referred to as Technical Report 1, called *Framework and guidance for assessing and managing flood risk for new development – An overview*.

This report summarises the framework, guidance and tools described in full in Technical Report 2. The intention being that it will act as an aid to practitioners for quick referral, rather than always having to refer to TR2.

This final version of TR1 will be made available on the Defra/EA R&D website.

5.3 Technical Report 2 (TR2)

The initial draft of Technical Report 2 entitled *Framework, Guidance and Tools for Assessing and Managing Flood Risk for New Development* was issued in January 2005. This was provided in two formats: a paper format and a digital format.

The final draft of TR2, renamed *Framework and guidance for assessing and managing flood risk for new development – Full documentation and tools*, is also provided in both formats. A pdf of the paper version and zip file of the digital version will be made available for download from the Defra/EA R&D website.

5.3.1 Framework Contents

The following is a full list of the framework contents including guidance and tools.¹⁰

Information Chart

- Framework Contents
- References
- Research and Initiatives
- Statutes and Regulations
- EA Guidance

Activity Chart

- How assessments of flood risk are used
 - Development Planning
 - Flood Management Planning
 - Sustainability Appraisals
- Generic approach to assessing and managing flood risk
 - Process 1 – Problem Formulation
 - Process 2a – Tiered Risk Assessment
 - Process 2b – Stages of Risk Assessment
 - Process 3 – Options Appraisal
 - Process 4 – Monitoring and Review

Decision Guidance

- What's needed for Development Planning?
 - D1.1 National Planning Policy

¹⁰ For a full description of how these outputs interrelate reference should be made to FD2320 Guidance Document S1.1 Introduction to the Framework.

- D1.2 Regional Spatial Strategies
- D1.3 Local Development Frameworks
- D1.4 Planning Applications
- Which indicators can be used?
 - D2.1 Flood Risk Indicators
 - D2.1 TOOL1 Flood Risk Indicators Tables
 - D2.1 ADD1 RASP
 - D2.1 TOOL2 Flood Risks to People Calculator
 - D2.1 ADD2 Calculator Guidance Note
- Which type of assessment can be used?
 - D3.1 National-scale Flood Risk Assessments
 - D3.2 Catchment Flood Management Plans
 - D3.3 Shoreline Management Plans
 - D3.4 Strategic Flood Risk Assessments
 - D3.5 Flood Risk Assessments

Support Guidance

- How to navigate the framework
 - S1.1 Introduction to the Framework
 - S1.2 How to use the Activity Chart
 - S1.3 How to use the Information Chart
 - S1.4 Glossary and Abbreviations
- How to manage the assessment processes
 - S2.1 Reporting
 - S2.2 Information Management
 - S2.3 Auditing and Control
 - S2.3 TOOL Assessment Check-List
 - S2.4 Stakeholder Engagement
 - S2.5 Linkage to Statutory Requirements
- Key issues
 - S3.1 Climate Change
 - S3.2 Risk to People Behind Defences
 - S3.3 Safe Access and Exit
 - S3.4 Brownfield Development
 - S3.5 Mitigation Measures

5.4 Technical Summary (TS)

A two page Technical Summary will accompany the Technical Reports on the Defra/EA R&D website. This summary provides a brief description of the purpose of the project and the project outputs.

6. COMMUNICATION AND IMPLEMENTATION PLAN

6.1 Why is a plan needed?

This project provides a framework, guidance and supporting tools to enable a consistent approach for assessing and managing flood risk for new developments, to support the planning system in England and Wales. The framework includes definitions of current roles and responsibilities associated with carrying out this work (i.e. who does what).

To gain maximum benefit from the recommendations of this project a programme of communications and implementation (C&I) activities is required to integrate the new approach into the business policies, processes and practices of the main stakeholders. The programme will need to include all supporting processes, resources, skills, data etc. and will need to consider the needs of all stakeholders involved in, and/or implicated by, the new approach.

In conjunction with the recommended monitoring and review processes (see Section 6.4.9), the C&I activities will need to meet not only the initial needs of the stakeholders at the time of transition to the new approach, but also their ongoing requirements post-implementation.

6.2 What is provided by this plan?

This C&I Plan provides recommendations to Defra and the Environment Agency regarding what needs to be done to enable, facilitate and support uptake of the framework, guidance (and supporting tools) across England and Wales. It provides recommendations on:

- How to assess the needs of key stakeholder groups,
- How to use the results of the assessment to define a programme of C&I activities, and
- How the process of doing so can help to integrate the new approach into the business processes of the main stakeholders.

The actual assessment and delivery of C&I activities recommended within this plan would be carried out by Defra and the Environment Agency. It would not be feasible, within the scope of this project, to attempt to plan every activity required or subsequently to implement those activities. The scope of the project does, however, include some early communication activities, delivered during the project duration, with the purpose to achieve initial awareness raising within key stakeholders.

The remainder of this plan is divided into two parts:

- The requirements - this is an overview of what should constitute an effective C&I strategy for this project.
- The proposed approach – this is a summary of the results from discussions held during Phase 2 of the project on a proposed way forward for the C&I programme. Thus, this section should evolve with time.

6.3 The Requirements

6.3.1 Objectives

This plan makes recommendations regarding the need for a full C&I programme that should aim to:

- Raise awareness of the framework, guidance and tools among key stakeholder groups
- Understand where the new approach sits alongside current practices
- Understand the process changes that will be required
- Understand the stakeholders' existing skills and resource capacity
- Compare this with the skills and resource capacity requirements of the new approach
- Define initial and ongoing learning and development needs
- Develop and deliver training
- Provide access to materials (e.g. data and information)
- Implement ongoing support mechanisms to ensure that the stakeholders do not resort back to business-as-usual after implementation.

The C&I activities will need, therefore, to cover a broad range of areas and will need to include a variety of options designed, as appropriate, to meet specific objectives.

Two models (stakeholder transition and gap analysis) are presented within this plan to help provide some clarity and structure in defining what needs to be achieved. The models can also be used during the implementation process to assess how successful the C&I programme is being. The models are described in Sections 6.3.2 and 6.3.3.

For Sections 6.3.2 to 6.3.6, Appendix C.1 provides a list of example questions that should be considered in support of this plan.

6.3.2 Stakeholder Transition

Figure 6.1 provides a theoretical view of the objectives of an effective C&I programme. At present, the recommended approach is project-owned (i.e. within the FD2320 core Project Team and Project Board) and awareness by the key stakeholders is limited. The objective is to transfer ownership of the approach, over-time, to the business. To do this will require a range of targeted activities that enable the stakeholders to move through the four developmental stages of:

- **Awareness:** of the project and its recommendations/outputs
- **Understanding:** of how the recommendations/outputs relate to their own context
- **Trialling:** of the new approach in a pilot or 'dummy' environment to test and question its validity and benefits

- **Acceptance:** of the approach, its benefits and its evolution over time.

Inevitably, progress up the curve is rarely straightforward, as stakeholders tend to move between the middle two stages repeatedly before, if successful, progressing to acceptance. Consequently, the C&I programme should allow for an extended period of time in the two middle stages.

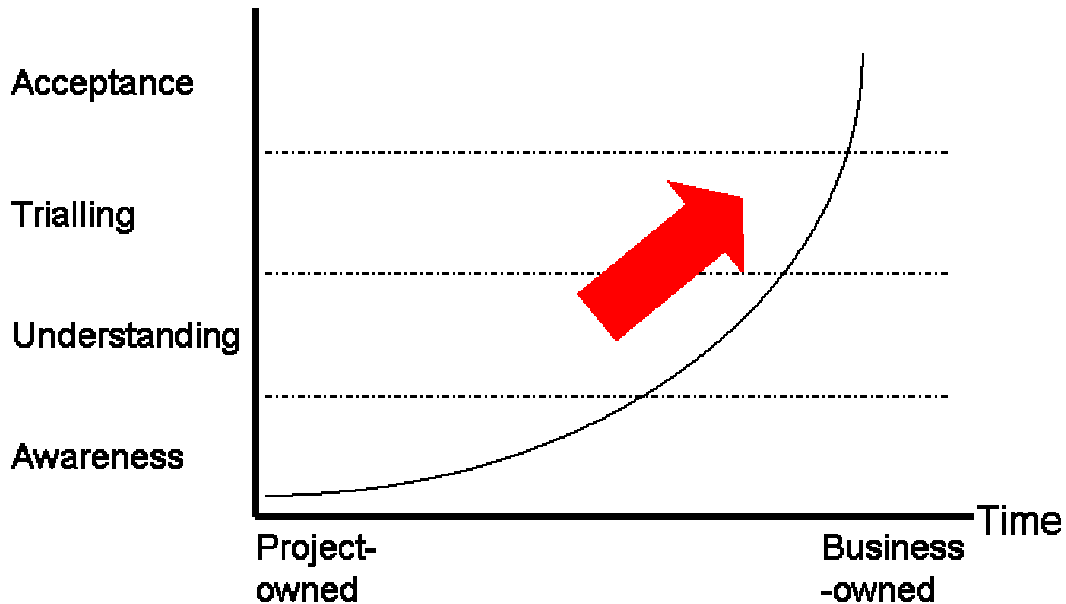


Figure 6.1 Model of Stakeholder Transition

Experience has shown that effective implementation of many projects fails due to an assumption that the right steps have been followed and, therefore, progress up the curve has been made. Often in reality, when ‘business-ownership’ is assumed by the project, the stakeholders are still deep in the trialling stage and have not yet accepted the new way of working. As a result, once support is removed, resistance to change is encountered and benefits are often not fully realised. Failure to allow for sufficient depth of understanding and trialling by key users will most likely result in their rejection of the changes and they will resort to previous ways of working. This plan, therefore, recommends that sufficient time be given to key ‘understanding’ and ‘trailing’ activities. It is also recommended that mechanisms be put in place to provide ongoing support post-implementation to prevent individuals falling back into the ‘trailing’ stage if they encounter problems. It is important that the strength of acceptance grows, and does not wane, over time.

The above model should be used in 3 ways:

- **Defining the needs:** Not every stakeholder group will need to have full acceptance and ownership of the project outputs. Some groups will simply need to know that the new guidance exists and what it contains. Before planning any activities, consider where on the curve each stakeholder group needs to reach.

- **Planning the activities:** For each stakeholder group, plan a series of C&I activities that will support and enable their progress up the curve until they reach the desired point only.
- **Evaluating success:** As the C&I programme progresses, it is advisable to re-visit the model and evaluate where on the curve each of the stakeholders has potentially reached. If the results are not as positive as had been hoped for, more activities may be needed. Conversely, it may be possible to reduce the planned programme if stakeholders have adopted the changes more rapidly than had been anticipated.

Appendix C.2 provides a sample format for the C&I plan.

6.3.3 Gap Analysis

To define an effective C&I programme requires a reasonably accurate gap analysis to be completed for each of the target audience groups (see Section 6.3.4). The purpose of the gap analysis is to understand the extent of the transition that will be required to move from the current approach and practices to the ‘desired’ future approach and practices. An example summary of requirements for a gap analysis is given in Figure 6.2. This is required for each stakeholder group.

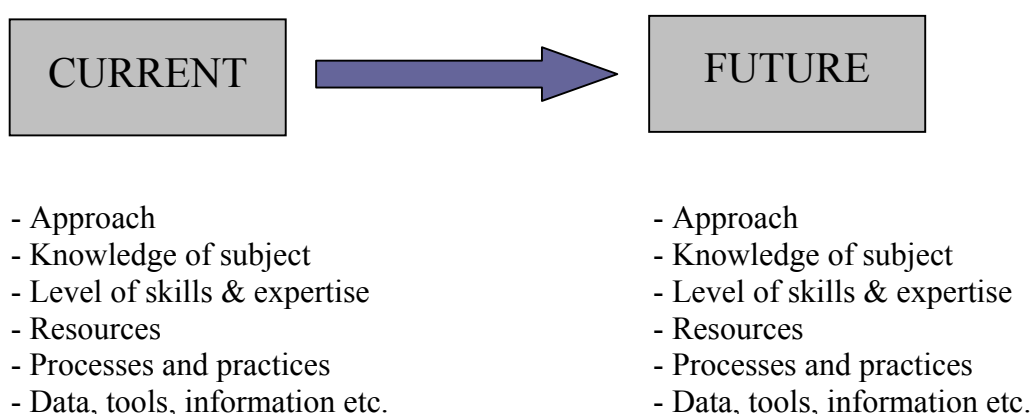


Figure 6.2 Example Gap Analysis

It may be that the need to change is very minimal, but an important first step is to understand fully what is going to be the size of the change. If the above can be defined to a reasonable level of completeness/accuracy, C&I activities can be planned to facilitate the transition of the target audience from the current to the desired future state (see Appendix C.1 for supporting questions).

6.3.4 Target Audience

The target audience for the C&I activities will include at least the following:

Environment Agency Staff

Flood risk regulation staff at national, regional and area levels¹¹:

¹¹ This is based on the existing EA structure, which is due to change in May 2005.

- Planning Liaison Officers*
- Development Control Officers*
- Flood and Coastal Defence Process Managers
- Flood and Coastal Defence Regulation Engineers
- Flood Risk Policy Managers
- Planning and Corporate Services Managers

* highest priority for full implementation

Non- Environment Agency staff

- ODPM
- Defra
- Regional Assemblies and Development Agencies
- Local Planning Authorities
- Internal Drainage Boards
- Water Companies and other Sewerage Undertakers
- Developers
- Insurance Companies
- Consultants
- R&D Community
- Others

For the framework to be fully implemented, all parties will need to be at least aware, if not fully conversant, with the new approach. In particular, the Environment Agency and Local Planning Authorities¹² will need to adopt a consistent approach.

6.3.5 Culture and Process Changes

Although the changes required may not appear to be significant, it is important to recognise that for some practitioners they may embody subtle changes that require a shift in thinking and approach. Moreover, there may not be a consistent starting point in the current way of working.

For example, dealing with the concept of risk, and making appropriate decisions based on the understanding of that risk, is likely to be new to some practitioners. This might be mitigated by providing training in the risk approach, as well as training in carrying out processes or work instructions.

6.3.6 Barriers to Uptake

It is recommended to start the C&I planning process by considering the likely barriers to change. It is important not only to be smart about identifying the drivers for people

¹² A list of organisations that might be able to assist with awareness-raising or training activities with local planners is provided in Appendix C.11.

to use the new approach, but also to take time to think about where resistance will be and to plan ahead for it.

For example, new guidance can often be perceived as adding to staff workload rather than helping them to reduce it. This might be mitigated by the use of carefully explained awareness-raising activities, clear identification of the application of the guidance within work practices and suitable support mechanisms for queries to be resolved quickly and accurately.

6.4 The Proposed Approach

6.4.1 Project Dissemination Activities

This section details activities that are part of the project scope and will occur before project closure at the end of March 2005. The activities aim to raise awareness across all stakeholder groups. These are in addition to the project consultation activities (described in Section 3) that included dissemination of initial draft outputs.

- Technical Reports 1 and 2 and the Technical Summary to be provided on the Defra/EA R&D website;
- Announcements via appropriate CIRIA channels, for example the website, fortnightly e-newsletter, quarterly publication, events and targeted distribution groups of interested parties. This will include links to the R&D outputs on the Defra/EA website. (Details of these proposed communication activities are given in Appendix C.4.);
- E-news bulletin for project contacts (The proposed content is provided in Appendix C.5.);
- Papers presented at key conferences (A short paper has already been accepted at the Defra flood and coastal management conference in July.)

Appropriate, sensitive announcements are required for the time of project closure and release of the project outputs via the Defra/EA R&D website. These should be short and succinct. Fuller, more definitive announcements should be released once the implementation approach has been confirmed.

6.4.2 Post-Project Activities

This section describes implementation activities that are beyond the scope of this project, but are recommended for the successful adoption of the project outputs.

The project has delivered a proposed science- and risk-based framework that needs to be developed into appropriate policies and practices by the stakeholder groups, in particular the Environment Agency. There needs to be full consideration of the implications of these outputs and how practitioners should adopt them. Therefore, there will be some delay between the end of the project and full adoption across the stakeholder groups.

Recommendations for post- project activities are summarised as:

- Identify which of the project outputs can be disseminated early and do not require trialling,
- Undertake comprehensive trialling/pilot testing (starting with demonstrations of the project outputs for those who will undertake the trials),
- Develop organisation specific policies and processes to accompany science,
- Develop and implement a ‘live system’ (see Section 6.4.6),
- Carry out further dissemination and training once the system goes live,
- Provide an ongoing support mechanism (see Section 6.4.8).

6.4.3 Implementation Approach

Currently, there are two identified approaches for implementation:

- **Environment Agency-led:** The Environment Agency takes ownership of the outputs in the first instance and rolls them out internally to ensure they are confident with their approach, before implementation commences with non-Agency stakeholder groups.
- **Simultaneous roll-out:** Implementation within and outside of the Environment Agency occurs simultaneously. This approach might result in earlier adoption across stakeholder groups, but might leave the EA vulnerable to criticism regarding the provision of support and information, which could undermine confidence in the system.

Whichever approach is adopted, elements of the framework, for example some of the guidance notes could potentially be made available for use immediately to support practitioners. Thus, implementation of the new guidance should be an organic process.

With either approach, it is recommended that a Steering Group be set up, to include representatives of each of the key stakeholder groups. The remit of the Steering Group would be to:

- Share ownership of the framework going forward,
- Conduct gap analysis for each stakeholder group to understand the extent of potential change,
- Explore implications and agree mutually-acceptable policies and practices,
- Share resource requirements (financial and other) of implementation work.

The first task of the Steering Group would be to agree which of the two approaches should be undertaken (or suggest an alternative approach) and how best to go forward with the C&I programme. The following programmes are put forward as a starting point for discussion at the first Steering Group meeting. Appendix C.3 provides a suggested time frame for both of these programmes.

Environment Agency-led Implementation

- Stage 1: Awareness raising across all stakeholder groups
- Stage 2: Increased understanding and trialling with a select pilot group of practitioners (resulting in amendments to the framework, guidance and tools as required, development of a live system version and development of Environment Agency policies and practices)
- Stage 3: Adoption within the Environment Agency (including training and dissemination), plus simultaneous awareness raising activities for the wider stakeholder group
- Stage 4: Adoption across the wider stakeholder group, which will then result in development of policies and practices in stakeholder organisations
- Stage 5: Ongoing support, plus monitoring and review of the uptake (see Section 6.4.9).

Simultaneous Roll-out

- Stage 1: Awareness raising across all stakeholder groups
- Stage 2: Increased understanding and trialling with a select pilot group of practitioners (resulting in amendments to the framework, guidance and tools as required, development of a live system version and development of Environment Agency and non-agency policies and practices)
- Stage 3: Adoption across all stakeholder groups (including training and dissemination)
- Stage 4: Ongoing support, plus monitoring and review of the uptake (see Section 6.4.9).

6.4.4 Trialling of Project Outputs

Trialling is required for the project outputs to have credibility and for their effectiveness to be proven. This should include a series of walkthroughs by different user groups.

Some project outputs might be considered sufficiently robust to be disseminated early to assist practitioners as soon as possible. However, there will remain a need to trial/pilot test the outputs to ensure that they are accurate, complete, consistent, relevant and useable. Some of the project outputs might need refinement to suit organisations' business needs, level of decision-making and available resources.

Questions that will need answering include:

- Can the user get an answer to the question posed?
- Is this answer appropriate?
- Is the answer to the right level of detail?
- How easy was it to get the answer?

- Is the process time efficient?
- Is the process pragmatic enough to work in a broad set of circumstances?

A time and budget contingency needs to be set aside in the implementation programme to carry out any remedial work identified.

A list of items recommended for trialling/pilot testing is provided in Appendix C.6.

There are potential opportunities to take advantage of ongoing R&D projects that include case studies to undertake some of the trials. Opportunities drawn to the Project Team's attention by the Pennine Water Group at Sheffield University include working with Bradford City Council and a number of organisations in Scotland.¹³

Demonstrations of the project outputs will be required for those undertaking the trials. An example of the type of demonstration required is provided in Appendix C.8. Some kind of ongoing support may also prove useful.

6.4.5 Development of Policy and Process

As stated earlier, the project has delivered a proposed science- and risk-based framework that needs to be developed into appropriate policies and practices by the stakeholder groups, in particular the Environment Agency. Consideration of this is beyond the scope of this project. However, the modular construction of the framework should enable a similar approach for developing policies and processes.

As the ODPM is currently reviewing PPG25, this presents an ideal opportunity for the EA to influence government policy to reflect the project outputs. If this were successful, this would then have a domino effect through stakeholders policies and processes, bringing them more in line with the project outputs (and subsequently the live system) without it being perceived as a separate activity.

6.4.6 Development of a Live System

The project outputs are designed to be delivered in electronic format and have been very positively received. It is recommended that there be one common repository (ideally a web-site) for the framework, guidance and tools, which is available for all practitioners to access.

This would have a number of advantages including:

- Single location to update data and information;
- Improved consistency;
- Simplification of locating information i.e. via one common entry point;
- Reduced likelihood of inaccurate data being accessed;
- Reduced concerns over version control, updates and dissemination.

¹³ Although the project scope does not include Scotland, much of the approach is generic and equally applicable to Scotland. The extent of the Trialling would need to reflect the differences in planning policies.

6.4.7 Dissemination and Training as part of Adoption

Three types of dissemination or training have been identified:

Type 1 – Simple dissemination of the project outputs

Type 2 – More detailed demonstration of project outputs to enable pilot testing/trialling to be undertaken

Type 3 – Full training in the live system as part of adoption

Examples of power-point presentations that could be used during dissemination/training are provided in Appendix C.7 and Appendix C.8.

Costs associated with providing Type 1 and Type 2 events are provided in Appendix C.9.

An example of a small leaflet that can be used as an introduction to the project outputs is provided in Appendix C.10 (paper version of this report only).

Full training of practitioners (Type 3) should only be carried out, once the pilot testing/trialling has been undertaken and the policies and processes to support the framework are in place. Until these activities and full gap analysis of stakeholder groups have been carried out, it is not possible to scope the training requirements.

When undertaking the gap analysis, there will be a number of issues that will need to be taken into consideration, for example:

- How familiar are different stakeholder groups with the concepts of risk assessment, e.g. will they already understand the principles behind the Generic Approach?
- How familiar are different stakeholder groups with dealing with uncertainty and applying the precautionary principle within decision-making?
- To what extent should different stakeholder groups understand all of the processes presented in the framework compared to the activities that directly affect them?
- How much of the framework, guidance and tools will be available to each stakeholder group, e.g. will some items have restricted availability?
- How familiar are different stakeholder groups with relevant source material (existing guidance, tools, etc. cross-referenced in the project outputs)?

Training events could also provide an opportunity to provide specific training in related guidance produced outside of this project, e.g. use of the preliminary rainfall-runoff guidance (W5-074) and CIRIA guidance C624.

6.4.8 Ongoing Support

As recommended in Section 6.3.2, provision should be made for support to practitioners after initial training. A help desk has been discussed although no further details elaborated. It is recommended that the proposed Steering Group consider this point in early discussions.

6.4.9 Links with Monitoring and Review

The C&I plan, and resultant activities, will need to link with the monitoring and review process to ensure:

- Appropriate support mechanisms are in place and ongoing
- Processes are in place that are sufficiently flexible to allow evolution of the live system as required.

Figure 6.3 shows the basic links between the C&I process and the Monitoring and Review process.

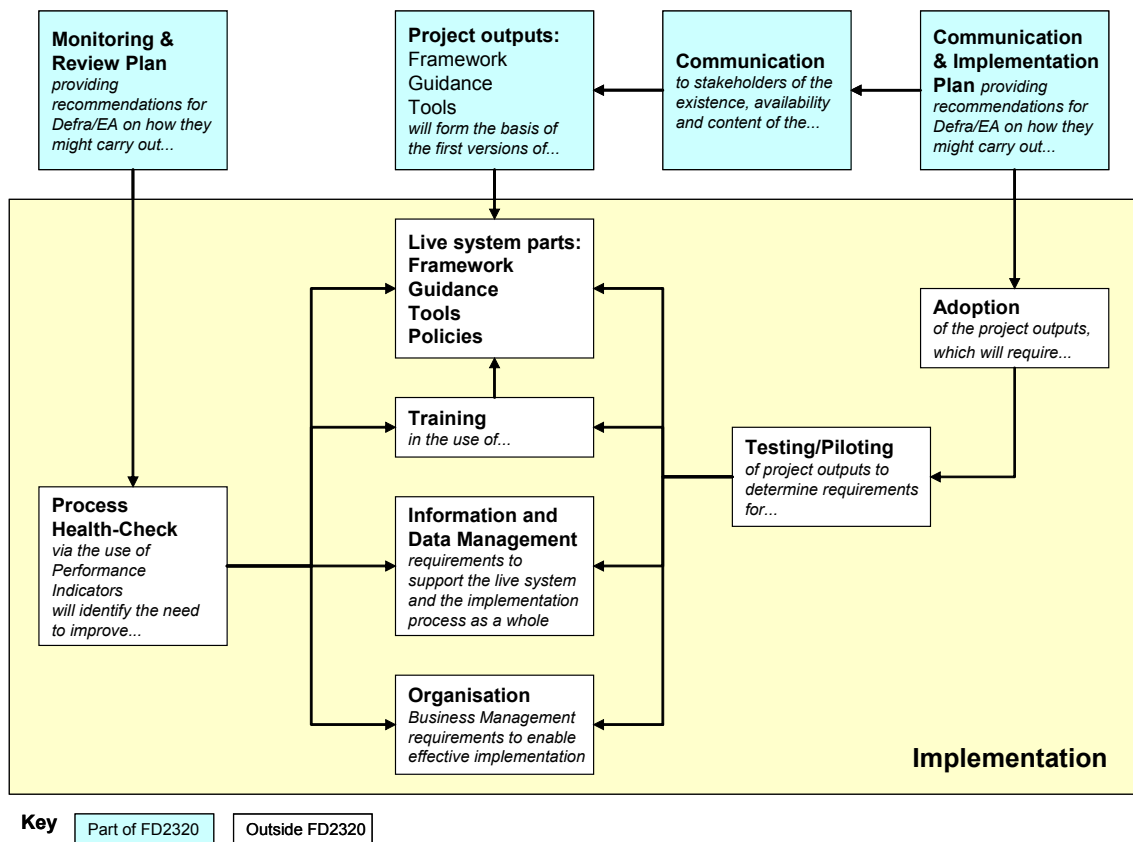


Figure 6.3 Links between Communication, Implementation, Monitoring and Review

7. MONITORING AND REVIEW PLAN

7.1 Why is a plan needed?

The Environment Agency needs a method for monitoring and reviewing its advice and decision-making processes regarding new development with respect to flood risk and flood management.

The main objective is to monitor the EA's success rate in preventing 'inappropriate' development. However, the concept of 'inappropriate' is complex and, as the final decision regarding whether a development takes place does not lie with the EA, it is not entirely in its control. Therefore, a simple measure of 'yes' or 'no' does not give the whole picture and, in fact, does not show where improvements can be made. Therefore, a series of performance indicators is required.

A secondary objective is to monitor the successful uptake of the framework within the EA and the benefits that it provides to the advice and decision-making processes. Additional performance indicators are required to show this. However, these performance indicators are not entirely separate from those required for the main objective, as the accountability of the decision-making process is an integral part of both issues.

There could be merit in also monitoring the successful uptake of the framework within the industry as a whole. This is beyond the scope of this plan and reference to activities used in this plan should only be considered within the context of the EA's work. However, it would not be a particularly onerous task to monitor the extent of the adoption of the framework within the planning authorities or the uptake of Standing Advice, as these could be monitored by the EA. Therefore, these two indicators have been included.

7.2 What is provided by this plan?

This Monitoring and Review Plan provides recommendations to Defra and the EA regarding what should be monitored, what the results might mean and how the review process can lead to improvements. The actual monitoring and review process would be carried out by Defra and the EA as they see fit.

Without an in depth understanding of the EA's organisational structure, etc. it is not possible to decide on the EA's behalf which performance indicators should be selected (this is beyond the scope of this project). In addition, it is not possible to give full details of how the performance indicators would be determined and used. However, it is possible at this stage to provide a list of potential indicators and some relatively simple comments regarding the following:

- what information is needed
- who should have responsibility
- what the targets might be
- what the actions might be if the targets are not reached

Tables D.1 and D.2 (found in Appendix D) provide a potential list of performance indicators and comments regarding the above.

In addition, the EA is in the process of reviewing its organisational Key Performance Indicators (KPI), which include indicators related to flood risk management. These are listed in Table D.3. It clearly would be advantageous if these indicators corresponded (at least in part) with those proposed in Tables D.1 and D.2. There are only a few direct matches between the two sets of indicators (as shown in Table D.1), but there are a number of links between the KPIs and the framework. Table D.3 links the indicators to parts of the framework (reference should be made to the framework Activity Chart) and, where possible, also to specific Flood Risk Indicators (FRI) defined as part of this project.

7.3 Grouping and Review of Indicators

There are 6 main categories of performance indicators:

Organisational Performance Indicators

1. **Time** - whether deadlines are met and whether time spent reduces
2. **Cost** - whether the process costs less and whether the solutions cost less
3. **Decisions** – whether the correct decisions have been made and whether they are in line with policy

This set of indicators helps to demonstrate the value added by the framework to the EA's business processes.

Technical Performance Indicators

4. **Approach** - whether the process has been carried out in the appropriate way
5. **Science** – whether the answers have been calculated correctly
6. **Risk** – whether the actual number of properties at risk has gone down or the risk decreased

This set of indicators helps to demonstrate that the assessments themselves are getting things right and can also form the basis of the auditing/review process carried out by the EA on behalf of the Planning Authorities.¹⁴

If targets can be set for these categories, these can be represented in a simple radar format as shown in Figure 7.1.

¹⁴ Further details regarding this are provided in FD2320 Guidance Note S2.3 Auditing and Control.

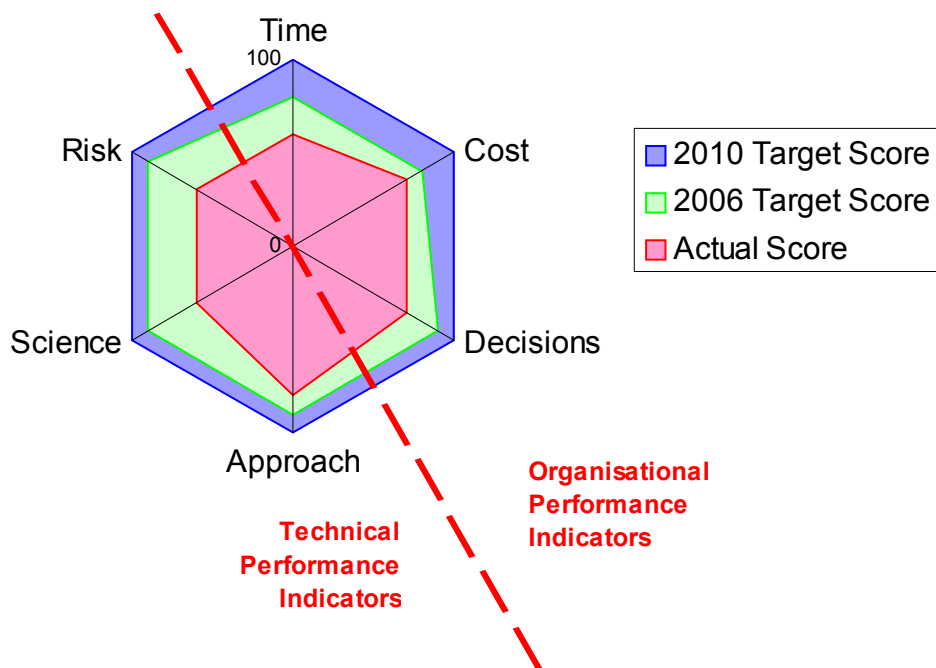


Figure 7.1 Example Radar Chart of Performance Indicator Results

7.4 Remedial Actions

If targets are not being met, appropriate actions need to be carried out. These are linked to the *Communication and Implementation Plan* described in Section 5.

There are 4 main actions:

1. Improve the **live system parts**, i.e. framework, guidance, tools and policies
2. Carry out further **training** in how to use the framework, guidance and tools
3. Improve access to the **information** referred to in the framework and guidance, but is held elsewhere (which would include reviews of information storage, accessibility, upkeep, etc.)
4. Improve links between the framework and other parts of the **organisation** and improve other aspects of the organisation itself (including communication internally and with other stakeholders).

Table D.1 (found in Appendix D) indicates which of these actions might be required should a particular performance indicator not reach the required target.

Figure 6.3 shows the basic links between the Monitoring and Review process and the Communication and Implementation process.

8. PROJECT REVIEW

8.1 Outputs Compared to Original Scope

The original terms of reference can be found in Appendix E. The following is a summary of how the project outputs compare to these and shows how the scope of the project has been successfully achieved.

8.1.1 Phase 1

1. Review existing procedures

Results of this review were presented in the Interim Report and have subsequently been incorporated into the guidance notes provided by the project (each guidance note has a section called Processes and Procedures).

2. Review existing flood risk assessment and management tools and techniques

Results of this review were presented in the Interim Report and have subsequently been incorporated into the guidance notes provided by the project (each guidance note has a section called Tools and Technologies).

3. Scope framework requirements

This was described in the Interim Report and the approach adopted has been described again in this report.

4. Scope tools, procedures and guidance

This was described in the Interim Report. However, revisions to this scope were required during Phase 2 to ensure the Project Team concentrated on providing the most pertinent project outputs to maximise benefit to the users

5. Identify data and information needs

These were identified in the Interim Report and have subsequently been incorporated into the guidance notes provided by the project (each guidance note has a section called Data and Information). There is also a specific guidance note called S2.2 Information Management.

6. Flood risk issues for development (local and national planning)

This was described in the Interim Report and has resulted in 4 guidance notes D1.1 to D1.4 covering the 4 identified scales of decision-making: national, regional, local and site-specific.

7. Consultation workshops

As described in Section 3.5, two workshops were carried out in Phase 1.

8. Detailed definition of Phase 2 tasks

This was provided in the Interim Report. However, based on consultations during Phase 2 some modifications to the tasks were required.

8.1.2 Phase 2

1. Framework and methods for FRA for developments

The framework as described in the Activity Chart, including the Generic Approach, decision guidance, support guidance and the usage diagrams fulfils the requirements of a hierarchical framework and the tiered risk assessment approach. It also encompasses all of the different issues that need to be considered in assessing and managing flood risk either via the description of the Generic Approach or by the content of the guidance documents.

2. Quantification of risk indicators

During an early stage of the project, it was determined that guidance on the quantification of flood risk indicators is already being developed as part of other R&D projects. However, there is a pressing need to understand which indicators should be used when and how to apply them. This has been reflected in the guidance provided by this project (see Guidance Note D2.1 Flood Risk Indicators).

3. Software tools

The following individual software tools have been produced by this project:

D2.1 TOOL1 Flood Risk Indicator Tables (Excel), which provide a means to filter potential flood risk indicators depending on the scale of the decision-making and the detail of the assessment.

D2.1 TOOL2 Flood Risks to People Calculator, which is an Excel spreadsheet tool to determine risks to people for a new development

The Activity Chart (MS Powerpoint), Information Chart (Excel) and the hyperlinked guidance notes and tools collectively demonstrate the potential for a web-based tool to navigate the framework, guidance and tools.

The following tools (although not software tools) have also been produced:

- S2.3 TOOL Assessment Check-list, which provides a series of questions that can be used to provide a scored audit of any type of assessment of flood risk
- Risks to People behind Defences Lookup Tables (in Guidance Note S3.2)
- Safe Access and Exit Lookup Table (in Guidance Note S3.3)

4. Decision guidance for risk assessment and 5. Decision guidance for risk management

It was determined fairly early on in Phase 2 that it was more appropriate to consider risk assessment and risk management as part of an iterative decision-making process and, therefore, should be combined. This is illustrated by the Generic Approach.

The decision guidance is presented in a modular form via a series of guidance notes. This is intended to reduce the need for users to refer to anything other than what is relevant to their needs. It also enables updates to particular guidance notes (as and when policies change or new science is available) to be more easily undertaken.

6. A communications and implementation plan

This has been provided in Section 6 of this report.

7. A monitoring and review plan

This has been provided in Section 7 of this report.

8.2 Adoption of Project Outputs

Detailed recommendations regarding the communication, implementation, monitoring and review requirements to enable adoption of the project outputs are provided in Sections 6 and 7. These sections identify requirements for both policy and business process reviews within organisations.

These include the following:

- Trialling/pilot testing of project outputs. These being the framework, guidance and tools. Specific recommendations are provided in Appendix C.6.
- Based on the results of the trialling/pilot testing, carry out any necessary amendments to the project outputs.
- Produce a web-based version of the framework, which is currently demonstrated in the form of a MS Powerpoint file, setting in place ownership and maintenance mechanisms for the live system. (This has since been undertaken as part of the project extension.)
- Provide training for users to accompany the roll-out of the live system, including provision of a support system.
- Set up a monitoring and review system to accompany the roll-out, to track uptake and effectiveness of the live system.
- Develop further databases/information resources to support the framework, such as databases of Regional Spatial Strategies, CFMPs, SMPs, SFRAs, etc.

Suggested programmes for these activities are provided in Appendix C.3.

8.3 Input into Current R&D Projects

Current R&D projects that could benefit from the outputs from this project include:

- Adaptable Urban Drainage – Addressing Change in Intensity, Occurrence and Uncertainty of Stormwater (AUDACIOUS)
- Floodplain land use optimising workable sustainability (FLOWS)
- Integrated flood risk analysis and management methodologies (FLOODsite)
- Flood risk management research consortium (FRMRC)
- Performance based asset management systems (PAMS) (Defra/EA R&D project W5-0205)

- Sustainable flood and coastal management (Defra/EA R&D project FD2015)
- Water cycle management for new developments (WaND)

As stated in Guidance Note S1.2, the purpose of the Activity Chart is to encapsulate on a single sheet the principles of the framework and the guidance and tools that support it. If used in conjunction with the Information Chart, it enables the user to access all parts of the framework and additional reference material quickly and easily.

Feedback from those involved during the project has been very positive toward the usability of the Activity Chart and the clear, simple way in which it presents generic concepts such as the tiered assessment approach.

There has been a suggestion that it may be a useful model that could be adopted by other research projects, such as AUDACIOUS and FLOOD*site*, to deliver the findings of their work. As such, users of the research would recognise a common front-end application and become familiar with the hyperlink navigation to useful supporting guidance and research outputs.

8.4 Future R&D Requirements

8.4.1 Research Science

At the present time, the major R&D projects of the Flood Risk Management Research Consortium (FRMRC) and FLOOD*site* are potentially covering the majority of outstanding research science requirements. It will only become clear where gaps remain once these projects have been underway for a few more months.

Early on in this project, it was recognised that there was a need to develop an approach for assessing environmental consequences. This has now led to a scoping study, which will be completed by the end of March 2005.

A recurring issue throughout the consultation activities was the need to understand the sensitivity of urbanisation on catchments and how much of the surrounding area should be considered in an assessment of flood risk. A limited review of this has been undertaken as part of this project (details are provided in Appendix F) and this is an area that would benefit from additional R&D to produce a simple tool and appropriate guidance.

The area of the Generic Approach presented as part of this project that is currently the most overlooked is Process 4 – Monitoring and Review. This is an essential part of the overall process of assessing and managing flood risk, in particular in relation to performance and maintenance issues related to mitigation measures and applying an adaptive management approach to deal with climate change or unforeseen land-use changes, etc. To some extent this is being covered by the PAMS project, but this is only in relation to EA assets. There is a remaining need to identify monitoring requirements, techniques and technology for other assets (such as SUDS) and non-structural mitigation measures.

8.4.2 Development of Application

The feedback received from the consultation activities suggests a much greater need for R&D in the application of new science.

Although beyond the scope of this project, the following would be a natural progression/expansion of the framework:

- Apply the same approach to coastal erosion risk assessment and management, which would build on the outputs from the new Defra/EA R&D project *Risk Assessment of Coastal Erosion*¹⁵
- Increase links to Sustainability Appraisals and the SEA Directive (in support of the EA website *Good Practice Guidelines for Strategic Environmental Assessment* that is already up and running¹⁶)
- Provide more explicit links to the Water Framework Directive and River Basin Management Planning (Forrow *et al.* 2004)
- Improve linkage to data and information management systems currently under review as part of the Defra/EA R&D project FD2323 *Improving Data and Knowledge for Effective Integrated Flood and Coastal Erosion Risk Management*
- Develop a stakeholder engagement strategy/framework, including monitoring and review mechanisms, building on the work underway as part of the FRMRC.
- The type of framework devised for this project could be similarly applied to “Integrated Urban Drainage Planning”, an identified need based on the feedback Defra received during the consultation exercise *Making Space for Water* (Defra, 2004).

¹⁵ Recently awarded. Project reference is unknown

¹⁶ http://www.environment-agency.gov.uk/aboutus/512398/830672/?lang=_e&version=1&

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Appendices

Appendix A

Research and Development Projects and Initiatives

Appendix A.1 List of Relevant Initiatives and Research Projects

Appendix A.2 Details of Relevant Initiatives and Research Projects

APPENDIX A.2

DETAILS OF RELEVANT INITIATIVES AND RESEARCH PROJECTS

The following research projects or initiatives have a relevance to FD2320. The following is not exhaustive and should not be considered as such, but it is intended to cover the most prominent work that is currently underway or has been completed relatively recently.

ADAPTABLE URBAN DRAINAGE – ADDRESSING CHANGE IN INTENSITY, OCCURRENCE AND UNCERTAINTY OF STORMWATER (AUDACIOUS)

Website <http://www.eng.brad.ac.uk/audacious/>

Justification

There is a need for an improved understanding of the potential impacts of climate change on the performance of existing building drainage and local drainage systems and the downstream interfacial effects to main drainage. This would enable the development of new flexible and adaptable approaches, suitably positioned and integrated, which, within defined uncertainty and allocated risk and cost burdens, may be used to mitigate the effects as part of the overall hierarchy of responses advocated by government.

Objective

To develop tools and procedures for the assessment and mitigation of the effects of climate change on urban drainage systems, bringing together hydrologists, building drainage and sewerage engineers, health, social and infrastructural economic specialists. This will include the development of methodologies for management, including assessment of perceptions, costs, failure and risk.

Deliverables

Outputs will be toolbox based, with tailored products utilising appropriate models, media and forms for various stakeholder groups.

Relevance

This study will consider ways of reducing the flood risk caused by urban runoff in extreme events from the viewpoint of the different responsible bodies (e.g. Water Companies, Highways Authorities, etc.) Currently, there is a recognised gap in FRAs regarding the impact of urban drainage on the overall flood risk of an area and a need for increased co-operation between organisations involved in managing the drainage infrastructure compared to the bodies involved with fluvial or coastal flooding.

APPLIED MULTI RISK MAPPING OF NATURAL HAZARDS FOR IMPACT ASSESSMENT (ARMONIA)

Website http://www.territorio.t-6.it/armonia_overview.htm

Justification

Natural disasters are a typical example of people living in conflict with the environment. The vulnerability of populated areas to natural disaster is partly a consequence of decades of spatial planning policies that failed to take proper account of hazards and

risks in land use zoning and development decisions. Therefore it is critically important to bring together knowledge, technology and actors in the field of risk assessment and land use zoning to achieve more effective natural disaster prevention and mitigation.

Objective

The overall aim is to provide the EU with a set of harmonised methodologies for producing integrated risk maps to achieve more effective spatial planning procedures in areas prone to natural disasters in Europe.

Specific objectives are the following:

- Integration and optimisation of methodologies for hazard and risk assessment for different types of potentially disastrous events;
- Harmonisation of different processes of risk mapping in order to standardise data collection, data analysis, monitoring, outputs and terminology for end users (multi-hazard risk assessment);
- Development of a harmonised decision-making tool structure for applying hazard and risk mitigation through spatial planning in risk prone areas and development of a guideline on natural hazard mitigation in the context of the EU Strategic Environmental Assessment Directive (2001/42/EC).

The project covers the following types of natural phenomena:

- Floods
- Earthquakes
- Landslides
- Forest fire
- Volcanic
- Groundwater pollution
- Meteorological extreme events

Relevance

This project is useful in relation to providing a means to apply of the SEA directive with the spatial planning procedures across the EU.

BUILT ENVIRONMENT: WEATHER SCENARIOS FOR INVESTIGATION OF IMPACT AND EXTREMES (BETWIXT)

Website <http://www.cru.uea.ac.uk/cru/projects/betwixt/>

Justification

Building Knowledge for a Changing Climate (BKCC) is a portfolio of research projects looking at how climate change will effect aspects of the built environment. As part of this research there is a need to have high-resolution weather data appropriate for the built environment.

Objective

In order to develop high-resolution climate change scenarios for key locations, this project will utilise computer-based weather generators to produce common source datasets for the other projects in the BKCC initiative. The basis for this additional data will be the UKCIP02 climate change scenarios, which will then be developed for

shorter time periods and locations, to meet the particular requirements of the built environment. This project will also address issues of scenario uncertainty relating to key climate elements, and provide further information on potential changes in the "urban heat island" effect.

Deliverables

The project will act as a service to the other EPSRC/UKCIP projects in the initiative, and develop best practice in the application of climate change scenarios. At the end of the project, the new data generated will be made more widely available.

Relevance

The translation of the UKCIP02 climate change scenarios into shorter time periods and locations, to meet the particular requirements of the built environment will be very valuable for determining the impact of climate change on flooding for new developments and the surrounding urban environment.

CATCHMENT FLOOD MANAGEMENT PLANS (CFMP)

Website <http://www.environment-agency.gov.uk/yourenv/consultations/747031/>

There are two aspects to the work currently carried out regarding CFMPs. The first is the application of the CFMP methodology. The second is looking specifically at the catchment hydraulic modelling element of a CFMP. These have been described separately below.

Application of CFMPs

Justification

A Catchment Flood Management Plan (CFMP) is a high-level strategic planning tool through which the EA will seek to work with other key decision-makers within a river catchment to identify and agree policies to secure the long term sustainable management of flood risk. CFMPs are a new approach in England & Wales. In particular they will improve our understanding of what factors influence floods and flood risks at the catchment scale.

Objective

To develop preferred policies for managing flood risk for catchments in England and Wales, and to identify areas to be covered by strategy plans where the policies and associated measures will be developed in more detail for parts of catchments.

Deliverables

The Catchment Flood Management Plan.

Relevance

CFMPs are to become the key planning approach for river catchments – an area of the planning process that is not currently being addressed adequately. Whilst the Environment Agency (who develops the plans) is not a planning authority, it is intended that CFMPs can be linked with land use plans to ensure that future flood management policies are taken into account in land use planning.

Catchment Hydraulic Modelling for CFMPs

Justification

There are a number of different modelling approaches that could be chosen for analysis of river catchments, each with different degrees of accuracy and cost. There is a need

for a consistent approach to the selection of appropriate modelling methods for each catchment and a means of justifying and defending the choice of methods.

Objective

To develop an approach to catchment hydraulic modelling, suitable for application to CFMPs, and associated guidance for users.

The approach was developed for different river types based on a range of case studies. These being:

- Upland
- Lowlands with washlands
- Perched, where flood water which overtops the river banks does not return directly to the river
- Heavily engineered urban
- Tidal
- Controlled by control structures at intervals along the river channel

Deliverables

A modelling guidance report, which gives guidance on the most appropriate method of modelling for different river types.

Catchment models developed using the guidance will provide water level data for use within the Modelling and Decision Support Framework (MDSF - see below). This in turn will provide information on the economic damages and social impacts of future scenarios and flood management policies.

Relevance

The modelling method might be suitable for the proposed approach to modelling for local planning envisaged in Section 6.5 of the report.

CLIMATE ADAPTION: RISK, UNCERTAINTY AND DECISION-MAKING – UK CLIMATE IMPACTS PROGRAMME (UKCIP)

Website <http://www.ukcip.org.uk/>

Justification

The UK Climate Impacts Programme (UKCIP) helps organisations assess how they might be affected by climate change, so they can prepare for its impact. UKCIP aims to co-ordinate and integrate an assessment of the impacts of climate change at a regional and national level that is led by stakeholders. UKCIP provides support and guidance throughout the process for both stakeholders and the researchers, so providing a bridge between the researchers and the decision-makers in government organisations and business.

Objective

Guidance to help decision-makers handle climate risk and uncertainty, drawing on a wide range of UK expertise in climate change forecasting, risk assessment, policy and project appraisal.

Deliverables

The UKCIP report 'Climate adaptation: risk, uncertainty and decision-making' was published on 20 May 2003. It provides a step-by-step decision-making framework designed to help decision-makers (including planners, businesses and government) manage their activities in the face of an uncertain future climate. The guidance helps readers to judge the significance of the climate change risk, compared to the other risks, so that the most appropriate adaptation measures can be determined.

Relevance

FD2320 needs to address the issue of climate change. Guidance provided by UKCIP will form an integral part of the framework for FRA.

CLIMATE CHANGE AND THE HYDRAULIC DESIGN OF SEWERAGE SYSTEMS

Website

http://www.ukwir.org/templates/ukwirsite/ukwir_frame.asp?loadpage=/templates/ukwir/site/ukwir_docmap.asp@

Objective

The project was wide ranging, but with a principle focus on the performance of sewerage systems under future (year 2080) rainfall conditions and what changes might be needed in the hydraulic design of sewerage systems to address any problems that climate change might pose. Other issues include a summary of international drainage practice and predicted changes in, sea levels and river flows.

Deliverables

There are 13 documents in total, collated in 4 volumes:

- Volume I – Climate Change effects on Rainfall
- Volume II – Rainfall Data Production and Analysis
- Volume III – Sewerage System Modelling
- Volume IV – Associated Topics

Relevance

In order to effectively manage the runoff from a new development site, it is essential to design new storm drainage with an appropriate allowance for climate change. These reports provide valuable information regarding what to expect in the way of design changes.

CLIMATE CHANGE IMPACTS AND ADAPTATION: CROSS REGIONAL RESEARCH PROGRAMME

Website <http://www.defra.gov.uk/environment/climatechange/>

Justification

UKCIP02 scenarios indicate that the UK's climate will feature milder, wetter winters and hotter and probably drier summers. Extreme weather conditions, such as heavy rainfall or very high temperatures, are more likely to occur more often, and sea levels will continue to rise. While the UK is taking considerable action to limit carbon and other greenhouse gas emissions through its Climate Change Programme, it is also necessary to prepare for the changes in climate that are already inevitable. Detailed,

quantitative research into the impacts of climate change at regional levels in the UK needs to be the basis for this adaptation action.

The decision to set up a more detailed research programme followed earlier scoping work on the impacts of climate change in the UK by regional partnerships and the devolved administrations working with the UK Climate Impacts Programme (UKCIP).

Objectives

This is a programme of research into the impacts of climate change on some key UK sectors. Six research projects in total are being undertaken.

Four projects cover specific interests:

- planning, land use and the built environment
- business
- water resources
- countryside and the rural economy

These are investigating the impacts of climate change on particular aspects of these sectors, and also consider potential adaptation responses. This will include using local or regional case studies.

The other two projects are looking at methods for quantifying the costs of climate change impacts and at reviewing adaptation options and strategies.

A pilot project, anticipating this new programme, is investigating the impact of climate change on tourism and recreation in NorthWest England and has been underway for about six months.

Deliverables

Unknown.

Relevance

These projects will provide a useful source of information for regional decision-makers, such as local authorities, tourist boards, water companies and landowners, of the likely impacts of climate change. They will add to the evidence base that is needed to design effective adaptation responses at a local and regional level.

CLIMATE CHANGE IMPACTS ON FLOOD FLOWS IN RIVER CATCHMENTS

Justification

Uncertainties remain regarding the precise nature of future climate change, particularly at a regional level and with regard to extremes, such as short duration high intensity rainfall.

Defra guidance currently suggests certain allowances to test sensitivity to climate change in flood defence scheme appraisals, e.g. a 20% increase in peak flows over the next 50 years.

Objective

To assess climate change impacts on river flood flows under the new UKCIP02 scenarios, derived from the Hadley Centre regional climate model. This will include

looking at the effect of catchment variability by modelling a wide range of catchment sizes, types and locations.

Deliverables

Results from the modelling will be presented to help develop policy and risk assessment and management guidance.

Relevance

Results from this project will have a direct bearing on future policy and guidance regarding flood risk and, as such, will be an integral part of the framework for FRA.

CLIMATE CHANGE RISK ASSESSMENT: NEW IMPACT AND UNCERTAINTY METHODS (CRANIUM)

Website <http://gow.epsrc.ac.uk/ViewGrant.aspx?Mode=Latest&Grant=GR/S18052/02>

Justification

CRANIUM is part of the EPSRC/UKCIP initiative on Building Knowledge for a Changing Climate.

Objective

The aim of the proposed research is to develop new methodologies for analysing uncertainty and making robust risk-based decisions for infrastructure design and management in the face of climate change. It is structured around three tasks:

- Task 1 will analyse uncertainties in key climate variable analysis of built environment, transport and utilities and provide means of communicating uncertainties to modellers and decision-makers.
- Task 2 will develop new methods for assessing system response to uncertain climate forcing.
- Task 3 will address how, in the light of these insights, decision making about operation of, or investment in, the system in question could be managed or modified to reflect potential climate change impacts arc specifically the uncertainties surrounding them.

Deliverables

Unknown.

Relevance

This project is relevant to the issues highlighted by FD2320 regarding managing and communicating uncertainty, in particular regarding climate change.

COMMON STRATEGIES TO REDUCE THE RISK OF STORM FLOODS IN COASTAL LOWLANDS (COMRISK)

Website <http://www.comrisk.org/>

Justification

Many low-lying areas need to be safeguarded from flooding, and it cannot be achieved solely through normal, technical flood control means. A means of transferring and evaluating knowledge, methods and common pilot studies; and a sustainable, harmonious and balanced development of coastal lowlands is seen to be required.

Objectives

To provide greater protection from coastal floods through the transfer and evaluation of knowledge, methods and common pilot studies, and to ensure a sustainable, harmonious and balanced development in the coastal lowlands of the North Sea region.

Deliverables

- A publication containing principles and recommendations for innovative and integrated risk management strategies in the North Sea Region (a good practice guide)
- A website and policy papers by the relevant coastal authorities on ways to improve coastal risk management on the results of the good practice guide
- An international conference, brochure and press conference

Relevance

The tiered approach to flood risk management proposed could be comparable to the integrated risk management approach under investigation by this project.

CONDITION MONITORING AND ASSET MANAGEMENT FOR COMPLEX INFRASTRUCTURE SYSTEMS (CMAM)

Website <http://www.ceg.ncl.ac.uk/research/projectdetail.aspx?id=214>

Justification

Flood defences are economically important safety critical infrastructure systems and need ongoing monitoring and maintenance to ensure their integrity. This is no simple task as:

- The scale of the flood defence infrastructure system means there is a large number of system components in need of management;
- Interactions between system components is frequently poorly understood;
- Failure mechanisms of flood defences are complex and site specific due to the natural variability in loading and geotechnical conditions;
- Monitoring information is scarce and can be expensive to obtain;
- Information on system behaviour does not lend itself to being compressed into a single format;
- Uncertainties, which may be significant, are expressed in a format appropriate to the type of evidence and these are not always directly comparable; and
- There may be a large amount of information relating to an investment decision, however it is often only partially relevant, incomplete or conflicting.

Consequently, monitoring and remediation resources can be mis-directed.

An increasing emphasis on strategic planning means decision-makers need to be able to manage and consider large amounts of information describing the behaviour of their system and are, therefore, facing intense information processing demands.

Objective

The overall objective of the CMAM project was to develop new decision support techniques to improve the safety and economic performance of complex infrastructure systems.

Deliverables

A new methodology for modelling the performance of complex infrastructure systems.

The performance modelling methodology has been implemented in a software tool called Perimeta. Perimeta combines a hierarchical process modelling tool with a database of performance indicators and an inference engine for propagating uncertain information through the hierarchy. A Perimeta model provides a visual overview of system performance and a platform for testing alternative intervention options.

New methods for estimating bounds on the probability of failure of deteriorated flood and coastal defence structures using the concept of fragility.

Relevance

This project may enable FD2320 to tie in the concepts of asset performance and risk of failure into the framework for FRA and enable the development of further guidance.

CREATING NEW FLOODPLAIN LANDSCAPES (Floodscape)

Website <http://www.floodscape.net/>

Justification

The application of ‘Creative Flood Management’ could lead to more cost-effective and sustainable planning of major investments as a result of:

- more effective and positive interaction with major development proposals, and
- working more closely with local communities and stakeholders who have a clear understanding of flood risk management (as opposed to the traditional approach of flood defence).

Objectives

Change public perception from flood prevention to flood risk management.

Deliverables

Within the UK, develop a master plan in a Thames Gateway ‘zone of change’ – potentially buildings designed to allow for flooding, opportunities for controlled inundation of land, public information, emergency evacuation procedures.

Other countries involved are Germany, the Netherlands and Belgium.

Relevance

This project could demonstrate the practical application of new and innovative flood risk management techniques.

DESIGNING FOR EXCEEDANCE IN URBAN DRAINAGE SYSTEMS (CIRIA RP699)

Website http://www.ciria.org.uk/suds/suds_projects.htm

Justification

Sewerage is designed for a lower level of performance than considered for flood risk (e.g. 30 or 50-year return periods compared to 100+ years). Therefore, the performance of such systems during these more extreme events can have a significant impact on the overall flood risk of an area, but is not generally taken into consideration.

Objective

To provide best practice guidance for the design and management of piped urban sewerage and drainage systems to reduce the impacts that arise when flows occur that exceed their capacity. It will also provide advice on risk assessment procedures and planning to reduce the impacts that exceedance in drainage systems may have on people and property within the surrounding area.

Deliverables

Easy to read good practice guidance on designing for exceedance that will be designed to engage a target audience that includes engineers, planners, consultants and developers. The guidance will primarily be aimed at conventional piped drainage although the principles can also be applied to SuDS. Summaries of the consultation and key elements of the document will also be placed on the website.

Relevance

This project will be key to the understanding of one of the lesser known/considered elements of flood risk, i.e. urban drainage.

DEVELOPMENT AND FLOOD RISK: GUIDANCE TO THE CONSTRUCTION INDUSTRY (CIRIA RP675)

Website <http://www.ciria.org/acatalog/C624.html>

Justification

Flooding poses a major threat to people and property and the risk of flooding presents several major challenges to the construction industry. The government has responded to this issue through the provision of Planning Policy Guidance 25, Development and flood risk.

Objective

This study will provide advice for the industry on working within PPG25 by providing guidance on the assessment of flood risk from rivers, coasts and groundwater within the land use planning process. It will also provide advice on how the industry can meet flood related planning conditions properly and efficiently.

Deliverables

The project outputs will be aimed at the construction industry as a whole and in particular at developers and construction clients. The outputs will also be relevant to planners, regulators, facility managers and members of the public living in at-risk areas.

Relevance

This guidance document provides the initial framework for FRA from the perspective of the construction industry and will form one of the main building blocks for FD2320.

ENVIRONMENTAL CHANGE INDICATORS

Website

<http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=10204#Description>

Justification

It is important to monitor and understand changes in environmental loading in order to manage flood risk.

Objectives

The objectives of this research are:

- to identify, define and select a wide range of Environmental Change Indicators (ECI) for England and Wales relevant to flood and coastal defence that are likely to be representative of changes in the environment
- to locate data series over sufficiently long periods to make the ECI calculations valid
- to produce five pilot indicators
- to discuss their implications for future use and expansion.

Deliverables

There were 4 project outputs produced:

- An inception report *Can environmental change indicators carry warnings for flood and coastal defence?*
- A report of a workshop
- A paper submitted to the Defra Conference of Flood and Coastal Engineers, July 2002
- A Technical Report *Environmental change indicators (including those related to climate change) relevant to flood management and coastal defence*

Relevance

Understanding the potential environmental change resulting from changes in flood management is an important part of the approach for assessment and management of flood risk. The ability to use ECIs could usefully complement the use of Flood Risk Indicators in the decision-making process.

ENVIRONMENTAL CONSEQUENCES OF FLOODING (PHASE 1)

Justification

Flood risk assessment and management requires understanding the impacts of flooding on a wide range of receptor-types, including buildings, infrastructure, people and the natural environment. Methodologies for assessing flood damage to property and infrastructure are available.¹⁷ The Flood Risks to People R&D project (FD2321) is addressing risks to people. A methodology is needed to assess the positive and negative effects of flooding on the natural environment, to ensure that environmental impacts are given proper consideration in flood risk management decision-making. There is currently no standard approach for evaluating the probability of occurrence and the magnitude of the consequences on the natural environment for use within a flood risk assessment. This means that decision-making is currently not driven by environmental considerations.

¹⁷ E.g. the Multi-Coloured Manual, produced by the Flood Hazard Research Centre at Middlesex University in 2003.

Objectives

This project will make recommendations for a focused programme of research that will ensure, in time, that impacts on the natural environment are considered alongside with more traditional socio-economic drivers. This is with the intention that follow on stages will develop an approach to assessing environmental consequences to be used in decision-making and risk communication, within the overall approach to flood risk management.

Deliverables

The main output for this Phase 1 study is a scoping report that will include a literature review, review of R&D and results from consultations and makes appropriate recommendations. These will include tasks that need to be undertaken to develop a methodology. This will also identify potential partners and users (and who else is working on similar issues elsewhere) and indicate opportunities for collaboration and the benefits.

Relevance

This scoping project is the start of the process to provide the missing element of an effective flood risk/management approach, which is environmental consequences.

EUROPEAN SPATIAL PLANNING: ADAPTING TO CLIMATE EVENTS (ESPACE)

Website <http://www.espace-project.org>

Justification

Public agencies have a responsibility to minimise the risk posed by climate change, and to develop plans for the future. This requires a better-developed framework than existing to deal with the risk.

Objectives

To promote awareness of the importance of adapting to climate change and to recommend that it is incorporated within spatial planning mechanisms at local, regional, national and European levels. It will look at how water resources are managed and how to plan for a future with a changing climate, ensuring that adaptation strategies are incorporated into spatial planning systems. This will include a dynamic transnational approach to climate change that can be implemented by the partners of the project.

Deliverables

- Four workshops aimed at developing project outcomes and delivery;
- Four technical conferences focussing on current issues and projects;
- An international conference to provide guidance and input; and
- A final Project Conference to launch the dissemination of project results.

Relevance

The issues of spatial planning and the impact of climate change are an integral part of the planning process in the UK as abroad.

EUROPEAN SPATIAL PLANNING OBSERVATION NETWORK (ESPON)

Website <http://www.espon.lu/online/homepage/index.html>

Justification

Research and studies on spatial development and planning seen from the national, regional and local points of view, is partly already existing and available, although only covering smaller parts of the European territory. There is a need to develop this for the European territory as a whole.

Objectives

The projects launched under the ESPON programme are intended to have an integrated approach and a clear territorial dimension. They cover a wide range of issues, stretching from scientific methods and databases via strategic projects to institutional and instrumental questions.

There are the following fields of research:

- Thematic studies on the territorial effects of major spatial developments on the background of typologies of regions, and the situation of cities on the base of broad empirical data.
- Policy impact studies on the spatial impact of Community sector policies, Member States' spatial development policy on types of regions with a focus on the institutional inter-linkages between the governmental levels and instrumental dimension of policies on the base of broad empirical data.
- Horizontal and co-ordinating cross-theme studies as a key component. Evaluation of the results of the other studies towards integrated results such as indicator systems and data, typologies of territories, spatial development scenarios and conclusions for the territorial development.
- Scientific briefing and networking in order to explore the synergies between the national and EU sources for research and research capacities.

Deliverables

The anticipated outputs are to have:

- A diagnosis of the principal territorial trends at EU scale as well as the difficulties and potentialities within the European territory as a whole;
- A cartographic picture of the major territorial disparities and of their respective intensity;
- A number of territorial indicators and typologies assisting a setting of European priorities for a balanced and polycentric enlarged European territory;
- Integrated tools and appropriate instruments (databases, indicators, methodologies for territorial impact analysis and systematic spatial analyses) to improve the spatial co-ordination of sector policies.

Relevance

This project provides the European context regarding spatial planning.

EVALUATING A MULTI-CRITERIA ANALYSIS METHODOLOGY FOR FLOOD MANAGEMENT AND COASTAL DEFENCE APPRAISAL

Website

<http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=FJPPProjectView&Location=None&ProjectID=10734>

Objectives

- To develop and test multi-criteria analysis techniques suitable for the appraisal of flood and coastal defence projects.
- To provide recommendations for Defra/EA project appraisal guidance on multi-criteria techniques that will improve flood and coastal defence decision-making.

Relevance

This project could usefully inform the evaluation of options as part of the generic approach to assessing and managing flood risk presented by FD2320.

FAILURE ON DEMAND OF FLOOD DEFENCE STRUCTURES/ COMPONENTS

Justification

The project was designed to support the EA's risk framework for flood defence systems and in particular was intended to be compatible with, and support the ongoing development of RASP and NFCDD.

Objectives

To demonstrate whether generic failure rate estimates could be derived for a standard taxonomy of flood defence scheme components. The aim was to use these failure rates, within a risk assessment methodology to predict the future failures of any defined defence schemes made up of these generic components.

A pilot study was carried out in which information on past failures of flood defence scheme components (locks, outfalls, pumping stations, etc.) were gathered via questionnaire and personal interview. In the absence of formal maintenance records, the information was obtained largely from the field experience of EA regional operations staff. The component failure information was incorporated into a database system that provided a means of calculating estimates of component failure rates (or failure-on-demand).

Deliverables

A pilot database system was developed incorporating data on 10 different generic flood defence scheme components, which were further categorised into a number of different variant types.

An envisaged second phase of work did not go ahead, primarily because of the lack of firm records from which to derive failure information, although some recommendations were put forward as to ways failure data could be augmented from subjective judgement and other generic evidence.

Relevance

There remains a recognised gap in the framework for FRA for providing easy to understand and easy to implement guidance/methods for assessing risk of failure of flood defence scheme components.

FLOOD MAPPING STRATEGY

Justification

Flood mapping is fundamental for flood risk management, yet it is extremely complex. It is not a precise science because so many factors affect flooding. Flood mapping is concerned with the estimation of the possible extent of river and coastal flooding, and recording of areas that have flooded in the past. By understanding the areas that are at risk of flooding, the EA can prioritise, justify and target investment to manage and reduce the risk to people, property and the environment.

The EA currently provides the Indicative Floodplain Map (IFM) for England and Wales. It is there to raise awareness of areas in the natural floodplain that could flood in extreme conditions, but does not show degrees of risk or the impact of flood defences. The new mapping will replace the current IFM and will show some flood defence information and more detail on the likelihood of flooding, from rivers and the sea.

Objective

- An assessment of flood risk across England and Wales to an appropriate accuracy depending on current and future land use;
- A quality-assured series of flood outlines marked on maps with an OS background and in an electronic format; and
- An annual revision of the maps to ensure that no map is more than one year old.

Deliverables

- Identifies mapping data needs to support management of flood risk and for other purposes (such as supporting planning policy and financial services), and how those needs may be delivered;
- Provides direction and clarity for improving information on flood risk for everyone concerned;
- Prescribes a national policy framework for flood mapping that will deliver EA 'Making it Happen' objectives to reduce flood risk;
- Seeks to further the understanding of the potential impacts of climate change on flood risk across England and Wales; and
- Recommends the way forward for further investment in flood mapping to deliver the vision, aims and objectives agreed by the EA Directors, over the 5 years from 2003 to 2008.

Relevance

This will become a fundamental component of the framework for FRA. Its effective implementation is critical for successful planning with respect to flood risk.

FLOODPLAIN LAND USE OPTIMISING WORKABLE SUSTAINABILITY (FLOWS)

Website <http://www.flows.nu/>

Justification

To individuals and communities across Europe, flooding presents a clear danger. As a result of climate change, urbanisation and land-use changes, floods are becoming more frequent, causing loss and damage to property and life.

Objective

To identify and exchange best practice solutions to flooding, bringing together partners from Germany, the Netherlands, Norway, Sweden and the United Kingdom. Local communities will be involved in finding and applying practical solutions.

Deliverables

Providing decision makers with more and better information on flood risk to help them:

- Make better decisions about where to site new housing
- Design family houses with a culture of living in and around water
- Provide practical solutions about how to make existing flood-risk housing more resistant
- Provide better warning systems when floods are forecast

Relevance

This project is a very useful testing ground for the practical implementation of more sustainable planning decisions and development types.

This project is particularly useful to FD2320 as it involves stakeholders that are not so commonly represented in the other R&D projects or initiatives, i.e. local authorities and the general public.

Particular FLOWS projects of relevance to FD2320 are the following:

- FLOWS WP1biii project *Guidance on Strategic Flood Risk Assessments for Low-lying Areas*
- FLOWS WP1biii project *Modelling and Mapping of Flood Risk*

FLOOD PLAIN MANAGEMENT MANUAL (PHASE 1)

Website

<http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=10468>

Justification

There are intense and conflicting pressures on floodplains. These include conservation, restoration, amenity and development in addition to providing for the passage and storage of floods. Guidance, in a similar form to that already prepared for Australian floodplains, is needed to inform all stakeholders of floodplain management issues and provide a basis for effectively managing flood plains taking into account these conflicting pressures.

Objective

To provide preliminary guidance on the effective management of floodplains to river managers, local authorities (planning, amenity and other relevant functions), local communities, conservationists and developers leading to the provision of a Flood Plain manual that forms a common reference for all parties involved in floodplain management.

Deliverables

The Stage 1 Report provides preliminary guidance to local authorities and others involved in floodplain management and includes proposals for Stage 2 of the project, it is primarily intended to set the scene for the Stage 2 research. Stage 2 has not taken place.

Relevance

The Stage 1 Report provides valuable information regarding on approach and stakeholder involvement.

FLOOD RISK MANAGEMENT IN ESTUARIES (FRaME)

Website <http://www.frameproject.org/>

Justification

New methods are needed to protect estuaries from the effects of increased flood risk due to climate change, as estuaries are highly productive ecosystems abundant in marine life and a valuable habitat. New initiatives are required whilst still safeguarding the Natura 2000 series.

Objectives

To assist in the practical development of sustainable flood risk management strategies in the North Sea estuaries, ensuring that the most favourable strategic options and techniques are adopted. It aims to combine Flood Control Areas with alternative sustainable land use.

Deliverables

- An international panel of experts
- A transnational expertise network
- A website
- A best practice manual for the implementation of FCAs along with the demonstration, monitoring and evaluation of three FCAs.

Relevance

This has relevance to SMPs and CZMPs within the UK.

FLOOD RISK MANAGEMENT RESEARCH CONSORTIUM (FRMRC)

Website www.floodrisk.org.uk

Justification

The major flooding in the UK in Autumn 2000 and Winter 2000/01 highlighted the damage that flooding can cause. Recent climate change scenarios, produced for the UK Climate Impacts Programme, using computer modelling methods, show that such serious flooding could become a more frequent problem, with heavier winter rainfall, more intense downpours and rising sea levels predicted. To meet these challenges a research consortium has been set up to tackle the problem of flooding in the UK. This is jointly funded by EPSRC and the Defra/EA Joint Flood Management Research programme.

Objectives

Key short-term objectives for the consortium are to:

- Reduce flood risk to people, property and the environment.
- Develop more accurate flood forecasting and warning techniques
- Improve the flood management infrastructure

In the longer-term the consortium will establish a high quality programme of underpinning science to enhance our understanding of flood risk and support the development of improved flood prevention, management and mitigation strategies.

Deliverables

R&D work packages have been developed under the following topics:

- Land Use Management - main aims are to develop scientific understanding of the local scale effects of agricultural land management practices on flooding, modelling tools to represent the impacts and also to provide policy guidance.
- Real-Time Flood Forecasting - main aim is to reduce the risk associated with the operation of the real-time forecasting system.
- Infrastructure - main aims are to develop an improved capability for the prediction of the onset of breach formation and progression and analysis of the geotechnical failure process of fissuring and morphology/structure interactions.
- Whole Systems Modelling - main aim is to deliver the next generation of flood inundation models for coastal and fluvial flooding.
- Urban Flood Management - main aims are to develop methods for predicting flood routes across urban areas and determining consequences and to develop new serviceability indicators to prioritise and optimise remediation measures.
- Stakeholder and Policy – main aim is to identify deficiencies that can be rectified through enhanced stakeholder engagement in developing new multi-functional and spatially explicit policies.
- Morphology and Habitats – main aim is to enhance understanding of the physical processes responsible for driving sediment dynamics and morphological responses to flood management, including investigation of links between morphological adjustments and habitat provision in fluvial and tidal systems.
- Risk and Uncertainty – main aims are to make uncertainty analysis a routine aspect of flood risk modelling activities, to resolve the uncertainty-handling and software issues associated with the construction of composite risk models of flooding systems and to support the implementation of methods of robust, risk-based decision-making for flood management.

Relevance

This project has significant relevance to this project. However, a lot of the deliverables will not come on-line until after the completion of this project. Therefore, although the R&D needs to be taken into consideration, it will not be possible to incorporate it directly into our work.

FLOOD RISKS TO PEOPLE

Website

http://www2.defra.gov.uk/research/project_data/More.asp?I=FD2317&SCOPE=0&M=PSA&V=PI%3A120

http://www2.defra.gov.uk/research/project_data/More.asp?I=FD2321&SCOPE=1&M=CFO&V=HRWGL

Justification

The main factors that contribute to death/injury/harm to people during floods include:

- Flow velocity
- Depth of flooding
- Suddenness of flooding (and the amount of flood warning)
- The degree to which people are exposed to the flood (related to size of floodplain, location of floodplain, type of accommodation, etc.)

- Vulnerability of the population (e.g. old, young, infirm, etc.)

There is a need to understand how these factors combine to cause death or serious harm to people.

Objective

To develop methods for assessing and mapping the risk of death or serious harm to people as a direct result of a flood event and to provide guidance on areas where people are most at risk.

Deliverables

Algorithms suitable for risk/vulnerability mapping and associated guidance.

Relevance

This project is looking at the single most important consideration for a FRA and will provide the fundamental answers regarding risk to people that can then be translated in appropriately precautionary guidance for development planning and flood mitigation.

FORESIGHT FLOOD AND COASTAL DEFENCE PROJECT

Website <http://www.foresight.gov.uk/>

Justification

There is a need to produce a long-term vision for the future of flood and coastal defence that takes account of the many uncertainties, is robust, and can be used as a basis to inform policy and its delivery.

Objectives

To analyse the drivers of future flood risk (identifying which are most important and which are most uncertain), assess their future impacts and to consider how the UK could respond to the challenges identified. This includes the use of the risk model RASP to quantify risks for England and Wales and looking at urban areas to assess future drivers and risks.

Deliverables

Phase 1 produced a first cut assessment in order to:

- identify key factors likely to change flood risk on a 30-100 year timescale (the *Drivers*) in terms of both the physical processes of, and human interventions in, the flooding system;
- provide a framework within which the following phases of the project can quantitatively assess changes in future flood risk; and
- outline a work plan for Phase 2 of the project

Phase 2 deepens the analysis of Phase 1 and quantifies the impacts of future flood risk in the UK for four future scenarios. The Phase 2 report is split into the following topics:

- Deepening the Assessment of Drivers of Future Flood Risk
- National flood risk assessment for England and Wales
- Assessment of intra-urban impacts of future flood risk
- Assessment of environmental impacts of future flood risk

Phase 3 will consider how the UK could respond to the challenges of future flood risk.

Relevance

The results from this study will feed into the high-level decision making element of the framework for FRA.

GUIDANCE ON UNCERTAINTY ASSESSMENT AND COMMUNICATION

Websites

http://www.rivm.nl/en/milieu/milieubalans_verkenning/uncertainties/

<http://www.nusap.net/sections.php?op=viewarticle&artid=17>

Justification

Part of the knowledge and information provided by the Netherlands Environmental Assessment Agency (MNP) is about the quality of the available knowledge and methods used and about the robustness of the policy-relevant conclusions. Policy makers, politicians and other societal actors, in their respective roles, must be able to deal responsibly with the large uncertainties that are sometimes inherent in problems related to the environment, nature and sustainability.

Objectives

To provide procedures, guidance and tools to assist those undertaking decision-making activities with associated uncertainties to assess and communication those uncertainties effectively.

Deliverables

A series of documents were produced:

- Mini-checklist
- Quicksan Questionnaire
- Quicksan Hints and Actions List
- Detailed Guidance
- Tool Catalogue for Uncertainty Assessment

Relevance

The communication style and approach adopted by this project can inform the communication philosophy behind FD2320.

IMPROVING DATA AND KNOWLEDGE FOR EFFECTIVE INTEGRATED FLOOD AND COASTAL EROSION RISK MANAGEMENT

Justification

The planning, designing, building, operating and maintaining flood and coastal defences, and the establishment of efficient and effective risk management activities such as flood warning, development control, etc. are all dependent on the availability of accurate, relevant and up-to-date data. The understanding of flooding and coastal erosion processes cannot be improved unless we continue to collect data and are able to process them to provide relevant information. It is also important to ensure the information about data sources is widely available.

Objectives

To produce tools and best practice guidance for effective data, information and knowledge management related to Flood and Coastal Erosion Risk Management, incorporating the findings of R&D and the activities identified in FD2314 *Position review of data and information issues within flood and coastal defence*.

Deliverables

- A report containing details of R&D reviews, consultations, case studies, etc. covering current and future needs
- Tools and techniques to assess data quality, etc.
- A compliant data and meta-data standard register
- Best practice guidance

Relevance

The outputs from this project should be incorporated into the live system resulting from FD2320.

IMPROVING THE FLOOD RESISTANCE OF BUILDINGS THROUGH IMPROVED MATERIALS, METHODS AND DETAILS

Justification

The recent incidences of severe flooding in the UK, together with recent predictions on future flooding from the *Foresight* project, have given rise to significant interest by Government, the financial institutions, insurers, building industry and the public in the improvement of local flood protection to buildings. This has been driven by the need to protect the health and safety of the individuals living and working in affected properties as well as the need to reduce the economic cost of flooding.

Objectives

This project will follow on from existing and ongoing research to investigate two aspects of flooding:

- Resistance to flooding – an evaluation of water exclusion measures for building structures, building systems and their components under controlled laboratory conditions;
- Resilience to flooding – the ability of different constructions and generic products and materials to withstand damage by flooding; the drainage and drying properties of materials; and their ability to be cleaned or replaced.

This will include laboratory tests and field trials.

Deliverables

Apart from the R&D project reports, a guidance document will also be produced suitable for public dissemination and delivered by CIRIA.

Relevance

This project is just an example of the work currently underway looking at flood resilience of properties, which is one means to mitigate flood risk.

INTEGRATED FLOOD RISK ANALYSIS AND MANAGEMENT METHODOLOGIES (FLOODSITE)

Website <http://www.floodsite.net/>

Justification

FLOODsite is one of the first new-style ‘Integrated Projects’ funded from the EC 6th Framework Programme. These Integrated Projects cover research in a whole area of science and technology previously commissioned through several smaller projects.

Integrated Projects aim to promote co-operation and mobility amongst scientists and to improve access to research infrastructure and training.

Objectives

To provide an integrated approach to flood risk analysis and management from operational to strategic planning time horizons, covering river, estuarine and coastal flooding, based on:

- An integrated European methodology for flood risk analysis and management
- A consistent approach to the whole system (natural hazard, ecology, socio-economic and cultural factors)
- A consistent approach towards flooding from rivers, estuaries and the sea
- A framework for integrated flood risk management
- Integration with other EA and national research

Deliverables

- Project image, web presence and data procedures
- Report on the language of risk
- Review of dissemination methods and raising public awareness
- Report and software for improved characterisation of flash flood catchments
- Techniques and guidance for estimating coastal and river extremes, accounting for trends and uncertainties
- Hydraulic loading of flood defence structures using new information on extremes
- Report on flood impact evaluation methods used in Europe
- Reports on risk perception and community behaviour in face of flood risks for each country
- Best practice guide outlining defence types, failure modes including 'indicators' and methods of analysis
- Reports on loss of life and modelling damage reduction by flood warning
- Report on MCA method for assessment of pre-flood measures
- Methodology for reliability analysis, including time dependent processes such as deterioration and progressive failure.
- Improved methods for flash flood forecasting in small basins
- Guidance on the emergency repair of dike failures
- Review of measures, policy instruments and strategies for different flooding situations and evaluation of different strategies for flood mitigation with respect of sustainability criteria
- Method to define comprehensive and sustainable for use with future planning scenarios and the FRMA procedure
- Methods to identify in real-time safe evacuation routes
- Report on integrated framework for long-term planning together with a functional design of DSS
- Conceptual integrated framework for propagating of uncertainty through complex models
- Guidelines for the development of a European Flood Hazard Atlas
- FLOODlab web-based tool demonstrator completed
- Educational and Professional Development training material
- Integrated Report on Lessons from the Case Studies
- Final integrated scientific report on the whole project

Relevance

The project philosophy is closely aligned to the current flood risk management approach used in the UK and other European countries with risks being assessed

through the source-pathway-receptor model and managed and mitigated through pre-flood, flood-event and post-flood activities. This maps well onto the work both of *Foresight* and the EPSRC Flood Risk Management Research Consortium.

INVESTIGATION OF EXTREME FLOOD PROCESSES & UNCERTAINTY (IMPACT)

Website <http://www.samui.co.uk/impact-project/>

Justification

Dams and flood defence structures are essential to modern life in Europe. This project involves 9 participants from 8 countries in a programme of research to investigate extreme flood and failure processes (breaching, sediment movement, urban/rural flood propagation) and the risk and uncertainty associated with each process. These processes contribute the greatest uncertainty to flood prediction.

Objectives

Specific objectives of the project are to:

- a) Advance scientific knowledge in the areas of breach formation, sediment movement (under extreme floods), flood propagation through urban and rural areas and flood risk management.
- b) Develop improved predictive models with which flood risks and uncertainty associated with these processes may be determined within the overall framework of flood risk management
- c) Review implications for end user application, and consider how the risk and uncertainty information may be integrated into specific applications

Deliverables

Communication of results.

Relevance

The known gap in understanding of defence performance and risk is a recognised requirement for improving the FRA process.

JOINT PROBABILITY – DEPENDENCE MAPPING AND BEST PRACTICE

Website

http://www2.defra.gov.uk/research/project_data/More.asp?I=FD2308&SCOPE=0&M=PSA&V=PI%3A120

Justification

This and preceding projects have studied sea level/wave and sea level/fluvial JP problems in some detail, with significant impact on how flood and coastal defences are designed and managed.

The JP approach can be used in urban areas where flooding can be caused by a combination of high direct rainfall and high tide level. The method has not been widely used in this case because of the lack of information on correlation (or statistical linkage) between rain storms and surge heights. There has until now been no detailed analysis of the potential effects of climate change on joint probability of extreme loads. This research is helping to fill these gaps.

Objective

To identify and develop best practice guidance for application of joint probability (JP) methods to a range of cases where understanding the risk posed by the combined effect of two or more extreme variables is important.

Deliverables

Guidance documentation for the application of JP methods.

Relevance

As we move away from only looking at the primary cause of flooding in an area and start to look at the risks associated with all of the influences on an area (e.g. fluvial, pluvial, tidal, etc.), the need to understand JP is fundamental.

KITEMARK SCHEME**Website**

http://www.environment-agency.gov.uk/subjects/flood/826674/830330/877142/484693/?lang=_e

Justification

The recent incidences of severe flooding in the UK, together with recent predictions on future flooding from the *Foresight* project, have given rise to significant interest by Government, the financial institutions, insurers, building industry and the public in the improvement of local flood protection to buildings.

Objective

The Environment Agency in England and Wales and has teamed up with HR Wallingford, to develop a certification scheme that is supported by the British Standards Institution.

The devices have been tested in a purpose-built rig at HR Wallingford's laboratories. The rig incorporates a row of terrace house 'fronts' complete with doors, windows, patio doors and airbricks, and a wave machine for realistic testing.

The facility can also test temporary free-standing devices such as barriers and tubes. The products have also been subjected to a factory test to ensure consistent manufacturing standards.

Deliverables

Suitable products are awarded a BSI Kitemark, a well-known quality standard for consumer goods.

Relevance

This project is just an example of the work currently underway looking at flood protection for properties, which is one means to mitigate flood risk.

MITIGATION OF CLIMATE INDUCED NATURAL HAZARDS (MITCH)**Justification**

Past European research has made significant advances in understanding, monitoring and forecasting climate induced natural hazard risks such as floods, droughts and landslides. The MITCH concerted action seeks to translate these advances into practical benefits,

by bringing together research institutions and end users (including insurers) with leading involvement in mitigation of natural hazards with meteorological cause.

Objectives

- To provide a forum for discussion and debate.
- To assist hazard planning and management by disseminating start-of-the-art research.
- To match end user needs with research community capability.
- To seek implementation pathways for research results.

Deliverables

Includes workshops and an active website to aid wide dissemination.

Relevance

Although the primary focus is on flood warning, it also considers flood-related hazards, such as land slips, debris flow and climate change impacts. All of which should be considered as part of a FRA.

MODELLING AND DECISION SUPPORT FRAMEWORK (MDSF)

Website <http://www.mdsf.co.uk/>

Justification

The CFMP process requires large quantities of data and various forms of modelling in order to predict flood levels and their effects under existing conditions and with future scenarios of climate change, land use change and development. In order to make modelling a practical option for multiple catchments, a relatively standardised approach is needed for both data and modelling.

The MDSF aims to:

- Facilitate assembly and management of catchment data;
- Provide guidance on flood water level prediction throughout a catchment;
- Calculate flood extents and depths (in the absence of defences), economic damages and social impacts; and
- Provide a framework for policy evaluation, assessing options and uncertainty estimation.

Objective

To provide a tool for use by the EA and consultant staff in the development of CFMPs. This will enable the CFMP programme to go forward in a consistent way, by using common data structures and scenario models and providing value for money by avoiding duplication of effort among consultants.

Deliverables

- Procedures providing guidance on the application of MDSF to CFMPs and on specific aspects including modelling;
- Software, including:
 - Customised GIS based on existing ArcView software; and
 - Modelling tools.

Demonstrations of the MDSF software tool are being conducted for development of CFMPs for pilot catchments. It should be noted that the current phase of MDSF is an improvement stage through incorporation of RASP ILM (see below).

Relevance

This forms an integral part of RASP and the use of CFMPs.

NATIONAL FLOOD AND COASTAL DEFENCE DATABASE (NFCDD)

Website <http://www.defra.gov.uk/environ/fcd/hltarget/nfcdd.htm>

Justification

Defra's High Level Target 4A requires the EA, in partnership with other operating authorities, to 'develop a National Flood and Coastal Defence Database and maintain it thereafter.' The specific requirement is to put in place arrangements for systematic collection and storage of data on flood and coastal defences. Given that there are more than 600 operating authorities, multiple data collection and storage systems are in practice.

The need for such a database was reinforced in the autumn 2000 floods, after which government reports called for a clear understanding of the condition and adequacy of defences. The final database should support risk-based approaches to flood defence (i.e. the EA's Flood Risk Management Strategy) and remove the need for operating authorities to develop their own systems, thus releasing EA resources currently used to input operating authority data.

Objectives

To provide a single, easily accessible, and definitive store for data on flood and coastal defences, supported by and available to all operating authorities. This database should facilitate the prioritisation of investment, inform management decisions, and aid in measuring achievement of policy aims.

The database will be developed over a number of phases, as the EA's understanding of risk and the best ways to manage it increases (part and parcel of the other R&D projects and initiatives currently underway).

Deliverables

- A central 'data warehouse' for storing information on:
 - Location, composition, and conditions of flood and coastal defence assets;
 - Asset inspection histories;
 - Indicative Floodplain Map; and
 - Information on historic or modelled flood events;
- Tools for viewing, analysing, updating, and managing the stored data.

Relevance

The NFCDD should be considered as an important element of the overall framework for FRA and also FRM. Not only does it provide the central store for several of important pieces of information required for FRAs (as listed above), but it also provides the audit and control mechanisms for the information.

PARRETT CATCHMENT PROJECT

Website <http://somerset.gov.uk/enprop/pcp>

Justification

The catchment receives higher than average rainfall, which with the effects of climate change has led to an increase in severe flooding events. The catchment harbours

numerous residential and industrial areas; along with 47 SSSIs totalling 9,377ha in area. The flooding has had an adverse effect on the local economy and so a catchment strategy is seen to be required.

Objectives

- Developing an Integrated Catchment Management plan
- Water farming
- Water management, consisting of moderating runoff, Managing flood events, Improving the rate of flood evacuation, Reducing tidal influence
- Bringing floodwater under a greater degree of control
- Develop a sustainable approach to integrated flood management
- Provide a range of measure for modifying land use
- Develop an integrated approach to rural development

Deliverables

A package of measure is to be delivered:

- Changes to agricultural land management
- Creating temporary flood storage areas on farmland
- Controlling runoff from development
- Dredging and maintaining river channels
- Raising riverbanks
- Upgrading pumping stations
- Spreading floodwater across the moors
- Tidal sluice or barrier
- Upgrading of existing channels
- A restriction of new developments on floodplains

Relevance

This is a practical example of an integrated catchment strategy.

PERFORMANCE AND RELIABILITY OF FLOOD AND COASTAL DEFENCE STRUCTURES

Website <http://www.PRFCD.org.uk>

Justification

It is envisaged that the concept of characterising the reliability of defences through a “fragility curve” will be a critical component in future management decision-making practices – a concept being promoted through RASP and other related research. There is now a clear need to provide practitioners and researchers with an R&D output that provides well argued approaches for developing fragility curves for a range of structures. In particular, explaining the concept of defence fragility and its limitations and opportunities for its use. This research will underpin the uptake of the fragility concept and will clearly highlight gaps in our current understanding of defence performance.

Objective

To identify methods and provide guidance on best practice approaches for assessing the reliability of defence structures (linear defences, pumps and gates) and their deterioration in time. The proposed project outputs will directly support the overall joint R&D programme objective of developing improved risk-based management/engineering.

Deliverables

Written guidance in the format of an R&D Technical Note on the concept of defence fragility and the methodologies behind the development of fragility curves. A more detailed R&D Project Report outlining the findings of the project and recommendations for future developments.

Relevance

The known gap in understanding of defence performance is a recognised requirement for improving the FRA process.

PERFORMANCE BASED ASSET MANAGEMENT SYSTEMS (PAMS)

Website <http://www.pams-project.net/>

Justification

Relative to existing methods associated with the appraisal of new flood defence schemes, current approaches to justifying maintenance needs are crude. In particular, the EA's Flood Defence Management Manual (FDMM) and Management System (FDMS) are no longer consistent with the EA's focus on managing flood risk as opposed to providing flood defence. Both the FDMM and the FDMS provide only limited guidance on which assets offer a critical contribution to flood and coastal erosion risk reduction and how best they should be managed. These shortcomings are widely recognised within the EA.

Objective

To establish a Performance-based Asset Management System that enables flood and coastal defence managers to assess the performance of, and management requirements for, existing flood defence assets. These may involve maintenance, adoption or replacement. In the longer term, the project also seeks to provide a means of identifying the preferred management intervention to achieve a particular performance outcome or expenditure profile.

Deliverables

- A review of possible approaches, highlighting a number of options.
- A detailed methodology (tested with a pilot study).
- A plan for implementation within the EA including training, documentation, software interfaces, etc.
- Implementation of the new approach along with supporting manuals and software.

Relevance

Asset management forms a crucial element of determining future performance of flood defences, which in turn impacts on future flood risk. FRAs should take into consideration the performance of mitigation measures over the lifetime of the development.

PLANNING FOR URBAN-RURAL RIVER ENVIRONMENTS (PURE)

Website <http://www.purenorthsea.com/>

Justification

Water Management systems for Urban-rural fringes are failing to meet the needs of spatial functioning and local stakeholders. Solutions are required to develop and implement sustainable solutions for these problems, including dehydration, poor water

quality and lack of spatial quality and identity within the urban-rural fringe zones of medium sized cities.

Objectives

To develop the various spatial fluctuations of water catchment areas in the urban rural fringe, with a focus on public participation, water quality and flood risks through integration of water management policy into spatial planning through the use of water as an organising principle for spatial development. In addition, generation of support for the development of master plans and the implementation of pilot projects along with concrete measures for water systems based on water management and spatial planning policies

Deliverables

- Four pilot projects, eighteen master plans, ten workshops, sixteen exchange visits and four sets of guidelines
- PURE check sustainability tool
- Introduction of local authorities to PURE

Relevance

The issues of multifunctional land use and assessment methods associated with rural versus urban areas need to be considered as part of this project.

POSITION REVIEW OF DATA AND INFORMATION ISSUES WITHIN FLOOD AND COASTAL DEFENCE

Website

http://www2.defra.gov.uk/research/project_data/More.asp?I=FD2314&SCOPE=0&M=CFO&V=WSAST

Justification

The use of data is fundamental to many decisions in flood and coastal management, although how that data is collected, managed and archived is neither consistent nor well understood. To encourage a cost-effective approach to future data and information management, a strategic approach to data and information is necessary. This is the whole life cycle of data, being collection, dissemination and use of data for decision-making to support both policy development and operational implementation.

Objective

To understand the efficiency of current data and information practices and what opportunities exist to improve the flood and coastal defence process. The project aims to challenge and reflect new thought processes on this top area, to support and promote policy development, implementation processes and operations, taking full account of existing data collection programmes and archives.

Deliverables

To report where limitations can be matched with quick fixes and uptake of ongoing research and initiatives.

Relevance

Use of data and information management form very important elements of the overall framework of FRAs. This project is the best available source for understanding current information management.

PRELIMINARY RAINFALL RUNOFF MANAGEMENT FOR DEVELOPMENTS

Website

http://www.ciria.org/suds/pdf/preliminary_rainfall_runoff_mgt_for_developments.pdf

Justification

“Rainfall runoff management for developments - Interim national procedure” produced by the EA is an interim method, which was always expected to be revised as improved tools are developed. It utilises well-recognised existing methods, but revisions were always anticipated to provide a more consistent approach as and when FEH procedures can be extended to catchments at development scale.

Objective

To develop a guide based on the requirements of the “Rainfall runoff management for developments - Interim national procedure” produced by the EA.

Deliverables

A guide aimed at Regulators, Developers and Local Authorities to advise on the management of stormwater drainage for developments and, in particular, to assist in sizing of storage elements for the control and treatment of stormwater runoff.

Relevance

This guide can be used to determine whether a new development is designed to prevent an increase in flood risk either within the development or the hydraulic area of influence – important considerations for the associated FRA.

REDUCING THE RISK OF EMBANKMENT FAILURE UNDER EXTREME CONDITIONS

Website

<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=10719#Description>

Justification

The need for improved guidance on the design and management of embankments across coastal and fluvial areas has been established through Defra and EA Concerted Actions and is supported through experience gained in recent UK flood events. Consistent with the EA Strategy for Flood Risk Management (2003-2008), is the need to take a risk-based and whole life approach to the management of flood defence embankments.

The design and management of flood and coastal defence embankments needs to draw on many civil engineering disciplines including hydraulics, geotechnics, survey inspection techniques, modelling and data analysis, and risk management. During the past decade there have been a range of developments, research projects and initiatives from which the operating authorities can learn and develop improved methods to enhance performance.

Objective

To present an overview of embankment performance issues and guidance on good practice for dealing with many aspects of embankment design, operation and management, such that practitioners may identify realistically achievable improvements and move towards ensuring that consistent standards and approach are achieved.

Deliverables

Two main deliverables include:

- A good practice guidance document covering a wide range of flood defence embankment issues from embankment function and performance through to introduction of a risk-based approach for sustainable management.
- Identification and prioritisation of key actions and initiatives required to provide immediate and longer term gains in embankment performance so ensuring maximum value from existing and future flood defence embankments.

Relevance

Although FRA is concerned with the performance of existing defences, the EA is also involved in providing guidance on design and future operation and maintenance of mitigation measures where developments will be at risk from flooding. The implementation of best practices is an important element of this.

REDUCING UNCERTAINTY IN ESTIMATION OF FLOOD LEVELS (RIVER CONVEYANCE)

Justification

In the past two decades there has been a managed programme of research on the EPSRC Flood Channel Facility (FCF) at HR Wallingford, on university laboratory flumes and on real rivers. This has resulted in a step advance in the understanding of flow phenomena in complex river and floodplain systems and constitutes the leading international effort in rivers research over the last two decades. This research improved understanding of many of the processes that determine the flood capacity of river and flood plain systems. However, there was a concern that this new knowledge had not been transferred successfully into practice within the UK flood defence community.

Objective

To produce a national new tool, the Conveyance Estimation System (CES) which will encompass, categorise and provide access to current knowledge and understanding to facilitate the estimation of conveyance by the various users in the UK.

The project will also provide advice on channel resistance arising from vegetation, substrate and irregularities along with seasonal variation and the influence of maintenance activities.

Deliverables

- The Conveyance Estimation System (CES) which will incorporate the conveyance estimator and the roughness advisor, as a stand alone “package” designed to solve simpler types of assessment (e.g. for maintenance operations) in its own right and to support parameter selection in hydraulic models;
- The algorithms of the Conveyance Estimator documented as open source code;
- User documentation, a conveyance manual and training material; and
- In addition, ISIS will be modified to include the CES methods.

The project outputs are directed at meeting the needs of different use groups in the EA and its consultants through the involvement of a consultative group in the development process.

Relevance

The use of best modelling practices can only enhance the confidence in the modelling carried out as part of FRAs. To that end, cross-references to this project will be required when developing the framework for FRAs.

RISK ASSESSMENT FOR FLOOD AND COASTAL DEFENCE FOR STRATEGIC PLANNING (RASP)

Website <http://www.rasp-project.net/>

Justification

To better understand the performance of flood and coastal defences, it is often necessary to consider systems of defences rather than single defences in isolation. At present there is limited guidance on assessing risk to large floodplain areas that depend on numerous, perhaps extensive and diverse, systems of defence such as embankments, walls, and moveable structures. With moves towards more integrated flood management, risk managers must have recourse to sound and practical tools and techniques for assessing the performance of whole systems in order to develop balanced, integrated risk management strategies.

Objective

To develop and demonstrate supporting methods for dealing with systems of flood and coastal defences (rather than merely considering single defences in isolation). To enable appropriate levels of analysis to be conducted, as justified by the importance of the decision and its sensitivity to uncertainty, through development of a tiered methodology.

Deliverables

RASP will deliver High, Intermediate, and Detailed Level Methodologies to be used for:

- National monitoring of risk from flooding;
- Strategic prioritisation of investment in defence improvements or other flood management options (e.g. increased storage or diversion);
- Targeting flood warning and emergency preparedness;
- Highlighting priorities for monitoring and maintenance and justification of maintenance decisions; and
- Scheme design and optimisation.

Outputs will be compatible with standard GIS to support simple user visualisation. RASP will also involve demonstration studies at pilot sites and production of written guidance to enable widespread application.

RASP will not be delivering new software but will be inputting into current software development projects such as the MDSF and NFCDD. MDSF and RASP are closely related and are being jointly developed.

Relevance

RASP with its 3 levels of methodology will form key elements of the framework for assessing flood risk at the national, catchment-wide and scheme scales.

RISK MANAGEMENT FOR UK RESERVOIRS (CIRIA REPORT C542)

Website <http://www.ciria.org.uk/acatalog/C542.html>

Justification

The storage of large quantities of water in reservoirs is essential for the provision of water supplies, flood storage, production of hydro-electric power, irrigation, canal replenishment, amenity use, etc. Many reservoirs in the UK lie immediately upstream of, or adjacent to, heavily populated areas, and the rapid uncontrolled discharge of water from any such reservoir could have catastrophic consequences on life and property. All reservoirs in the UK holding more than 25,000m³ are subject to regular safety checks in accordance with the Reservoirs Act 1975. Although no lives have been lost as a result of a dam failure since the introduction of reservoir safety legislation in 1930, there have been several “near misses”, which may not necessarily have threatened life. There is particular concern about the safety of the many embankment dams constructed more than 100 years ago before the development of soil mechanics. Following the recommendations of the House of Lords Select Committee on Science and Technology in 1982, a study concluded that there were no fundamental reasons why probabilistic risk assessment could not be applied to reservoir safety.

Objective

To provide guidance on the application of risk assessment and risk management procedures to UK reservoir practice, primarily for UK reservoir owners, panel engineers, regulators, insurance companies and others concerned with reservoir safety.

Deliverables

A guidance document that outlines a risk assessment of reservoirs that fall within the provisions of the Reservoirs Act 1975. Such reservoirs are those designed to hold or be capable of holding more than 25,000m³ of water above the natural level of any part of the land adjoining the reservoir (including the bed of any stream). The principal types of reservoirs covered are: impounding reservoirs; non-impounding reservoirs; and service reservoirs. This legislation covers some 2500 reservoirs, of which about 85% are formed by embankment dams.

Relevance

Lessons learnt from this study with regard to risk assessment could be applied to embankment failure associated with flooding.

RISK, PERFORMANCE AND UNCERTAINTY IN FLOOD AND COASTAL DEFENCE

Website

http://www2.defra.gov.uk/research/project_data/More.asp?I=FD2302&M=KWS&V=F D2302&SUBMIT1=Search&SCOPE=0

Justification

Modern flood and erosion risk management aims at managing whole flooding and erosion system, be they catchments or coastlines, in an integrated way that accounts for all of the potential interventions that may alter the flood or erosion risk. Science and technology of risk management have made tremendous progress and process-based models describing key elements of the flooding and erosion systems are now available and continue to develop. The potential now exists for an integrated description of the

whole system. In the past in the absence of appropriate decision support tools, risk managers have struggled to handle the complexities inherent in integrated management.

Up to the point of this study, current guidance on risk-based decision-making has been primarily focused on function specific decisions. To achieve best value, these function specific activities need to be conducted within an integrated risk-based framework that covers decisions at different levels and function specific decisions.

Adoption of consistent terminology will play an important role in achieving more integrated risk management. This project outlines key definitions and philosophies.

Objective

To review the following:

- Issues surrounding flood and erosion management from a risk and performance perspective
- The principles of risk, performance and uncertainty and the application of these principles in decision-making practice
- The need to move towards a more integrated risk-based decision-making framework
- Risk tools and techniques that may help the flood and coastal defence community to achieve best value and demonstrate areas of success and failure

Deliverables

A report covering all of the above.

Relevance

This study led the way for the development of RASP and MDSF and provides a comprehensive review of the issues associated with risk, performance and uncertainty in flood and coastal defence.

SCIENTIFIC DATA MANAGEMENT BY PROJECT CONSORTIA: BEST PRACTICE GUIDELINES

Website http://www.hrwallingford.co.uk/downloads/projects/estuary_data.pdf

Justification

Many estuary management projects require the collation of scientific data and this guide has been produced to assist organisation working on such projects. The need for such guidance was highlighted during the Estuary Research Programme Phase 1 (ERP1) EMPHASYS project completed in 2000. Whilst collating data on the physical processes of British Estuaries, the EMPHASYS project reported the need to develop a standard framework for future projects.

Objective

To assist organisations both commissioning projects as well as those actually undertaking the work to have a reference describing what is involved in work of this kind.

Deliverables

Best practice guidance document.

Relevance

Provides an example of best practice for data management, using the principles of information management proposed for this project.

SHORELINE MANAGEMENT PLANS (SMPs)

Website <http://www.defra.gov.uk/environ/fcd/policy/smp.htm>

Justification

A SMP provides a large-scale assessment of the risks associated with coastal processes and presents a long-term policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner. In doing so, a SMP is a high level document that forms an important element of the strategy for flood and coastal defence.

First generation SMPs have been completed around the coastline of England and Wales. Many operating authorities have adopted the recommendations of their Plan as a basis for production of individual strategic plans, monitoring programmes and studies for all or parts of their coastline and, where proven by strategic plans, the implementation of appropriate schemes. Future generations of SMPs should build on the first generation Plans, taking account of information subsequently collected or changing circumstances.

Deliverables

Defra published a revised Guide for Coastal Defence Authorities in the summer of 2001 following a review of the strengths and weaknesses of the first generation SMPs and in full consultation with the industry.

This guide concluded that the first generation SMPs were excellent high-level strategic documents, but that further research was needed into how the coast would evolve. As a result of this additional research, Defra has now prepared interim Procedural Guidance for Production of Shoreline Management Plans for consultation (SMP2). This, in due course, after further consultation will be superseded.

Relevance

SMPs are key for planning at the coastal cell level – an area of the planning process that is not currently being addressed adequately. This is partially due to unclear responsibilities at this level.

STRATEGIC FLOOD RISK PLANNING FOR GROWTH AREAS

Justification

The Government's Sustainable Communities Plan sets out a strategy for the development of 200,000 new homes in the South-East by 2016. Many of these homes will be built in flood risk locations. ABI is committed to working with the Government, local authorities, and property developers to ensure that this challenging level of development occurs in a way that is truly sustainable.

Objectives

To undertake a study to:

- (a) address potential economic and financial costs from flooding due to the additional development set out in the Communities Plan, and
- (b) consider the most effective approaches to manage the risk in coming decades.

Deliverables

Making Communities Sustainable: Managing Flood Risks in the Government's Growth Areas Summary Report and Full Technical Report have been produced and are available from the ABI website.

Relevance

These reports provide a useful example of how assessments of flood risk can be undertaken at the sub-regional planning scale.

SUDS – UPDATED GUIDANCE ON TECHNICAL DESIGN AND CONSTRUCTION

Website http://www.ciria.org.uk/suds/suds_projects.htm

Justification

The purpose of this project is to increase industry confidence in the use of Sustainable Urban Drainage Systems (SuDS), particularly with regard to performance and maintenance requirements.

Objectives

- To gather information on the technical performance and environmental benefits of using SuDS, through field monitoring of operational sites;
- Where possible, to try to identify the impact of degradation of SuDS on performance, and the effectiveness of maintenance activities;
- To improve guidance on the selection, design and maintenance of SuDS.

Deliverables

Dissemination of the project findings through CIRIA publications and relevant external publications and journals.

Relevance

There are concerns throughout the industry regarding risks associated with failing to maintain SuDS. There are also recognised problems associated with the adoption of SuDS by Water Companies, which will not be resolved until confidence has been increased regarding performance and maintenance.

SUDS WEBSITE – SUSTAINABLE DRAINAGE SYSTEMS: PROMOTING GOOD PRACTICE

Website <http://www.ciria.org.uk/suds/>

Objective

A CIRIA project to disseminate and promote good practice in the implementation of sustainable drainage in the built environment

Deliverables

Website includes:

- Details of different techniques and how to choose between them
- Legal issues (legislation, planning and approval)
- Details of ongoing research projects
- Case studies
- Details of forthcoming events
- Newsletter

- Publications

Relevance

Provides up to date information regarding best practices.

SUSTAINABLE FLOOD AND COASTAL MANAGEMENT

Website <http://www.sfcm.org.uk/>

Justification

The UK government strategy “A better quality of life” sets out a number of high level objectives including;

- Social progress which recognises the needs of everyone
- Effective protection of the environment
- Prudent use of natural resources
- Maintenance of high and stable levels of economic growth

Flood and coastal management can contribute to sustainable development in many ways, not least through greater integration with other forms of land and water management. A number of specific sustainability issues have already been identified including;

- Climate change
- The impacts and role of planning guidance
- Opportunities to meet environmental targets
- Stakeholder engagement
- Adaptation of defences
- Materials and recycling
- Development of alternatives to flood defence

Objectives

To develop practical guidance and tools for policy makers and practitioners on how flood and coastal management strategies might meet current needs without compromising those of future generations.

Deliverables

The project will produce guidance and tools for flood and coastal management policy makers and practitioners. The project will help to integrate sustainability principle into current and future practice.

Relevance

This project has a number of common issues with FD2320, these being:

- Climate change
- The role and impacts of planning guidance
- Stakeholder engagement
- Adaptation of defences

Therefore, this project will provide useful insights into these issues

SUSTAINABLE MANAGEMENT OF URBAN RIVERS AND FLOODPLAINS (SMURF)

Website <http://www.smurf-project.info/>

Justification

The River Tame in the West Midlands (specifically the urban area of the river catchment that includes Birmingham and a large part of the Black Country) is a typical example of an urban river - polluted, heavily modified by culverting, straightening, re-routing and with concrete banks and few natural features.

There is a need to tackle these environmental problems on the Tame by integrating the planning and management of land-use, water quality, ecology and flooding. Subsequently, the methods developed by the SMURF project will be used as a model for work on similar rivers throughout the UK and the European Community.

Objective

To demonstrate how the principles of urban river basin management planning can be applied to highly modified and degraded catchments.

By implementing sustainable land-use planning and water management techniques the SMURF project aims to:

- Improve the amenity, ecology and sustainability of the river catchment
- Involve local communities in the planning of the river basin
- Establish ecological objectives for the river system and a transferable Sustainable Indicators set
- Develop a detailed land-use planning model to help with future redevelopment in the floodplain and protect the community from future impacts of climate change
- Demonstrate how small scale changes can significantly improve a heavily modified river.

Deliverables

One of the major challenges facing agencies involved in the urban planning process is the lack of consistency in the GIS, database and modelling systems used by the respective organisations. In order to facilitate collaboration, an important element of SMURF is the integration of diverse systems into the overall planning environment.

This includes construction of a software system delivering a co-ordinated approach. This combines a GIS user-interface with a database for water quality and ecology, and the automatic running of hydrological models of the catchment.

Relevance

The experience gained from this project in the implementation of urban river basin management planning and development of complementary tools will form a very useful platform for the development of future guidance and tools concerned with the planning process and FRA.

SUSTAINABLE WATER MANAGEMENT IN LAND USE PLANNING (CIRIA RP627)

Justification

Water resources planning is a long-term, strategic activity. Effective liaison between Water Companies and those responsible for strategic land-use planning, particularly at national and regional level, is vital for making decisions that are timely, environmentally acceptable and economically sound. There is a need to raise awareness of the water resources planning process and the timing implications for new infrastructure investment as a result of proposed development. There is also a need to provide clarification regarding how water industry investment fits into land-use planning.

Objective

- To provide good practice guidance on the incorporation of water resource and wastewater treatment issues as part of the planning process for new developments. Particular regard is given to the appropriate use of sustainable approaches to water management, for example, in the aspects of surface and wastewater disposal, the design of water efficient housing and effective use of sources of non-potable water.
- To assess the need for and, if required, identify a framework for a computer based decision support system to assist in the consideration of sustainable water management in the planning process.

Deliverables

A good practice guide is designed to meet the needs of planners and developers, with guidance summaries being produced to inform regulators, water utilities and sewerage undertakers in their decision making. The report identifies any further developments required in resolving the potential conflicting needs of new housing and the water environment.

Relevance

This guidance report provides substantial information regarding the planning process and the involvement of the relevant stakeholders.

TEMPORARY AND DEMOUNTABLE FLOOD PROTECTION

Justification

One of the lessons learnt from the Autumn 2000 floods was that the use of local protection, usually sandbags, could significantly reduce the impact of flooding. It was, however, evident that a range of innovative flood protection systems was available, which had the potential to replace the role of sandbags. These had potential for use by either flood defence operating authorities or community groups. Clearly there had to be a better understanding of the capability of these new flood protection systems and how they could be incorporated into flood management plans.

Objective

To provide a technical guide and supporting information on the use of temporary and demountable flood protection production systems.

Deliverables

- A fact sheet for each system to aid comparison and selection.
- A guidance document that sets out a logical risk-based process for assessing the applicability of temporary or demountable systems to the particular flood protection problem. This guidance is described as 'interim' to be reviewed in 2005.

Relevance

Temporary and demountable flood protection, although very beneficial for existing development, should not be considered as a primary form of protection for new development. However, they do have a part to play in the overall management of flood risk. Therefore, they are referred to in context in FD2320.

THAMES ESTUARY 2100

Website http://www.thamesweb.com/page.php?page_id=60&topic_id=9

Justification

The effects of climate change, such as sea level rise, increased rainfall and storm frequency, mean that London and the Thames Estuary will be at greater risk from flooding in the future. To compound this, many flood risk areas are undergoing development and regeneration, meaning that more people, buildings and infrastructure are likely to be exposed to the risk of flooding in the future.

Although London's existing tidal defences offer a high level of protection from present day flood risks, they were only designed to provide protection up until 2030. Modifications to these defences could extend their useful life by a few more years, but there is a need for a long-term, strategic look at London's flood defences.

Objectives

Thames Estuary 2100 (formerly Planning for Flood Risk Management in the Thames Estuary) is a joint initiative between the Anglian, Southern and Thames regions of the Environment Agency and aims to determine the appropriate level of flood protection needed for London and the Thames Estuary for the next 100 years. In particular:

- Look at tidal defences in the context of the wider Thames Estuary setting;
- Assess the useful life of the existing defences and gain an understanding of the 'drivers' (i.e. climate change, urban development, social pressures and the environment);
- Inform and gain support of political and funding partners and stakeholders; and
- Prepare and manage a programme of studies (linked with consultation) that will eventually lead to a strategy for flood risk management in the Thames Estuary for the next 100 years.

Deliverables

At this stage deliverables from the programme of studies are in the process of being identified.

Relevance

This project is the biggest/most complex sub-regional/local assessment of flood risk to be undertaken in the UK. Lessons learnt from this will influence the approach adopted by the rest of the UK.

UK CLIMATE IMPACTS PROGRAMME 2002 CLIMATE CHANGE SCENARIOS: IMPLEMENTATION FOR FLOOD AND COASTAL DEFENCE

Justification

The UKCIP programme released new climate scenarios in April 2002. These provided information at a higher spatial and temporal resolution than had been available in the

UKCIP98 report. These scenarios needed to be translated into appropriate and consistent guidance for use within the flood and coastal defence community in England and Wales.

Objectives

- To review the precautionary allowances that had been established prior to UKCIP02 for future changes in sea level and river flow.
- To review user requirements.
- To review available information on climate change.

Deliverables

- Guidance for users on how to apply UKCIP02 climate change information across a range of flood and coastal defence tasks.
- Following completion of the R&D project, advice was provided to operating authorities on the use of the new scenarios for flood and coastal management.
<http://www.defra.gov.uk/enviro/fcd/pubs/pagn/Climatechangeupdate.pdf>

Relevance

The guidance from this project provides the basis of the climate change recommendations in FD2320.

USE OF SUDS IN HIGH DENSITY DEVELOPMENTS

Website http://www.ciria.org.uk/suds/suds_projects.htm

Justification

DETR and DTLR Guidance notes for development (PPG25 and PPG3) propose potentially conflicting requirements. PPG3 requires high-density developments while PPG25 emphasises the need to use SuDS. SuDS utilise on-site techniques for retaining rainfall runoff and, therefore, require space to achieve this.

Objectives

- Evaluate SuDS features in terms of land uptake and their relative performance in the context of urban housing development
- Consider land use and development layout to maximise the potential for using SuDS units.

Deliverables

A guidance document for use by local authorities and developers to assist in defining appropriate use of SuDS for high-density developments and the limitations imposed related to limited land availability.

Relevance

There is a recognised problem of conflicting requirements between PPG25 and PPG 3 and there is, therefore, a need in FD2320 to assess these problems and provide guidance where possible. The project illustrates one of the problems and, therefore, the results from this project will be incorporated into any guidance developed.

WATER CYCLE MANAGEMENT FOR NEW DEVELOPMENTS (WaND)

Website <http://www.wand.uk.net/>

Justification

There is a need for an improved, nationally recognised method for predicting runoff from development sites. This is a key issue for sizing the capacity (storage and conveyance) of drainage systems and an area in which EA and LA regulation and planning staff have major interests.

Objective

To support the delivery of integrated, sustainable water management for new developments by provision of tools and guidelines for project design, implementation and management.

There are three technically based work packages concerning water supply, storm drainage and wastewater. The goal is to identify key performance and design issues and to quantify the key system, infrastructure and environment interactions.

There are two other packages deal with aspects concerned with social acceptability of new 'sustainable' technologies, the decision-making process and the place of water management in it, the role of whole-life costing in this context and the potential for increased health risks.

Deliverables

Guidance documents covering all five elements given above and a toolbox that pulls together the strands of the issues and techniques raised in the five work packages.

The model will be used to evaluate alternative development and water management scenarios and to propose more sustainable strategies, demonstrated through a number of case studies.

Relevance

Predicting runoff from development sites is key to determining the hydraulic area of influence for a development and the associated flood risk.

Appendix B

Consultation Process – Supporting Material

Appendix B.1	Attendance at Consultation Events (Phase 1 and Phase 2)
Appendix B.2	Summary results from Workshop 1 breakout sessions
Appendix B.3	Summary results from Workshop 2 breakout session
Appendix B.4	Main issues from the Phase 1 consultation process
Appendix B.5	Summary of feedback from Workshop 3
Appendix B.6	Minutes from Review Meeting
Appendix B.7	Summary of feedback from Workshop 4

APPENDIX B.1 ATTENDANCE AT CONSULTATION EVENTS

	Name	Organisation	Project Board Member	Workshops				Additional Meetings
				1	2	3	4	
1	James Lancaster	ARUP		✓				
2	Stuart Hemmings	Association of Drainage Authorities (Black Sluice IDB)			✓		✓	
3	Andy Pepper	ATPEC River Engineering Consultancy			✓			
4	Eliot Simons	Atkins				✓	✓	✓
5	Richard Ashley	Bradford University (subsequently Sheffield University)	✓ (1)				✓	
6	John Blanksby	Bradford University (subsequently Sheffield University)	✓ (2)	✓				
7	Glenn Charles	Buchanan Consulting Engineers		✓				
8	Rik Totman	Buchanan Consulting Engineers		✓				
9	Clive Mason	Bullen Consultants					✓	✓
10	Helen Elliott	Cambridgeshire County Council					✓	
11	Ann Calver	CEH Wallingford						
12	John Packman	CEH Wallingford		✓				
13	Craig Elliott	CIRIA			✓			
14	Marianne Scott	CIRIA		✓			✓	✓
15	John Goudie	Defra	✓	✓	✓	✓	✓	
16	Colin Hogg	East Riding of Yorkshire Council		✓				
17	David Abercrombie	Environment Agency		✓				
18	Steve Allison	Environment Agency		✓				
19	Ian Blackburn	Environment Agency				✓		
20	Peter Borrows	Environment Agency				✓		
21	Nadia Brannon	Environment Agency				✓		
22	Phil Chatfield	Environment Agency		✓				
23	Rebecca Cheatley	Environment Agency				✓		
24	Andrew Coleman	Environment Agency			✓			
25	Nick Feltham	Environment Agency		✓				
26	Sean Furey	Environment Agency				✓		
27	Geoff Gibbs	Environment Agency		✓	✓	✓		✓
28	Justine Glynn	Environment Agency		✓				
29	Rachael Hill	Environment Agency			✓			✓
30	Paul Hunt	Environment Agency		✓				
31	Dave Jones	Environment Agency		✓				✓
32	Matthew Kean	Environment Agency			✓		✓	✓
33	Nick Kennedy	Environment Agency						✓
34	Keith Lead	Environment Agency						✓
35	Roy Lobley	Environment Agency		✓		✓		
36	David Marsh	Environment Agency		✓				
37	Ian Meadowcroft	Environment Agency	✓		✓			
38	Grant Moffat	Environment Agency						✓
39	Alice Morgan	Environment Agency		✓				
40	Ken Moss	Environment Agency						✓

	Name	Organisation	Project Board Member	Workshops				Additional Meetings
				1	2	3	4	
41	David Murphy	Environment Agency	✓		✓			
42	Barrie Neaves	Environment Agency				✓		
43	Julian Payne	Environment Agency		✓				
44	Mervyn Pettifor	Environment Agency (Chair of Project Board)	✓		✓	✓	✓	✓
45	Nigel Pye	Environment Agency				✓		
46	Alan Rafelt	Environment Agency						✓
47	Mark Rees	Environment Agency		✓				
48	Graham Robertson	Environment Agency		✓				
49	David Rooke	Environment Agency					✓	
50	Claire Squires	Environment Agency				✓		
51	Suresh Surendran	Environment Agency (Client Project Manager)	✓	✓	✓	✓	✓	✓
52	Charlie Thompson	Environment Agency		✓				
53	William Todd	Environment Agency				✓		
54	Lucky Wehale	Environment Agency				✓		
55	Paul Wheeler	Environment Agency		✓				
56	Paul Wyse	Environment Agency	✓ ⁽¹⁾					
57	Valerie Bain	HR Wallingford				✓	✓	
58	Pam Bowker	HR Wallingford					✓	
59	Bernard Dyer	HR Wallingford and London School of Economics					✓	
60	Colin Fenn	HR Wallingford					✓	
61	Peter Hawkes	HR Wallingford				✓	✓	
62	Richard Kellagher	HR Wallingford (Contractor Project Director)	✓	✓	✓		✓	✓
63	David Ramsbottom	HR Wallingford			✓		✓	
64	Paul Sayers	HR Wallingford			✓		✓	
65	Jonathan Simm	HR Wallingford		✓			✓	
66	Helen Udale-Clarke	HR Wallingford (Contractor Project Manager)	✓	✓	✓	✓	✓	✓
67	Steven Wade	HR Wallingford				✓		
68	Andrew Whitaker	House Builders Federation	✓ ⁽³⁾		✓			
69	Jonathan Cooper	JBA Consulting		✓				
70	John Hesp	John Hesp Associates					✓	
71	Rebecca Rutter	North West Regional Assembly			✓			
72	Sam Ashby	ODPM				✓		
73	Peter Bide	ODPM	✓ ⁽³⁾					
74	Dave Brook	ODPM	✓ ⁽¹⁾		✓		✓	
75	Suzanne Kochanowski	ODPM			✓	✓		
76	Paul Williams	ODPM			✓			
77	Peter Floyd	RPA Consulting				✓		
78	Alex Nickson	Thames Gateway London Partnership			✓			
79	Jim Pithouse	Worcester City Council	✓				✓	
80	Derek Armitage	WSP Group		✓			✓	

	Name	Organisation	Project Board Member	Workshops				Additional Meetings
				1	2	3	4	
81	Mark Beaumont	WSP Group		✓			✓	

Notes:

- (1) Attended Project Board Meeting 1 only
- (2) Attended Project Board Meeting 3 only
- (3) Attended no Project Board Meetings

APPENDIX B.2

SUMMARY RESULTS FROM WORKSHOP 1 BREAKOUT SESSIONS

Item No.	Room	Box Reference		Initials	Colour	Stars	Text	Category					
		Session 1	Session 2					Policy	Process	Science	Workshop Specific	Unclear	Definition
1	Blackstone	4	C1	SA	Pink	1	What constitutes new development in the scope of this workshop?				✓		✓
2	Blackstone	4		CH	Pink	3	Row 1 and 2 - split between outline and detailed planning permission inappropriate - outline is the planning permission				✓		✓
3	Blackstone	4		AM	Pink		Concern about distinction between outline and full planning applications - highlighted by example in handout of distance from defences. Full FRA may be needed at outline to establish principles.		✓				✓
4	Blackstone	A1	A4	JP	Yellow		Check list all considered: Any watercourses/culverts? Beside coast? Any springs nearby/ records of groundwater flooding? Any records/knowledge of surface water flooding, foul water flooding or overland flows? Is it in recorded/estimated floodplain areas?		✓				
5	Blackstone	A1	C1	NF	Pink	3	Workable definition of functional floodplain			✓			✓
6	Blackstone	A1 + A2	A3	CH	Pink		IFM inadequate basis for advice/ decision making especially small scale developments - delay in FZM					✓	✓
7	Blackstone	A1 + A2	A3	MR	Pink	4	Inaccuracy of the indicative floodplain maps			✓			✓
8	Blackstone	A1 + A2	A4	CH	Pink		Advice circulated widely. Developers will be inclined to focus on mitigation measures in preparing FRA.					✓	
9	Blackstone	A1 + A2	A4	AM	Pink		Patchy information - some cases very little is available and developers may feel the FRA required is very large given the minor nature of a development		✓				
10	Blackstone	A1 + A2	A4	MR	Pink		Site survey to ordnance datum (include adjacent area in survey)		✓				
11	Blackstone	A1 + A2	A4	MR	Pink		Lack of records and data of flood events			✓			
12	Blackstone	A1 + A2	B1 + B2	CH	Pink		Changing role of LPA in process as result of standing advice		✓				
13	Blackstone	A1 + A2	C1	JP	Pink		Lifetime of development - is 50 years meaningful for a house? What is appropriate timescale for development plan to consider development life for 100 years plus. Impact on managed retreat.					✓	
14	Blackstone	A1 + A2	C3	MR	Pink		FRA to be submitted to LPA in full including any models etc.		✓				
15	Blackstone	A2	A3	PH	Pink	1	What is the standard of protection?	✓					
16	Blackstone	A2	C3	PH	Pink		What sensitivity tests should be included to enable planning decisions to be made at local planning stage?		✓				
17	Blackstone	B1	B1	DM	Pink		LPA role should be clearly emphasised to ensure that they have appropriate expertise		✓				
18	Blackstone	B1	B3	JC	Yellow	3	Who does the SFRA and what role should the EA play?		✓				
19	Blackstone	B1	C1	JC	Pink		Should the EA appear at LPIs as a single issue body?	✓					
20	Blackstone	B1	C1	JC	Pink		Determination of land use - developed vs undeveloped - not EA responsibility	✓					
21	Blackstone	B1	C3	JC	Yellow (Pink?)		Should SFRAs be a back end check on LPA land allocations? Where in the process?		✓				
22	Blackstone	B1 + B2	B3 + B4	SA	Pink	3	What role will LA engineers have in the process - knowledge of NMR (non-main rivers?) flooding		✓				
23	Blackstone	B1 + B2	C1	CH	Pink		No formal requirement to consult EA on flood risk issues via GDPO (standing advice)		✓				
24	Blackstone	B1 + B2	C3	CH	Pink		Need for input into development plan - SFRA - Basis for advice and decision making - How will this be tied into LDF?		✓				

Item No.	Room	Box Reference		Initials	Colour	Stars	Text	Category						
		Session 1	Session 2					Policy	Process	Science	Workshop Specific	Unclear	Definition	
25	Blackstone	B2	C4	JC	Yellow (Pink?)		Who should take liability for FRA?	✓						
26	Blackstone	B2	C4	JC	Yellow (Pink?)		Who should check the technical output of FRA? Should the EA charge for this?		✓					
27	Blackstone	B3	B1	SA	Pink		Who decides what is required for long term maintenance of structures - finances and other resources - H&S for maintenance	✓						
28	Blackstone	B3	B4	MR	Pink		Future maintenance of 'developer built' defences?		✓					
29	Blackstone	C1	A1	JC	Yellow (Pink?)	1	Flood zone - theoretical risk vs actual risk			✓				
30	Blackstone	C1	A3		Yellow (Pink?)		Gap? SFRA to highlight particular flood issues and identify general approaches to be taken in local area e.g. redevelopment of commercial is essential for town		✓					
31	Blackstone	C1	A3	JC	Pink		SoP and FoS for defences - use in sequential test. From whom? NFCDD does not have it.		✓					
32	Blackstone	C1	C1	AM	Pink		How do we make sure that developers and LAs are not getting a confused message with so much guidance flying around? Standing advice, CIRIA, PPG25, etc.		✓					
33	Blackstone	C1	C1	SA	Pink		What type/standard of defence will allow development to take place e.g. soft/hard distinction?			✓				
34	Blackstone	C1	C1	CT	Pink		PPG25 - clarity within zone 3 on development category	✓						
35	Blackstone	C1	C1	CT	Pink		Safe access - clear position on EA involvement/role on this issue	✓						
36	Blackstone	C1	C1	SA	Pink		What standards are appropriate where differences in national planning guidance occur?	✓						
37	Blackstone	C1	C1		Yellow (Pink?)		Move PPG25 to risk from probability	✓						
38	Blackstone	C1	C1		Yellow	1	PPG3 vs PPG25	✓						
39	Blackstone	C1 + C2	C1	PH	Pink	1	Most things can be engineered. What happens if a solution goes against policy?		✓					
40	Blackstone	C1 + C2	C1		Yellow (Pink?)		Clarification of what needs to be included to account for climate change			✓				
41	Blackstone	C2	A4	JC	Yellow (Pink?)		Should risk be determined by RASP or Flood Zone Maps?			✓				
42	Blackstone	C2	C1	JC	Pink		Clarity on freeboard - SoP with or without			✓				
43	Blackstone	C2	C1		Pink		Practice tool for LPAs		✓	✓				
44	Blackstone	C2	C1		Yellow (Pink?)		Position statement on risk for changes of use in flood risk areas - conversion of house to flats	✓						
45	Blackstone	C2	C1		Yellow (Pink?)		Zone 3 definitions	✓						
46	Blackstone	C3	C1	SA	Pink		Does any depth of flooding mean access is not safe?			✓				
47	Blackstone	C3	C1	CT	Pink	3	SuDS - who's responsible for adoption and maintenance?	✓						
48	Blackstone	C3	C1	CH	Pink		Is there adequate guidance/control via building regulations - conflict e.g. inclusive access	✓						
49	Blackstone	C3	E4	CH	Yellow		Use of S106 agreement as basis for monitoring regimes/ mitigation measures		✓					
50	Blackstone	E1	C3	JC	Yellow (Pink?)		Is flood risk a major material consideration in reality?	✓		✓				
51	Blackstone	E1	E1	CH	Pink		How will the EA manage effectively/consistently an application of standing advice?		✓					
52	Blackstone	E1	E3	JP	Pink	1	LPA has final audit role on all issues but limited technical knowledge/backup - range of 'consultees' for advice with their own agendas		✓					
53	Blackstone	E2	E1	AM	Pink	1	How do we check FRAs - how far do you have to go into models, etc?		✓	✓				

Item No.	Room	Box Reference		Initials	Colour	Stars	Text	Category						
		Session 1	Session 2					Policy	Process	Science	Workshop Specific	Unclear	Definition	
54	Blackstone	E3	E4	AM	Pink	1	Concerns over what can be conditioned by LPAs - who will check FFLs, mitigation measures, etc. - conditions have to be enforceable.	✓	✓					
55	Blackstone		A3		Yellow		Environmental/statutory area designations	✓						
56	Blackstone		B1	JP	Pink	1	No overarching role and responsibility: very fragmented control. No organisation responsible for groundwater flooding, surface water runoff especially from agricultural land	✓						
57	Blackstone		B1		Yellow		Defra, ODPM, Regional Assemblies, EA National Policy Groups, EA Regional Groups				✓			
58	Blackstone		B1		Yellow		National Planning Officer Society, LGA				✓			
59	Blackstone		B1 B2	+ CH	Pink		Role of Planning Inspectorate	✓	✓					
60	Blackstone		B1 B2 B3	+ +	Yellow		Flood defence committees				✓			
61	Blackstone		B2		Yellow		Coastal zones, CFMP Project Boards - No clear body at this zone	✓	✓					
62	Blackstone		B2		Yellow		English Nature, NGOs, NHBC, CHL, ABI, Regional Development Agencies				✓			
63	Blackstone		B3		Yellow		EA strategic planning teams				✓			
64	Blackstone		B3 B4	+	Yellow		Unitary Planning Authority, County/ Planning Council				✓			
65	Blackstone		B4		Yellow		Water Companies				✓			
66	Blackstone		B4		Yellow		EA Development Control Staff, Individual landowners and developers				✓			
67	Blackstone		B4		Yellow		Drainage Authorities				✓			
68	Blackstone		C1	JC	Pink		Modelling of current and proposed runoff regimes: techniques and how to design attenuation			✓				
69	Blackstone		C2	SA	Pink		Co-ordination of catchment based policies with other guidance		✓					
70	Blackstone		C4		Pink		Role of stormwater management and use of models from water companies. What is in it for them?	✓						
71	Blackstone		E1 E2 E3	+ +	Yellow		Flood Defence Committees, Planning Inspectorate				✓			
72	Du Cros	4		PW	Pink		Need guidance specific to scale/type/location of development		✓	✓				
73	Du Cros	4		PW	Pink		Do we need a FRA for all development, e.g. domestic extensions	✓		✓				
74	Du Cros	4		PW	Pink		How do we avoid confusion with the different bits of guidance on FRA? (especially for non-professional developers)		✓					
75	Du Cros	4		PW	Pink		FRA for defended areas. (especially breach zones required)		✓					
76	Du Cros	A1		RL	Yellow		"FLOWS" project looking at SFRA and the planning process		✓					
77	Du Cros	A1		PW	Yellow		FA Flood map data - showing probability of flooding ie info on defences			✓				
78	Du Cros	A1		JB	Yellow		Fluvial and coastal addressed				✓			
79	Du Cros	A1		JP	Yellow (Pink?)		How to define and preserve pre-development flow paths. Extreme events? Subsurface flows Topography/geology/soils			✓				
80	Du Cros	A1		JB	Pink		No open register of property at risk		✓					
81	Du Cros	A1		JB	Pink		When is urban creep considered			✓				
82	Du Cros	A1		JB	Pink		Belief that SUDS are a panacea			✓				

Item No.	Room	Box Reference		Initials	Colour	Stars	Text	Category						
		Session 1	Session 2					Policy	Process	Science	Workshop Specific	Unclear	Definition	
83	Du Cros	A1		JG	Pink		Should we carry out local solutions such as SUDS anyway or consider a range of solutions to optimise flood risk characteristics in a catchment?			✓				
84	Du Cros	A1		PW	Pink		Mapping of problem surface water run-off areas (to enable better targeted FRA)			✓				
85	Du Cros	A1		PC	Pink		What are the consequences for foul sewage flows?			✓				
86	Du Cros	A1		PC	Pink		How will land drainage be dealt with?			✓				
87	Du Cros	A1			Pink		What significance reliance should be placed upon 'defences' in determining the planning process?			✓				
88	Du Cros	A1		PC	Pink		Sustainable water management - water resource issues?			✓				
89	Du Cros	A1		PC	Pink		Drainage impact assessments			✓				
90	Du Cros	A1		PW	Yellow		EA flood hazard info on eg depth of flooding, speed etc			✓				
91	Du Cros	A1 + A2		GG	Yellow		Topographic data. Hydrologic data. Flood risk history.			✓				
92	Du Cros	A3		SS	Pink		Performance of SUDS for different loads. Performance of defence in development control decision			✓				
93	Du Cros	A3		PC	Pink		Exceedance of design criteria – flow paths			✓				
94	Du Cros	A3		GG	Pink		(Could be C3) by ODPM. Extended Building Regulations that cover flood risk issues	✓						
95	Du Cros	A3		JP	Yellow (Pink?)		How to assess long term response. Maintenance needs and effect on performance?			✓				
96	Du Cros	B1		RL	Pink		Interpretation of "Science" into Agency policy/process	✓	✓					
97	Du Cros	B1		JG	Pink		Do local plans give sufficient info to discourage developers with respect to flood risk?		✓					
98	Du Cros	B1		JB	Pink		Flood related issues relating to new development need the full force of the law.	✓						
99	Du Cros	B1		PC	Pink		WSPLC - strategic sewer flooding plans		✓					
100	Du Cros	B1 + C1		PW	Yellow		FA Flood risk. Standing advice. (Matrix reqts)		✓					
101	Du Cros	B3		SS	Pink		Coincidental flooding - whose responsibility?		✓					
102	Du Cros	B3		PC	Yellow		SUDS O&M + continual performance			✓				
103	Du Cros	C1		DJ	Pink		Who takes the lead on H&S issues? Safe access and egress. Post flooding health.	✓						
104	Du Cros	C1			Pink		What constitutes risk - what are the metrics? Economic. Local community issues. People.			✓				
105	Du Cros	C1		SS	Pink		Is PPG25/EA Guidance up to date with current science and issues? R&D (Science) to Policy & Process?		✓					
106	Du Cros	C1 + C2		GG	Pink		By EA: Guidance on appropriate FRA		✓					
107	Du Cros	C1		JB	Pink		Where is the die cast?						✓	
108	Du Cros	C1			Yellow		CIRIA RP675 provides the FRA framework				✓			
109	Du Cros	C1		DJ	Pink		How are water quality issues protected within FRA			✓				
110	Du Cros	C1		RL	Pink		What should Agency's response in 20% climate zone be?	✓						
111	Du Cros	C1 + C2		GG	Pink		Guidance on scale of development issues			✓				
112	Du Cros	C1 + C2		RL	Pink		Communication to "unskilled" developers, ie single house builder, extension etc.		✓					
113	Du Cros	C2		RL	Pink		Guidance on bits of info required in FRA for different applications/location		✓					
114	Du Cros	C2		RL	Pink		Interpretation of "developed" and "sparsely developed"			✓				

Item No.	Room	Box Reference		Initials	Colour	Stars	Text	Category						
		Session 1	Session 2					Policy	Process	Science	Workshop Specific	Unclear	Definition	
115	Du Cros	C2		DJ	Pink		Consistent technical guidance on outputs from FRA i.e. when does a FRA pass or fail.		✓					
116	Du Cros	C2		PC	Yellow		Accounting for SUDS approach - or perhaps discounting						✓	
117	Du Cros	D1		JP	Yellow (Pink?)		How to assess pre-development flood risk? (Do we need to or just design to good practice?)			✓				
118	Du Cros	D1		SS	Pink		Accuracy of IFM			✓				
119	Du Cros	D1 + D2 + D3		GG	Pink		Link all guidance together		✓					
120	Du Cros	D1		JB	Pink		Modelling will always be deficient			✓				
121	Du Cros	D1		JB	Pink		New models will take time to come on board - what about now?			✓				
122	Du Cros	D2		JP	Yellow (Pink?)		How to assess post development flooding over range of return periods, scales, or pre-development conditions			✓				
123	Du Cros	D2		JCP	Yellow (Pink?)		How to assess flood defence options of mixed characteristics? (Storage/retention/infiltration/conveyance) - over range of conditions			✓				
124	Du Cros	D3		GG	Yellow (Pink?)		Feedback on performance		✓					
125	Du Cros	E1		SS	Pink		Development behind the defence			✓				
126	Du Cros	E3			Pink		Post development audit of outcomes		✓					
127	Du Cros	E3		JG	Pink		What process for monitoring ongoing performance of planning conditions such as SUDS is envisaged.			✓				
128	du Cros		A1	GG	Yellow		PPG and PPS documents, guidance, RSS - policies						✓	
129	du Cros		A1		Pink		WSPLC Sewer Flood Strategy at regional level						✓	
130	du Cros		A1		Pink		Catchment - WFD River Basin Management Plans - link to FRM			✓				
131	du Cros		A1 + A2 + A3 + A4		Pink		Is NFCDD adequate to provide data/information for this purpose? a) state of NFCDD development b) data held/data quality			✓				
132	du Cros		A2 + A3	GG	Yellow		LDF policies, SFRA				✓			
133	du Cros		A3		Pink		Integration of data and information at all decision levels (common database and co-ordination)		✓	✓				
134	du Cros		A3		Pink		WSPLC sewer/surface water flooding plan at local plan scale						✓	
135	du Cros		A4		Pink		Did data and information go back to NFCDD? Did they use data from NFCDD? Common data requirements here		✓					
136	du Cros		A4	GG	Yellow		FRA				✓			
137	du Cros		B2		Pink		Integration of all flooding issues, responsibility to coincidental flooding		✓					
138	du Cros		B4	JB	Pink		Insurers and mortgage lenders will protect new build but at what consequence to existing?	✓						
139	du Cros		B4		Pink		Who is responsible for providing and receiving data and information for and about the development?		✓					
140	du Cros		C1	JB	Pink		National - Setting the scene. Incentives can be introduced at this level. Modelling not very good.	✓						
141	du Cros		C1	JB	Pink		National - Demands are not just in Thames Gateway and M11 Corridor				✓			
142	du Cros		C1	RL	Pink		Use of SFRA promoted at Regional Assembly via RSS - model policies	✓						

Item No.	Room	Box Reference		Initials	Colour	Stars	Text	Category						
		Session 1	Session 2					Policy	Process	Science	Workshop Specific	Unclear	Definition	
143	du Cros		C1	JP	Yellow (Pink?)		Policy on assessing and limiting effect of urban creep?	✓						
144	du Cros		C1	DJ	Pink		How will flood zone map/flood map + RASP (NaFRA) be used in local plan/planning application SFRA/FRA?			✓				
145	du Cros		C2	JB	Pink		Catchment/ Coastal Zone - Still very large scale. This is the level at which social values can be addressed.			✓				
146	du Cros		C2	PW	Pink		WFD - Where do catchment flood management plans fit vis. SFRAs?			✓				
147	du Cros		C2	GG	Pink		What is appropriate for SFRA - guidance		✓					
148	du Cros		C2	RL	Pink		How will CFMPs link and provide information for SFRAs?			✓				
149	du Cros		C2	RL	Yellow		Flows project looking at CFMPs/SFRA cost/who pays, etc.		✓					
150	du Cros		C2 + C3	GG	Pink		Need to look beyond flood risk to political decisions ("sustainable communities")	✓						
151	du Cros		C3	JB	Pink		Local plan and hydraulic area of influence - This is where the real decisions should be taken. Sewerage drainage area.				✓			
152	du Cros		C3	RL	Pink		Unsure how land is "allocated" in new planning system		✓					
153	du Cros		C3	PW	Pink		Nationally consistent guidance on SFRA for LPAs required. (EA guidance being produced)		✓					
154	du Cros		C3	RI	Pink		Do LPAs understand sequential test in relation to land allocations for local plans?		✓					
155	du Cros		C3	GG	Pink		What is appropriate for FRA - guidance		✓					
156	du Cros		C3	DJ	Pink		Promote functional floodplain reclamation through redevelopment. Review of PPG25 and agency policy.	✓						
157	du Cros		C4	JB	Pink		Development site and hydraulic area of influence - sites within local plan		✓					
158	du Cros		C4	GG	Pink		Consequences of development of higher densities			✓				
159	du Cros		D2	DJ	Pink		How can CFMPs be more closely linked to planning process?		✓	✓				
160	du Cros		D2	JP	Pink		Realistic inclusion of detailed urban drainage features in CFMP type work? E.g. a) sequential test and CFMPs b) storage/SuDS in CFMPs			✓				
161	du Cros		D2	JP	Pink		Impact of creep on catchment scale flooding?			✓				
162	du Cros		D3	JB	Pink		The engine house is the local plan. If data and technologies are aimed at this level then the means of solving the problem will be achieved.			✓				
163	du Cros		D3	JP	Pink		Impacts of uncertainty on flood drainage provision?			✓				
164	du Cros		outside	JP	Yellow		Given questions are valid, but what information do we need to address these questions?				✓			
165	du Cros			RL	Pink		Split Row 1 in Session 1 into a) strategic (local plan, etc.) b) outline application				✓			
166	Du Cros	A1		JRB	Pink		Equal design standards for SUDS and pipes			✓				
167	Du Cros	B1		GG	Yellow		Local Planning Authorities. Strategic Flood Risk assessment for allocation.				✓			
168	Wynn	B1	B1	KM	Pink	1	Are roles and responsibilities correct? Right skills for job? LA/EA balance. Planners are afraid of becoming experts in FRA		✓					
169	Wynn	B1	B1	KM	Pink	1	SFRA by LA - link with local plan required		✓					
170	Wynn	B1	B1		Pink		LAs priorities at odds with FRA - makes FRA difficult		✓					
172	Wynn	B1	B4	MB	Pink		Release of DG5 info on flooding - difficult		✓					

Item No.	Room	Box Reference		Initials	Colour	Stars	Text	Category						
		Session 1	Session 2					Policy	Process	Science	Workshop Specific	Unclear	Definition	
173	Wynn	B1	B4	GC	Pink		Release of DAP/network analysis for assessing drainage impact		✓					
174	Wynn	C1	C3	KM	Pink	2	Guidance - site - timescales, size, type of development - practical implementation issues of generic advice			✓				
175	Wynn	C1	C3	MB	Pink		Need for clear guidance on future of stages of application, especially outline - type of site and location - linked to scale (PPG25 not got it)		✓					
176	Wynn	C1	C4	JG	Pink		EA need a way of being able to make an informed decision and accept outline stage - check list of production		✓					
177	Wynn	E1	E1		Yellow		Change in planning process needs consideration and feedback to FRA		✓					
178	Wynn	E1	E1	MS	Pink		Awareness of RP675 and other guidance that exists		✓					
179	Wynn	E1	E1	MS	Pink	1	Understanding of FRA procedures and structures - training		✓					
180	Wynn	E1	E1		Yellow		Making use of existing guidance, including RP675		✓					
181	Wynn	E3	E4	KM	Pink	2	Feedback to rows 1 and 2 - Enforcement non-existent and this limits improvement in process	✓						
182	Wynn				Pink		Flood zone maps						✓	
183	Wynn				Pink	1	Flood Hazard						✓	
184	Wynn		A2		Pink		Detail of SEA elements i.e. how is a FRA conducted?						✓	
185	Wynn		A2		Pink		Required defences						✓	
186	Wynn		A3		Pink		Defence Levels			✓				
187	Wynn		A3		Pink		Flood depths			✓				
188	Wynn		A4		Pink		Distance from embankment - What is the risk?			✓				
189	Wynn		A4		Pink		Risk minimisation to developers i.e. how much up front costs to get green light		✓					
190	Wynn		B1		Pink		FRA not present in building regulations	✓						
191	Wynn		B3		Pink		Roles of Insurers - cost of flooding						✓	
192	Wynn		B4		Yellow		"CIRIA like", EA standard advice			✓				
193	Wynn		B4		Pink		Small consultants providing adequate FRA						✓	
194	Wynn		C4		Pink		CIRIA lite - targeted to different scenarios, linked to EA standard advice to developers			✓				
195	Wynn		E2		Yellow	2	Impact of SEA part of LDP - FRA, WMP, CFMP						✓	
196	Wynn		E2		Pink	1	Databanks of FRA						✓	
197	Wynn		E3		Pink		How good are FRAs?						✓	
198	Wynn				Pink		Preplanning & Policy above Row 1 in Session 2				✓			

APPENDIX B.3

SUMMARY RESULTS FROM WORKSHOP 2 BREAKOUT SESSION

Issue No.	Issue	Score				Rank	Category				Covered elsewhere		To be included in Phase 2
		High	Medium	Low	Total		Research Science	Development of Application	Business Process	Policy	Completely	Partially	
26	SFRAs and FRAs - practical implementation	19	1	0	59	1	85	100	100	15	0	100	100
14	Role of CFMPs vs SFRAs	17	2	1	56	2	75	90	100	35	5	95	95
1	Accuracy of the IFM and FZM	10	5	5	45	3	45	90	50	25	15	80	75
23	Increasing density of urban areas - infill	10	5	5	45	4	90	95	15	15	5	0	95
10	EA involvement in SFRAs	11	2	7	44	5	5	10	100	100	0	0	20
15	Impact of WFD	9	6	5	44	6	80	10	10	95	0	100	95
28	Development near embankments & risk of breach	5	12	3	42	7	95	95	45	25	5	95	100
33	Checking SFRAs and FRAs	9	3	8	41	8	95	100	100	15	0	0	100
30	Impact downstream of a development	3	14	3	40	9	100	15	5	0	0	0	100
9	Changing roles due to standing advice	9	1	10	39	10	0	0	100	100	0	0	5
16	Duplication of work (use of SFRAs vs FRAs)	8	3	9	39	11	0	100	100	5	0	0	100
17	Sensitivity of risk after outline planning stage	3	11	6	37	12	95	100	25	10	0	0	95
24	Workable definition of functional floodplain	3	10	7	36	13	5	95	15	15	0	0	90
25	Definition of standard of protection	6	4	10	36	14	0	95	20	10	0	20	95
18	PPG3 vs PPG25	2	10	8	34	15	10	10	100	10	0	100	10
27	Climate change for developers	3	7	10	33	16	15	95	30	30	0	100	100
3	Adequacy of the NFCDD for use with FRAs	0	12	8	32	17	0	95	100	5	0	95	95
22	Urban creep - increasing impermeability	4	3	13	31	18	90	95	15	10	5	95	95
4	Information flows between databases and studies	3	4	13	30	19	0	95	95	5	0	5	95
7	SuDS adoption (performance and maintenance)	3	2	15	28	20	95	5	5	95	95	5	0
19	Flood risk in Building Regulations	2	4	14	28	21	0	15	25	100	5	5	10
8	Sewerage undertakers	1	4	15	26	22	0	5	100	100	0	5	5
29	Sensitivity of floodplains due to pinch points	0	6	14	26	23	100	0	0	5	0	0	100
31	Enforceability of mitigation measures	2	2	16	26	24	0	0	100	5	0	0	5
12	Groundwater flooding	1	3	16	25	25	15	10	5	100	0	5	0
5	Databanks of studies	1	2	17	24	26	0	90	90	0	5	0	5
6	National/regional scale hydraulic area of influence?	2	0	18	24	27	0	0	0	0	0	0	0
20	Influence of insurance industry	1	2	17	24	28	0	0	100	5	0	5	0
32	Final decisions made by LPAs/UAs	1	2	17	24	29	0	0	100	0	0	0	0
2	Lack of records of flooding events	0	3	17	23	30	0	90	95	5	5	0	0
11	Non-main watercourses	0	2	18	22	31	0	0	100	5	0	5	0
13	Surface water runoff from agricultural land	0	2	18	22	32	10	5	5	100	0	10	0
21	Solutions contrary to policy	0	1	19	21	33	0	0	100	5	0	0	0
34	What is appropriate and links to monitoring*	4	1	0	14	34	15	20	15	15	0	0	25
39	SFRA zoning of land use types*	3	1	0	11	35	10	15	10	5	0	0	10
35	Timing of development (existing/future)*	2	1	0	8	36	5	10	10	5	0	0	15
37	Pilot Study*	2	0	0	6	37	5	5	5	0	0	0	15
38	Boundaries (conflict between)*	2	0	0	6	38	0	15	15	5	0	0	15
42	Joint probability of flooding*	1	1	0	5	39	10	10	5	5	0	5	5
36	Measure of benefit*	1	0	0	3	40	0	5	5	5	0	0	5
40	Redevelopment of existing areas*	1	0	0	3	41	0	0	0	0	0	0	5
41	Interim during strategy development and pre cfmp*	1	0	0	3	42	0	5	5	5	0	0	5
43	Flood sensitivity vs design*	0	1	0	2	43	0	5	5	5	0	0	5

APPENDIX B.4

MAIN ISSUES FROM THE PHASE 1 CONSULTATION PROCESS

The following issues were highlighted by Workshop 1 as being those of greatest importance. These were subsequently discussed and ranked during Workshop 2. The results of the ranking are given in Appendix E. However, the discussion of these issues is given here. The percentages given below duplicate the information on the spreadsheet in Appendix E. These percentages show the proportion of those attending Workshop 2 that agreed with the following:

- There is a need in each of the 4 categories.
- The need is covered elsewhere (i.e. other R&D or initiatives).
- The need should be covered in Phase 2 of this project.

The issues were split into the 5 principles for the workshop and this format remains here:

- Information & Data Requirements
- Roles & Responsibilities
- Processes, Procedures & Guidance
 - Nature of assessment
 - Nature of response
 - General guidance
- Enable Technologies (although none highlighted)
- Audit & Control

There were several additional issues raised at Workshop 2 and these are included at the end of this appendix.

INFORMATION AND DATA REQUIREMENTS

Accuracy of the IFM and Flood Zone Mapping

Research Science	45%
Development of Application	90%
Business Process	50%
Policy	25%
Covered elsewhere completely	15%
Covered elsewhere partially	80%
To include in Phase 2	75%

This issue is partially (although a few Consultees considered it as completely) covered by the following projects/initiatives:

- Flood Mapping Strategy

- W5-076: River conveyance (Reducing uncertainty in estimation of flood levels)

The following comments were made regarding the accuracy of the IFM and flood zone mapping and the implications:

1. IFMs are used to determine whether a FRA is needed. There is concern that this can sometimes lead to unnecessarily detailed and expensive FRAs for relatively small sites. There is clearly a need for guidance on appropriate levels of FRA depending on location, but this should not be entirely based on the IFM or the future flood zone mapping.
2. Development of the flood zone mapping is being dealt with elsewhere. There is not an additional need for Research Science with respect to this for this study.
3. The flood zone mapping will be better product for use than the IFM, but will still be misused. The greatest need is guidance regarding their appropriate application.
4. There is an intention to use results from studies to provide feedback to improve the flood zoning, but there would be issues regarding the quality of the studies, etc.
5. The maps do not need to be more accurate. They should only be used as a first filter or trigger to steer flood risk approach and are, therefore, fit for purpose if used at the appropriate level.
6. The zones should not be applied as a distinct line to limit where FRAs need to be done. There will always be instances where FRAs will be needed beyond this line, especially for large developments.
7. Following on from this, there is significant debate regarding what should be the requirements for a SFRA or FRA within a protected floodplain? A better understanding of the probability of risk vs. the consequences is needed and should this be the job of the flood zoning?
8. There is concern that the insurance companies are not endorsing current IFMs by producing their own.
9. There are concerns that in the future such lines on maps will be used for new (inappropriate) levies.
10. Development control authorities do not want to encourage developers or others to attempt to move the lines.

In summary, there is a recognised need for guidance to be provided regarding the appropriate use of flood zone mapping and this could be carried out as part of Phase 2 of this study, with close liaison with the EA's Flood Mapping Strategy initiative currently underway.

Lack of records of flooding events

Research Science	0%
Development of Application	90%
Business Process	95%
Policy	5%
Covered elsewhere completely	5%
Covered elsewhere partially	0%
To include in Phase 2	0%

This issue was not discussed in great detail, although there was general consensus that this was not crucial to FRAs and did not need to be included in Phase 2.

Adequacy of the NFCDD for use with FRA

Research Science	0%
Development of Application	95%
Business Process	100%
Policy	5%
Covered elsewhere completely	0%
Covered elsewhere partially	95%
To include in Phase 2	95%

This issue was not discussed in great detail. There was general agreement that, although the NFCDD came under a number of other initiatives (including the R&D project W5-070: PAMS), there was a need to review the relevance of the data contained in the database and provide suitable guidance for its usage. This could be carried out as part of Phase 2 of this study.

Information flows between databases and studies

Research Science	0%
Development of Application	95%
Business Process	95%
Policy	5%
Covered elsewhere completely	0%
Covered elsewhere partially	5%
To include in Phase 2	95%

The following comments were made regarding information flows:

1. There is a need for feedback to NFCDD and IFM/FZM and between FRAs, SFRAs, CFMPs and SMPs. The purpose, extent and implications of this need exploring.
2. An associated issue is the procurement of information for carrying out FRAs. The information required is mostly held by the EA and those carrying out the FRAs sometimes find it difficult to source. If a SFRA has been carried out, this should have obtained most of the required information for a more detailed FRA and should be made available.
3. It was commented that it would be helpful if the EA made information on maximum design water levels more freely available.

4. There is clearly a communication issue between stakeholders. Stakeholders need to be made better aware of data held by others.
5. CFMPs need to be used (if they exist) in the production of SFRAs. It was also recognised that CFMPs may not exist or may be out of sync with SFRAs and that it was important that information from the local risk assessment should feedback into the CFMPs. This led to the view tha CFMPs should be given high priority to provide the necessary information for SFRAs.

In summary, it was recognised that a clear understanding of data availability and the potential interaction of different levels of studies is needed. This could be covered by Phase 2 of this study.

Databanks of studies

Research Science	0%
Development of Application	90%
Business Process	90%
Policy	0%
Covered elsewhere completely	5%
Covered elsewhere partially	0%
To include in Phase 2	5%

This issue was not discussed in great detail, although there was general consensus that this was not crucial at this stage and did not need to be included in Phase 2.

National/regional scale hydraulic area of influence

This issue was not discussed in detail. No voting took place on this issue.

ROLES AND RESPONSIBILITIES

SuDS adoption

Research Science	95%
Development of Application	5%
Business Process	5%
Policy	95%
Covered elsewhere completely	95%
Covered elsewhere partially	5%
To include in Phase 2	0%

This issue was not discussed in great detail, although there was general agreement that there was still an issue associated with SuDS adoption and this requires the resolution of performance/reliability and maintenance issues. However, these issues are being covered by other projects (including CIRIA RP697: *Benefits & performance of SuDS*).

Sewerage undertakers

Research Science	0%
Development of Application	5%
Business Process	100%
Policy	100%
Covered elsewhere completely	0%
Covered elsewhere partially	5%
To include in Phase 2	5%

Involvement of sewerage undertakers (i.e. integration with sewerage, CSOs, etc.) does not appear to be happening as much as it should. When carrying out FRAs, it is particularly difficult to obtain information regarding highway drainage and surface water sewers.

This was not discussed in great detail, as it was agreed that these were Business Process and Policy issues that cannot be solved by this study.

Changing roles due to Standing Advice

Research Science	0%
Development of Application	0%
Business Process	100%
Policy	100%
Covered elsewhere completely	0%
Covered elsewhere partially	0%
To include in Phase 2	5%

Due to standing advice there is a shift in emphasis from EA to LPA, which is causing a confidence gap. Planners are resistant to becoming experts in FRA.

This was not discussed in great detail, as it was agreed that these were Business Process and Policy issues that cannot be solved by this study.

EA involvement in SFRA

Research Science	5%
Development of Application	10%
Business Process	100%
Policy	100%
Covered elsewhere completely	0%
Covered elsewhere partially	0%
To include in Phase 2	20%

It was felt that LPAs had to do the study because of their other planning responsibilities that related to selection of sites. Also, the time-basis of a strategy means that only the local authority could carry out such a study.

It was also agreed that it was difficult to expect Developers to provide an integrated evaluation of the development impact (in the style of a SFRA). Their responsibilities could only be related to their development in question.

It was acknowledged that LPAs have little technical skills for such work and they would need to employ consultants. EA needs to be part of the process in order to approve the end product.

It was suggested that this issue should be grouped as part of the other issues on SFRA. However, this is really a Business Process and Policy issue and not something that can be covered by this study.

Non-main watercourses

Research Science	0%
Development of Application	0%
Business Process	100%
Policy	5%
Covered elsewhere completely	0%
Covered elsewhere partially	5%
To include in Phase 2	0%

There were concerns raised over the local authorities' responsibilities for consideration of non-main watercourses in risk assessments being over-looked.

This was not discussed in great detail, as it was agreed that this was a Business Process issue that cannot be solved by this study.

Groundwater flooding

Research Science	15%
Development of Application	10%
Business Process	5%
Policy	100%
Covered elsewhere completely	0%
Covered elsewhere partially	5%
To include in Phase 2	0%

There are concerns regarding the lack of responsibility for groundwater flooding.

This was not discussed in great detail, as it was agreed that this was a Policy issue that cannot be solved by this study.

Surface water runoff from agricultural land

Research Science	10%
Development of Application	5%
Business Process	5%
Policy	100%
Covered elsewhere completely	0%
Covered elsewhere partially	10%
To include in Phase 2	0%

There are concerns regarding the lack of responsibility for surface water runoff from agricultural land.

This was not discussed in great detail, as it was agreed that this was a Policy issue that cannot be solved by this study.

As part of the Flood Risk Management Research Consortium, the aims of the Land Use Management programme are to develop scientific understanding of the local scale effects of agricultural land management practices on flooding, to develop modelling tools to represent the impacts and also to provide policy guidance.

PROCESSES, PROCEDURES AND GUIDANCE

TYPE OF ASSESSMENT

*Role of CFMPs vs SFRA*s

Research Science	75%
Development of Application	90%
Business Process	100%
Policy	35%
Covered elsewhere completely	5%
Covered elsewhere partially	95%
To include in Phase 2	95%

This issue is partially covered by the R&D project FD2010: *Guide to the Management of floodplains to reduce flood risk*.

The following comments were made regarding the role of a CFMP compared to a SFRA:

1. There needs to be greater understanding of the roles of CFMPs versus SFRA and how they feed into each other.
2. There needs to be closer integration between CFMPs and SFRA. The SFRA methodology must dovetail with existing methods such as CFMPs.
3. There are differences of opinion over the level of detail contained in a CFMP compared to a SFRA. Some people would like CFMPs used instead of SFRA, whilst others believe CFMPs are too broad brush.
4. Any guidance needs to be realistic about what is achievable and by whom.
5. This issue is tied into the issue below – impact of the WFD.
6. Associated with this issue is the conflict between EA's catchment based boundaries (used for CFMPs) and LPA's administration boundaries (used for Local Plans). Reconciling this is recognised as being crucial for ensuring FRAs are fit for purpose. This is becoming even more relevant with the onset of the reformed planning system in which regional and sub-regional planning strategies will have statutory weight. The different timescales of flood management and land use planning need addressing. The new planning documents are supposed to be a broader spatial approach with more scope to include flooding issues.

In summary, it was recognised that a clear understanding of the purposes of CFMPs and SFRA is needed and pragmatic guidance needs to be developed that will enable the relevant organisations to dovetail their work together. This is linked to information flows between databases and studies. This could be covered by Phase 2 of this study.

Impact of the WFD

Research Science	80%
Development of Application	10%
Business Process	10%
Policy	95%
Covered elsewhere completely	0%
Covered elsewhere partially	100%
To include in Phase 2	95%

It was agreed that the impact of the WFD (with respect to flow control, quality, drought implications, river basin scale planning, etc.) will have to be integrated into the FRA framework and all guidance developed.

As the WFD is pushing to tackle flooding at source by applying SuDS more often in urban areas and in rural areas looking at land management and diffuse pollution, these will have flood risk implications in principle or physical manifestation.

This issue is partially covered by CIRIA RP627: *Sustainable water management and land use planning* and a number of EA initiatives.

Duplication of work

Research Science	0%
Development of Application	100%
Business Process	100%
Policy	5%
Covered elsewhere completely	0%
Covered elsewhere partially	0%
To include in Phase 2	100%

This was considered a very important issue and linked to the issues of roles of CFMPs and SFRA and information flows.

At present individual developers are having to do full assessments over wide areas and it is causing duplication of work. A substantial part of this work could be done once as part of a SFRA.

Due to the inter-relationship of this issue with others that will be key for this study, this issue should also be tackled.

Sensitivity of risk after outline planning stage

Research Science	95%
Development of Application	100%
Business Process	25%
Policy	10%
Covered elsewhere completely	0%
Covered elsewhere partially	0%
To include in Phase 2	95%

Important decisions regarding flood risk are made at Outline Planning stage. There is a need to ensure that an accompanying risk assessment not only provides the appropriate level of detail, but the sensitivity of flood risk to changes in circumstance

(within the development itself or surrounding area) that may come after this stage also needs to be taken into consideration.

A lack of available information at the time is a common problem. Where issues are raised over this, it can lead to delays in house construction.

It was generally felt that this could be considered for Phase 2 of this study.

NATURE OF RESPONSE

PPG3 vs PPG25

Research Science	10%
Development of Application	10%
Business Process	100%
Policy	10%
Covered elsewhere completely	0%
Covered elsewhere partially	100%
To include in Phase 2	10%

This issue is partially covered by the Dti project: *Use of SuDS in High Density Developments*.

There is a perceived conflict between PPG3 and PPG25, which LPAs have to constantly deal with.

The role of the FRA should be fed back into the review of PPG25. The concept of 'fit for purpose' should be included in the new planning regulations.

In general, this was considered to be a Business Process issue and not something that could be considered as part of this study.

Flood risk in Building Regulations

Research Science	0%
Development of Application	15%
Business Process	25%
Policy	100%
Covered elsewhere completely	5%
Covered elsewhere partially	5%
To include in Phase 2	10%

There should be incorporation of flood risk into the Building Regulations.

The Building Regulations need to be more involved regarding the issues of on-site disposal of stormwater.

This was generally considered to be a Policy issue and not something that could be considered as part of this study.

Influence of the insurance industry

Research Science	0%
Development of Application	0%
Business Process	100%
Policy	5%
Covered elsewhere completely	0%
Covered elsewhere partially	5%
To include in Phase 2	0%

The insurance industry is influencing where developments take place and the impact of this needs investigation. However, this is a Business Process issue and not something that could be considered for this study.

The EA is currently working with the Association of British Insurers (ABI) to support the insurance industry's commitment to continue to offer insurance to the vast majority of homes and businesses in flood risk areas.

The EA has no role in determining insurance cover, but does share a common goal with the ABI to improve flood mapping and provide the best available information to the public.

Solutions contrary to policy

Research Science	0%
Development of Application	0%
Business Process	100%
Policy	5%
Covered elsewhere completely	0%
Covered elsewhere partially	0%
To include in Phase 2	0%

This was not discussed in great detail, as it was agreed that this was a Business Process issue that cannot be solved by this study.

GENERAL GUIDANCE

Urban creep

Research Science	90%
Development of Application	95%
Business Process	15%
Policy	10%
Covered elsewhere completely	5%
Covered elsewhere partially	95%
To include in Phase 2	95%

This is a recognised issue across the water industry and Severn Trent Water commissioned an assessment of urban creep on sample catchment for their AMP4 submission. (Details can be found in Jonathan Cutting's paper from the WaPUG Autumn 2003 conference – 13 November 2003.)

The following comments were made regarding urban creep:

1. Urban creep (increasing impermeability) is not currently being considered in FRAs, but it does impact on local flood issues. The scale of this is, however, unknown.
2. There is a need for a broader perspective on flooding (i.e. local drainage as well as river catchment).
3. How do different catchment types respond?
4. FRAs are needed to take account of this at both Master Plan and strategic levels.
5. This issue is linked to the other issues: PPG3 vs PPG25 and infill development.
6. There is a need to assess pinch points in the wider catchment.
7. A position needs to be taken on end density that is precautionary based on usage, etc.

In summary, it was felt that there were a lot of unknowns associated with this issue and there would be benefit to the FRA guidance if this were included in the R&D of this study.

Infill development

Research Science	90%
Development of Application	95%
Business Process	15%
Policy	15%
Covered elsewhere completely	5%
Covered elsewhere partially	0%
To include in Phase 2	95%

As above, increasing density of urban areas (infill development) is not currently being considered and FRAs need to take account of this at both Master Plan and strategic levels. Therefore, it was felt that this could be included in Phase 2 of this study.

Workable definition of a functional floodplain

Research Science	5%
Development of Application	95%
Business Process	15%
Policy	15%
Covered elsewhere completely	0%
Covered elsewhere partially	0%
To include in Phase 2	90%

There is a need for a workable definition of functional floodplain. Associated issues include definitions within Zone 3 and the distinction between theoretical and real risk.

This issue was not discussed in great detail, but it was generally agreed that guidance was required and this could be included in Phase 2 of this study.

Definition of standard of protection

Research Science	0%
Development of Application	95%
Business Process	20%
Policy	10%
Covered elsewhere completely	0%
Covered elsewhere partially	20%
To include in Phase 2	95%

There needs to be a clear definition for standard of protection. There is a need for consistency and a move towards a risk based approach. The definition is particularly crucial if the risk-based approach is to be successful. This is linked to the issue of understanding ‘appropriate’ development and ‘appropriate’ protection.

This issue was not discussed in great detail, but it was generally agreed that guidance was required and this could be included in Phase 2 of this study.

Guidance for practical implementation of SFRA and FRAs

Research Science	85%
Development of Application	100%
Business Process	100%
Policy	15%
Covered elsewhere completely	0%
Covered elsewhere partially	100%
To include in Phase 2	100%

This issue is partially covered by the following projects/initiatives:

- CIRIA RP675: Development & flood risk: Guidance to the construction industry
- W5-074: Preliminary rainfall runoff management for developments
- FLOWS

The following comments were made regarding guidance for SFRA and FRAs:

1. Further guidance on SFRA and FRA is required for practical implementation of the currently available advice, which is considered too generic.
2. Developers currently find that there is inconsistency with what is requested for a FRA.
3. Guidance needs to be fairly prescriptive.
4. Guidance needs to be clear and straightforward.
5. Guidance needs to be appropriate in scale and detail depending on the location.
6. Guidance needs to consider impact/consequences of flooding (risk to people), as consequences are important in determining appropriateness of development.
7. It was generally felt that a lot of the science is already available, but this needs analysis/interpretation to determine the best approaches.

8. There is a need to bring things together in a consistent and robust manner, so that a FRA or the objections to it can withstand a public enquiry.
9. The guidance needs to provide the link between the science and the Business Processes and Policy.
10. As mentioned under IFM and Flood Zone Mapping, there remain major issues with defended areas and what should be taken into account for an SFRA or FRA.
11. A pilot study was suggested as a good means to test out the guidance.
12. The experience in Black Sluice was that the dialogue between stakeholders improved substantially as a result of carrying out the first SFRA, which was a significant benefit in addition to the results of the SFRA itself.

An associated issue is the role of a SFRA compared to a FRA. The following comments were made regarding this issue:

1. What is needed in a SFRA compared to a FRA and how should these be used to make decisions?
2. It was suggested that perhaps the issue is with the use of the term SFRA and having this as a different type of study from a FRA. All studies could be considered as FRAs but at different scales. There was some debate over this.
3. There is concern that different types/levels of FRA do not overlap too much with different information from different people. SFRAs should be tailor made for the requirements of the area being considered and do not need to be 'over the top'.

In summary, guidance for SFRAs and FRAs was considered the single most important need for all stakeholders and, therefore, fundamental to this study.

Climate change for developers

Research Science	15%
Development of Application	95%
Business Process	30%
Policy	30%
Covered elsewhere completely	0%
Covered elsewhere partially	100%
To include in Phase 2	100%

Defra has given guidance, but how to apply the guidance is unclear. There is a need to communicate this guidance and to understand the implications for all stakeholders.

Using some kind of multiplier will result in a larger floodplain, but there is no guidance regarding whether planning decisions should be based on this larger floodplain.

There are also issues associated with the life of the development.

Substantial R&D is underway covering the Science aspects of climate change, but it was generally agreed that there remained a need for developing a method to apply

this. In addition, there are some specific R&D requirements (e.g. short duration rainfall, urban areas, etc.) that are not covered by other initiatives.

There was general agreement that this could be a useful element of Phase 2 of this study, but was not given particularly high priority.

This issue is partially covered by AUDACIOUS. There is also an internal EA guidance document that is currently being developed.

Development near embankments and the risk of breach or failure

Research Science	95%
Development of Application	95%
Business Process	45%
Policy	25%
Covered elsewhere completely	5%
Covered elsewhere partially	95%
To include in Phase 2	100%

There is a need for clear guidelines on the allowable distance for a development behind an embankment (what is considered an appropriate/acceptable level of risk), taking into account height, structure, period of high water, existing developments, trees and undergrowth, etc. Consideration of climate change and the future performance of the embankment should be included in this.

There is a need for tools to facilitate the decision making process. RASP gives information, but cannot make the decisions.

There was general consensus that this is an important issue and was ranked fairly highly for inclusion in Phase 2 of this study.

This issue is partially covered by the R&D project FD2319: *Performance & reliability of flood & coastal defence structures* and the Flood Risk Management Research Consortium Infrastructure Programme.

Sensitivity of floodplains due to pinch points

Research Science	100%
Development of Application	0%
Business Process	0%
Policy	5%
Covered elsewhere completely	0%
Covered elsewhere partially	0%
To include in Phase 2	100%

This was not discussed in great detail, but there was general consensus that Research Science was needed in this field and it could be included in Phase 2 of this study. However, it was ranked low in the priorities.

Impact downstream of a development

Research Science	100%
Development of Application	15%
Business Process	5%
Policy	0%
Covered elsewhere completely	0%
Covered elsewhere partially	0%
To include in Phase 2	100%

This was not discussed in great detail, but there was general consensus that Research Science was needed in this field and it could be included in Phase 2 of this study. This issue was ranked relatively high in the priorities. Regarding the application of the research, it could also be considered as part of the overall need for guidance on SFRAs and FRAs.

AUDIT AND CONTROL

Enforceability of mitigation measures

Research Science	0%
Development of Application	0%
Business Process	100%
Policy	5%
Covered elsewhere completely	0%
Covered elsewhere partially	0%
To include in Phase 2	5%

This was not discussed in great detail, as it was agreed that this was a Business Process issue that cannot be solved by this study, although it was agreed that this was an important issue.

Auditing of final decisions made by LPA/UA

Research Science	0%
Development of Application	0%
Business Process	100%
Policy	0%
Covered elsewhere completely	0%
Covered elsewhere partially	0%
To include in Phase 2	0%

This was not discussed in great detail, as it was agreed that this was a Business Process issue that cannot be solved by this study.

Checking of SFRA and FRAs

Research Science	95%
Development of Application	100%
Business Process	100%
Policy	15%
Covered elsewhere completely	0%
Covered elsewhere partially	0%
To include in Phase 2	100%

The following comments were made regarding checking SFRA and FRAs:

1. This issue is linked to both of the items above (enforceability of mitigation measures and auditing of final decisions). There is concern that Developers believe that a FRA is about producing a document that will be approved by the EA and planning authority and will allow the development to proceed. Once the FRA has been approved there is a risk that it will be filed away never to be referred to again. It is important to establish that a FRA might result in a development not proceeding due to it being inappropriate.
2. There was concern that any guidance produced and the associated checking procedure do not result in a 'hoop hopping' exercise in order to guarantee approval. There should always be a requirement to consider the issues appropriately/genuinely. This requires improved dialogue with developers.
3. At present most FRAs are checked by the EA, as Planning Officers do not have the background, training or experience.
4. There is a need to know how to interpret the results (criteria for EA to accept/not accept development).
5. Guidance is needed regarding the level of detail required in the checks (e.g. auditing models).
6. Any checks should be linked to consideration of the mitigation measures needed to address the risk.
7. The Highways checklist approach might be a good example to follow.
8. There was discussion regarding whether Developers can be expected to be objective and whether they were the best-placed people to carry out the FRAs. The intention would be for the checking process to control this.

In summary, it was generally agreed that this should be a crucial element of this study.

ADDITIONAL ISSUES RAISED

The following are additional issues raised that warrant particular mention. Where consultees raised other issues, these have generally been included in the discussions given above under a relevant topic.

Appropriateness

There is much interest in what ‘appropriate’ actually means. Appropriateness needs to be expressed in terms of risk-based criteria, land use type, flood vulnerability and tolerances and monitoring. There is a need to get away from vague guidance on appropriateness, such as PPG25, and attempt to be more prescriptive.

This is a reoccurring issue that has relevance to all guidance to be produced during this study.

Strategic Environmental Assessment (SEA)

FRAs should form an integral part of SEAs of Regional Spatial Strategies and Local Development Frameworks. SEAs will become statutory in July 2004. CFMPs and SMPs may also be subject to SEA, so the FRA process needs to be sufficiently robust to cope with the new statutory requirements.

Timing of planning decisions and retrospective development issues

Development is happening now based on previous decisions. There is concern over having Developers working to two or more standards. A particular issue is the re-development of existing developed areas.

Catchment boundaries compared to LPA boundaries

This has been discussed under the issue ‘Role of CFMPs vs SFRAs’. It was raised as a specific issue from workshop 1 and should have had its own vote, but got missed off by mistake. If it had been included, this would have been ranked very high and there are clear Development of Application needs that should be addressed as part of this study.

Outputs

Specific comments regarding outputs from this study included the following:

1. Outputs need to be designed to suit the users.
2. Everyone is keen to see sound but simple science.
3. The overall objectives are for clarity, consistency and appropriateness.
4. An interim position is necessary to help guide people as soon as possible, as R&D from other initiatives will take time to come on board.
5. National Regulation Management Group in the EA has produced internal guidance, which needs to be developed for external use. It is currently the best that can be done based on the information currently available. The guidance needs to be integrated into this study.

6. The FRA framework should be a vehicle selector to enable those carrying out the study to tick all of the boxes, but the methods/vehicles selected will depend on the specific requirements of the area/catchment under view.

Pilot Studies

It was suggested that there was a need for pilot studies to look at different types of development (e.g Thames Gateway).

APPENDIX B.5

SUMMARY OF FEEDBACK FROM WORKSHOP 3

FEEDBACK IN OPEN FORUM SESSIONS

Comments relating to Thames Gateway in general

1. Need to ensure the Sequential Test is fundamental in development planning before moving to discussions regarding mitigation.
2. There is still a need to demonstrate that SFRAs are needed.
3. T2100 (Thames Estuary 2100) has a 5 year target, but the Thames Gateway is having to grapple with issues now.
4. A piecemeal approach is inadequate.
5. Some of the core science is not yet available to Development Control. Therefore, they have to ensure developments are on the cautious side. It is recognised that mitigation measure may be more expensive now than they might be in the future, once more accurate assessments of risk are available.
6. When the current boom passes in the housing market, Developers may become less inclined to over-engineer developments due to cost.

General comments

1. When should the Agency simply say ‘no’?
2. What is acceptable risk?
3. There is a need to translate R2P into actual guidance.
4. Need to recognise that the difference between risk to property and risk to people with the concept of acceptability (it’s not just economic consequences).
5. Should CFMPs/SMPs drive SFRAs? Is this realistic recognising that they do not explicitly determine areas for development? They certainly play a role and the importance of CFMPs/SMPs should be clarified by exploring what they deliver in the way of defence strategies, etc.
6. Clarification between the SFRA and FRA should be provided. Suggested difference is as follows:
 - SFRAs determine where development will be permitted (based on the Sequential Test and sustainability requirements) and allow planning constraints to be applied.
 - FRAs come from the pretext that the development will be permitted on the site, but the Developer must demonstrate how that risk will be managed. (Post-meeting note: This will need clarification with the CIRIA guidance as the first 2 levels of the FRA process are based on determining whether the location is appropriate – effectively planning – before moving onto flood risk management.)
7. How can we bring the concepts of Hazard, Area and People, as used in R2P into the framework? This is already provided in the Flood Risk Indicators, but should perhaps be included in the text for assessment processes.
8. It’s important for FD2320 to feed into the Defra ‘Making space for water’ consultation.
9. Are we nearer to answering the question: What level of assessment is needed for an application for a Bungalow immediately behind a defence, versus one a km away from the defence?

General comments on the Activity Chart

1. A sub-regional planning box is needed and SFRA's should sit between sub-regional planning and LDFs.
2. Box 1 is showing more the current situation rather than the best practice situation. Should NaFRA, CFMPs and SMPs be shown to link more closely to SFRA's and FRAs? This links to comment 5 above. They currently look too peripheral.
3. Box 7: How do you know which tier of the assessment will be sufficient, i.e. when can you stop?
4. Box 12: Need to add Habitats directive

SUMMARY OF DISCUSSIONS IN BREAKOUT GROUPS

Ashford case study

1. There is a view that the 'Sustainable Communities' can challenge conventional approaches to development planning with respect to flood risk. We need to try to find a way for the Agency to have a clear standpoint on this.
2. This case study shows that we need to consider alternative process routes, as the Agency will not always have the luxury of starting at the beginning.
3. Setting milestones at key points will help this process, by setting out the minimum requirements at these points before the Agency can allow the process to proceed to the next stage.
4. The Agency needs to stick to its principle requirements, i.e.
 - Has an appropriate assessment been carried out?
 - Is the risk acceptable?
5. For the Agency to be able to stick to its guns, is there a need for the approach to be signed off by government? The view was that this would probably not be likely, but the approach can be presented as the Agency's 'template for sensible thinking' and it would be responsibility of the Planners and/or Developers to suggest an alternative/better way of thinking.

Tripcock Park case study

1. There is still a problem of Planning Applications being granted without FRAs. It still appears to be unclear to DC staff whether the Agency should object in these circumstances.
2. What should be done when the information is not there? Greater emphasis should be put on when to say 'no' due to lack of information.
3. DC staff already know the processes and didn't see the point of the activity chart. (Post-meeting note: Need to work on and highlight benefits in relation to communicating these processes to LPAs and Developers, providing an audit trail for the Agency when decisions come to inquiry, enabling Agency staff to demonstrate why they might say 'no', encouraging best practices and benchmarking within the Agency, etc. etc.)
4. Guidance on acceptability (as presented by Pete Floyd) is what's really needed.
5. The colour coding for the Planning Activities can be confused with the colours in the Assessment Activities.
6. The Assessment Activities are not sufficiently self-explanatory without the guidance from the Planning Activities (which was not available for the workshop).
7. DC staff would be reluctant to wade through the guidance in the Planning Activities, prior to moving on to the Assessment Activities. (Post-meeting note: It was not sufficiently explained that the context of the generic assessment activities will be explained in the relevant guidance e.g. roles and responsibilities related to

planning applications will be contained in T1.4, whether this is the best way of providing the information needs exploring)

8. Roles and responsibilities within the Assessment Activities need to be clearly defined. Showing the parallel processes, etc. was suggested.
9. General feeling of lack of guidance on tidal flooding and development behind defences.
10. Clarity is needed regarding why a Developer should need to assess the risk associated with an Agency defence. (Post-meeting note: Need to explain concept of change in risk and the responsibility being on those changing the risk, as they will need to manage it.)
11. Decision boxes in Process 2a are too ambiguous. (Post-meeting note: Clear links to the CIRIA guidance on FRAs are needed.)
12. Difficulties understanding the context of the Options Appraisal process. (Post-meeting note: probably due to confusion over who is doing what.)

Lower Lea case study

1. S-P-R-C terminology is not accessible for everybody.
2. Decision boxes in Process 2a are too ambiguous.
3. Difficulties understanding the context of Process 3 - Options Appraisal when looking at Outline Planning Application. (Post-meeting note: Clear links to the CIRIA guidance are needed.)
4. Greater guidance/more clarity is needed for Process 4 – Monitoring and Review, particularly from the Agency's viewpoint.
5. Confusion over whether all the Assessment Activities are to be carried out by the Agency.
6. Concern over the relevance of Go to Process 1 in Process 4, as this stops being a Development Control problem. (Post-meeting note: Who's problem does it then become?)

SPECIFIC ACTIONS FROM WORKSHOP

1. Add milestones to the processes.
2. Determine how processes can be picked up, if the planning process has jumped to a later stage.
3. Incorporate the concepts of Hazard, Area and People more fully.
4. Clarify the tiered approach to show when you do not have to proceed to the next level.
5. Add sub-regional planning into the planning process and explain its importance.
6. Define roles and responsibilities for each type of assessment.
7. Map the defence strategy process, so that we can see the full relationships between assessment types and decision-levels.
8. Look at the possibility of testing the processes with case studies.

ADDITIONAL FEEDBACK RECEIVED POST WORKSHOP

Breach scenarios

Positive response regarding the consequences of breaching being developed by the Risks to People project. Remaining concern regarding lack of guidance on probability of breaching. The Agency is often faced with making the key decision on whether to get developers to consider such an event or not. Often the consequences of this choice are huge on pre-application work, development proposals, timescales, and profitability and even 'developability' of the site. The approach could vary from a precautionary one of 'assume a breach will happen in the lifetime of the development' to a more scientific look at the vulnerability of the embayment (perhaps related to fragility). Even a relatively simple approach would be preferable to the present situation.

APPENDIX B.6

MINUTES FROM REVIEW MEETING

Date: Thursday 20th January 2005

Location: HR Wallingford

Attendees: Suresh Surendran, EA (Client Project Manager)
Richard Kellagher, HR Wallingford (HRW Project Director)
Helen Udale-Clarke, HR Wallingford (HRW Project Manager)
Marianne Scott, CIRIA
Mervyn Pettifor, EA
Geoff Gibbs, EA
Rachael Hill, EA
Dave Jones, EA
Matthew Kean, EA
Nick Kennedy, EA
Keith Lead, EA
Grant Moffatt, EA
Ken Moss, EA
Alan Rafelt, EA

Apologies: Robin Bailey, EA
Alison Jones, EA
Roy Loble, EA
Peter Woods, EA

<i>Ref.</i>	<i>Comments</i>	<i>Action</i>
1	Activity Chart	
1.1	Digital version considered a useful navigation tool by those who had used it. A paper version, however, will also always be useful.	
1.2	Replace 'Trade-off Analysis' with 'Evaluate Options', as this provides a broader approach	HUC
1.3	Remove links between NaFRA and SFRA and FRA in the Development Planning and Flood Management Planning diagrams. At present the NaFRA results are not usable at these scales and are unlikely to be so for the foreseeable future.	HUC
1.4	This highlights the need for consistency between the EA and Regional Assembly outputs. During adoption, it would be nice to have regionally bespoke information available behind the framework, such as direct links to RSSs and CFMPs.	
2	D2.1 TOOL1 Flood Risk Indicator Tables	
2.1	Appears more relevant for planning than site-specific FRAs - consider removing reference to FRAs, as the emphasis should remain on the developers to determine which types of flood risk are relevant	HUC
2.2	Check appropriate use of terms 'zone 3' and 'zone 2' for applicability to PPG25 and TAN15 or alternative terms with less ambiguity	HUC
2.3	Concerns remain over it being usable to select indicators (is it too restrictive?), but considered as useful list to check back against and likely to be help when advising LPAs.	
2.4	Table at back of guidance note looks useful and could do with developing.	HUC
3	D2.1 TOOL2 Risks to People Calculator	
3.1	Very useful for development behind defences, but probably would be used less in undefended areas	

<i>Ref.</i>	<i>Comments</i>	<i>Action</i>
3.2	Potentially risky if in the wrong hands, therefore, should availability be restricted? Concerns were raised regarding its availability with the FD2320 Technical Reports. However, the message that needs to be clearly made is that FD2320 has produced a number of tools through the R&D – their suitability and application is yet to be decided. Therefore, anyone choosing to use them would have to justify their application and cannot expect approval.	
3.3	Currently only considers individual risk – inclusion of societal risk would be useful. (Post meeting note: Check Flood Risks to People Project to determine latest situation regarding the potential inclusion of this, either during this project or later.)	HUC
4	D3.5 Flood Risk Assessments	
4.1	Provide hyperlinks in the tables to processes and between tables	HUC
5	S2.3 TOOL Assessment Check-List	
5.1	Unless an appropriate weighting can be incorporated into the scores, remove thermometer	HUC
5.2	Explore the possibility of having a more explicit proceed/do not proceed system	HUC
5.3	Consider alternative wording to OK/Not OK e.g. satisfactory or sufficient	HUC
5.4	During adoption, there will probably be a need to create smaller versions (less questions), but as it stands this is a useful tool to be provided as an output from the project	
6	Trialling of guidance and tools	
6.1	Agreed to trial guidance and tools (in SFRA and FRA contexts) to the best of endeavours by 15 Feb 2005. After this date feedback will be reported, but not acted upon, due to project deadlines.	EA Reg. Eng. & DC staff
6.2	Feedback will be reviewed for science versus EA process and policy issues. It is the science issues that will need inclusion where possible – after having decided what is essential to ensure robustness of deliverables and what can be recommended as further work.	HUC
7	Input into PPS25	
7.1	Rachael and Geoff, who will both be working on providing the ODPM with guidance regarding the content of PPS25, are keen to see FD2320 having a significant input into the technical annex to accompany the planning policy statement.	
8	Communication and Implementation	
8.1	Boundaries need setting regarding what should be disseminated and to whom, e.g. a) Defra and EA staff b) Other government agencies/authorities c) Others	Project Board
8.2	Different levels of detail in the dissemination are required both within and outside the EA.	
8.3	Need to ensure that there is recognition of the distinction at this stage between the R&D report and the adopted view of Defra or the EA (which would come with time)	Project Team
8.4	Need to carefully plan PR and ensure that enquiries can be dealt with appropriately	Project Team
8.5	General feeling was that project outputs would not change what EA DC do on a daily basis, but will provide: a) support/back up regarding science b) improved means of communicating concepts c) improved means of checking approach (systematic) HOWEVER, before determining the adoption approach this needs to be proven.	EA

<i>Ref.</i>	<i>Comments</i>	<i>Action</i>
8.6	Further piloting is needed beyond the end of the project prior to adoption.	EA
8.7	The purpose of the regional dissemination days and the timing of the events still need thought. One option would be for the initial events acting as means to encourage the uptake and Trialling of the outputs, with the goal of adopting them as a work instruction the following year. A separate meeting between MP, MS, HUC and SS will be arranged following on from the Project Board Meeting to discuss the various options in more detail.	MP, MS, HUC & SS
8.8	Need to consider the production of a version for external use in parallel to the EA adoption. (This is beyond the scope of the project.)	EA

APPENDIX B.7

SUMMARY OF FEEDBACK FROM WORKSHOP 4

Project Outputs

1. The project presents a lot of information, not all of which is relevant for all parties. There are concerns over information overload. Particular concern was raised regarding small local developers and architects and individual householders and what it means to them. They couldn't really use the project outputs as they stand.
2. There is an issue regarding 'versions' for different stakeholders to be considered in the adoption of the outputs. At the very least there needs to be a set of scenarios or a route map for different user groups. It would be good to create a front page that would ask questions of the user to determine which information will be relevant to them. This will not be produced as part of the FD2320 project, due to time and budget limitations.
3. It is good news that FD2320 is not reinventing the wheel, but instead provides sign-posts to relevant guidance, etc. The principles of the Generic Approach are fundamentally unchanged from what has gone before. This project is effectively just spelling it out in a logical, transparent way. Therefore, this part of the framework can be considered as tried and tested and has huge potential.
4. PPS25 needs to look at FD2320.
5. Roles and responsibilities and links to statutory requirements could be expanded to 'Duty of care' during development of the policy and process, both of which need developing as part of the implementation process.
6. FD2320 should lead to better decision-making as it's based on a sound process, yet recognises that judgements still need to be made. FD2320 should lead to more consistency and transparency.
7. There was still uncertainty regarding whether FD2320 was providing a clear definition of 'appropriateness'. However, there is a difference between appropriate assessment approach and decision-making (which are the emphasis of this project) and appropriate use of science/technologies (which is being covered partly by FD2320 but also by the FLOWS project on modelling and mapping).
8. There is a risk that the size of the output could be a turn-off. A website and/or CD version looks promising. A CD version would certainly be less frightening. Packaging the guidance into its parts might help. The PR needs to emphasise that it's an aide to existing work and not more work. However, Planners have a lot of different software guidance coming on board at the moment and all with different looks/feels and front ends e.g. planning portal, environmental impact software. (Note: The final TR1 will be a summary report and TR2 will be the full report.)
9. A more user-friendly version of the digital files is needed. There are problems with knowing where to start, printing, saving edited versions, etc. However, it needs to be recognised that this is a demonstration version only. The live system would be best suited as a website.

Communication & Implementation

1. The need for piloting/Trialling is clearly important. Policy and process need to be developed to support the guidance, but some of the guidance and science can

probably be applied sooner rather than later. A review is needed of what can be used as it is.

2. Originally the EA had wanted full dissemination sooner, but now there are concerns over going too far too soon, based on feedback from Regulation Engineers and Development Control suggesting they would feel vulnerable and unable to deal with enquiries. The EA will always be the first point of enquiry. Would the answer be a help desk? A support contract of some kind, similar to what has been set up for MDSF, might be required.
3. Is the problem a resource issue within the EA in briefing the LPAs or is the problem buy-in with EA Development Control, who need to understand where/how it can actually help them?
4. Concerns were raised regarding concentrating efforts within in Environment Agency in isolation and whether this might cause a vacuum. Why can't it go out widely and soon, considering it is consistent with existing guidance, and especially considering PPS25 is due July 2005? Also, this project does not only cover fluvial/coastal flooding, but all types of flooding and, therefore, goes beyond the EA's current responsibilities.
5. LPAs will need to review all of their policies and applications (both Local Development Frameworks and development control) in the light of PPS25. Therefore, it would be beneficial for them to consider FD2320 (or its live version) sooner rather than later (this could potentially be via the Planning Officers Society).
6. There is a risk of an outcry particularly from the LPAs regarding having even more guidance. LPAs are put under a lot of pressure because of the planning delivery grant. Buy-in from LPAs is likely to be variable, with areas with the greatest Zone 3 coverage probably being interested first.
7. LPAs need to play a key part in the Trialling. It is suggested that pilot testing should be carried out with say 3 selected authorities. A 'pilot group' might be a good means to facilitate the piloting and feedback. Friendly LPAs are needed or we need to find LPAs that are currently struggling that we can help out. The EA and Planners should really work together and recognise that it will be an iterative process.
8. Developers need to develop a new way of looking at things. They will need to know what to expect (not just checklists). The Consultants that they use are already used to applying the approach, but it had not been codified before.
9. It will be necessary to identify barriers and opportunities. At the moment there are a lot of competing efforts, but this is resulting in duplication of work.
10. The Trialling process could fit in well with WaND, AUDACIOUS, etc. Therefore, there are opportunities to be taken regarding funding and labour.
11. Perhaps what's needed is a steering group to follow up this project after March. A decision will need to be taken regarding ownership of the trialling, live system, help desk, etc. Then ownership of the review/monitoring system also needs determining.

Research & Development

1. A number of ongoing projects are already looking at policy issues and stakeholders needs, including the FRMRC, FLOWS and a variety of INTERREG projects. The consistency and completeness of this, however, is unclear.
2. There is a need to identify where there is a real need for R&D by checking what's covered already in ongoing projects.
3. High-level planning (national and regional) was suggested as being the area where there will be future challenges to development decisions
4. A distinction needs to be made between future scientific advances and taking the framework forward. Some of the R&D needed does not fall within the areas of traditional science. The future may have less emphasis on new science and more on translating it into practice, although it is recognised that there are particular scientific gaps still requiring R&D.
5. Greater co-ordination of R&D is needed. The unusual feature of this project is that it is much more user orientated than most R&D projects. Perhaps a lesson learnt is that in future when Defra/EA review R&D needs there should be more consultation with stakeholders.
6. Flood resilience/mitigation is a key area requiring improved scientific knowledge.
7. Integrated urban water management is a clear need, as the Defra consultation process 'Making space for water' identified. This puts a potentially wider remit on the application of the project outputs. The results of the consultation should be taken into consideration before future needs are determined.
8. The potential links to the WaND project should be identified, in particular in relation to potential mitigation.
9. The project at present does not cover the economic driver to any significant extent. Does this close the loop? Is this actually a policy issue?
10. Can we get acceptance industry wide? Should we be looking at creating an industry standard or would this stifle innovation? We're probably a long way from preventing innovation, as there will always be a need for judgement.

Appendix C

Communication and Implementation Plan – Supporting Material

- Appendix C.1 Example questions in support of the communication and implementation plan
- Appendix C.2 Example format for communication and implementation plan
- Appendix C.3 Example implementation programmes
- Appendix C.4 Example press release for April 2005
- Appendix C.5 Proposed final news bulletin for April 2005
- Appendix C.6 Project outputs recommended for trialling/pilot testing
- Appendix C.7 Example dissemination (Type 1) presentation (provided in paper version only)
- Appendix C.8 Example demonstration (Type 2) presentation (provided in paper version only)
- Appendix C.9 Example costs for Project Team to carry out further dissemination or demonstration of project outputs
- Appendix C.10 Sample marketing leaflet for introducing the project outputs
- Appendix C.11 Examples of organisations that are involved in disseminating information or training for local planners

APPENDIX C.1

EXAMPLE QUESTIONS IN SUPPORT OF THE COMMUNICATION AND IMPLEMENTATION PLAN

Target audience:

1. Is the target audience list complete/right?
2. How far up the transition curve does each group realistically need to get?
3. Can we feasibly define implementation activities for all these groups?
4. What is the geographical spread of each group?
5. How big is each target audience group?
6. What is the geographical spread of each group?
7. How do skills vary within and across groups?
8. How dynamic are the groups, i.e. fluid or fairly static membership?

Gap analysis:

1. Who on the project team, or from external stakeholder groups, can provide the necessary information for both Environment Agency staff and non-Environment Agency staff?

Culture change:

1. What cultural changes will be required to implement the approach, e.g. dealing with the concept of risk management, both within the Agency and externally?
2. How difficult might these be to overcome?

Business processes:

3. What is the link with the Agency Management System (AMS)?
4. Will the processes supersede existing Agency practices?
5. How will they affect the practices of other stakeholder groups?
6. Who will help define these so that an accurate set of recommendations can be made?

APPENDIX C.2

EXAMPLE FORMAT FOR COMMUNICATION & IMPLEMENTATION PLAN

APPENDIX C.2 EXAMPLE FORMAT FOR COMMUNICATION & IMPLEMENTATION PLAN

Activities	To whom?														When?													
	Environment Agency Staff					General non-Environment Agency staff	Non-Environment Agency staff									2005												
	Process and Operational Managers	Regulation Engineers	Planning Liaison Officers	Development Control Officers	Flood risk policy Managers		ODPM	Defra	Local Authority Planning Officers	Regional Assemblies and Development Agencies	Internal Drainage Boards	Developers	Insurance industry	Consultants	R&D Community	pre-March	March	April	May	June	July	August	September	October	November	December		
AWARENESS																												
1 Stakeholder Workshops		X	X	X	X		X	X	X	X	X	X		X	X	X												
2 Project Board Meetings		X			X			X	X					X	X	X												
3 News bulletins to project contacts	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X											
4 Review meeting with EA practitioners		X	X	X	X											X												
5 Announcements through publications						X											X											
6 Papers at conferences						X														X								
7																												
8																												
UNDERSTANDING																												
9																												
10																												
11																												
12																												
TRIALLING																												
13																												
14																												
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APPENDIX C.3

EXAMPLE IMPLEMENTATION PROGRAMMES

STAGE	ACTIVITIES	When?																												
		2005												2006																
		February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July											
1	Environment Agency-led approach Awareness raising for all stakeholders																													
2	Pilot group trials																													
3	Development of EA policy and practice Development of live system (incl. refinements to framework, guidance and tools)																													
3	Adoption within the EA EA internal training																													
4	Further, more detailed awareness raising for all stakeholders Nation-wide adoption (incl. development of non-EA policies and practices)																													
5	Ongoing support Monitoring and Review Refinements as required																													
1	Simultaneous roll-out approach Awareness raising for all stakeholders																													
2	Pilot group trials Development of EA policy and practice Development of non-EA policies and practices																													
3	Development of live system (incl. refinements to framework, guidance and tools) Nation-wide adoption																													
4	Ongoing support Monitoring and Review Refinements as required																													

APPENDIX C.4

COMMUNICATION ACTIVITIES

1. CIRIA project webpage

Flood risk assessment guidance for new development (CON121)

[Defra/Environment Agency project number FD2320]

This project has developed a science and risk-based framework for a nationally consistent approach to assessing and managing flood risk for new development across England and Wales. This has been achieved by integrating and simplifying existing guidance documents (including CIRIA's *Development and flood risk – guidance for the construction industry (C624)* (please make this name a link to the C624 project webpage) and the latest findings from an extensive range of research projects.

The project outputs define what is an appropriate assessment of flood risk for use at all scales of development planning (from national scale planning policy decisions to individual planning applications) and for all types of development. A consistent approach for flood risk management of new development is also included.

Caution: The project has produced outputs designed with a number of different end users in mind (including the Environment Agency, Local Planning Authorities, Regional Assemblies and Developers). At present, the framework and guidance should only be considered as R&D outputs; they do not represent the policies of either Defra or the Environment Agency. The project outputs need to be tested further and parallel policies and practices need developing by the relevant stakeholder groups. However, practitioners should still find the best practice guidance and tools useful in explaining the concepts, indicators and the framework and this is being encouraged, but this will not prevent assessments from being challenged by regulators and their advisors.

Project status

The project started in December 2003 and completed in March 2005. [Click here for the latest project newsletter](#). Project deliverables are available via the Defra/Environment Agency joint flood and coastal management R&D website. [Click here for project deliverables](#).

Project funders

The project was delivered as part of the joint Defra/Environment Agency R&D programme for flood and coastal defence, under the theme of Risk Evaluation and Understanding Uncertainty.

Research partners

This project was led by HR Wallingford. CIRIA and CEH Wallingford were project partners.

Contact

For information on the project, please contact Helen Udale-Clarke (Contract Project Manager) of HR Wallingford on +44 (0)1491 822 325, h.udale-clarke@hrwallingford.co.uk or Dr. Suresh Surendran (Client Project Manager) of Environment Agency on +44 (0) 1925 653 999, suresh.surendran@environment-agency.gov.uk. CIRIA's Project Manager was Marianne Scott.

2. CIRIA flooding website

A link to the project webpage, see point 1, will be added to the CIRIA flooding website at the time the FD2320 webpage goes live.

3. CIRIA Highlights, fortnightly e-newsletter

*“Flood risk assessment guidance for new development has developed a science and risk-based framework designed to enable a consistent approach to the assessment and management of flood risk for new development across England and Wales. The framework (including guidance and tools) has been achieved by integrating and simplifying existing guidance (including CIRIA’s *Development and flood risk – guidance for the construction industry (C624)*) and the latest findings from an extensive range of research projects.*

The project outputs define an appropriate assessment of flood risk for all scales of development planning and for all types of development. A consistent approach to flood risk management of new development is also included.”

The announcement will be included in the 21 April e-newsletter.

4. Evolution, CIRIA’s published quarterly magazine

*This has already been done. A short mention of FD2320 was included in an article about CIRIA project RP676 *Standards for the repair of buildings following flooding*. It will be published in June.*

5. Press release

*“Defra and the Environment Agency announce the completion of the R&D project *FD2320 Flood risk assessment guidance for new development*. The project has developed a science- and risk-based framework for a nationally consistent approach to assessing and managing flood risk for new development across England and Wales. This has been achieved by integrating and simplifying existing guidance documents and the latest findings from an extensive range of research projects. The proposed framework will not be implemented immediately. The project outputs need to be tested and parallel policies and practices need developing by the relevant stakeholder groups. However, practitioners should still find the best practice guidance and tools useful in explaining the concepts and the science and this is being encouraged, Project outputs are available via the Defra/Environment Agency joint flood and coastal management R&D website <insert link>.”*

6. Marketing leaflet

Prepared by HR Wallingford and provided separately.

7. HR Wallingford targeted email announcement with final News Bulletin

Prepared by HR Wallingford and provided separately. This will be sent out once the Final Draft documents are present on the HR Wallingford website (early April).

8. CIRIA targeted email announcement

This will be done after the HR Wallingford announcement, see point 7 above.

8. Defra conference short paper

This has already been submitted by HR Wallingford and the Environment Agency and accepted by Defra.

9. Research Focus magazine

CIRIA is looking into the possibility for what can be included in this magazine in April or subsequently.

APPENDIX C.5

PROPOSED FINAL NEWS BULLETIN FOR APRIL 2005

The following is proposed as the final news bulletin to be distributed by email to the current project communication list. This list includes all of those involved in the consultation activities and those who have expressed an interest in the project but were unable to be involved in the consultation.

FD2320 - Flood Risk Assessment Guidance for New Development

News Bulletin – April 2005

The FD2320 project is part of the joint Defra/EA R&D Programme for Flood and Coastal Defence, under the theme of Risk Evaluation and Understanding Uncertainty. The purpose of FD2320 was to provide an overarching framework and associated guidance on the assessment of flood risk and the management of that risk to assist with the regulation and planning of new developments in England and Wales. This involved defining what an appropriate assessment of flood risk should be at all scales of development planning (from national scale assessments to individual planning applications) and all types of development. This also included a consistent approach and appraisal methodology for flood risk management of new development.

The project had two Phases:

- Phase 1 consisted of a review of current policies, processes and science; consultation with practitioners and other stakeholders; and production of a detailed scope for Phase 2. This process started in December 2003 and resulted in an Interim Report, which was completed by August 2004.
- Phase 2 consisted of providing the framework, guidance and tools for assessing flood risk, based on the assessed needs in Phase 1. This started in June 2004 and was completed March 2005.

The project deliverables are intended to:

- Enable users to carry out activities in a timely manner reducing duplication of work, by using outputs from existing assessments of flood risk (where possible) and by including timely links to flood defence and environmental strategies.
- Enable users to communicate the assessment and decision-making processes to stakeholders in a transparent and unambiguous manner, through both reporting and auditing mechanisms.
- Enable monitoring and review of processes, decisions and flood risk to improve practices and implementation of the framework in the future.
- Be an evolving tool for users to incorporate lessons learnt, new research and development and new legislation as and when it comes on-line.

This has been achieved by integrating and simplifying existing guidance documents and the latest findings from an extensive range of research projects. Central to the framework is a Generic Approach to assessing and managing flood risk, which can be applied at any scale of decision-making. A simplified version of this is provided on the next page.

At the present time, the project outputs should only be considered as R&D recommendations; they do not represent the policies of either Defra or the EA. However, the best practice guidance and tools are useful to support practitioners' decision making processes and this is being encouraged. The project outputs need to be tested further and parallel policies and practices need developing by the relevant stakeholder groups. This was outside of the scope of the project.

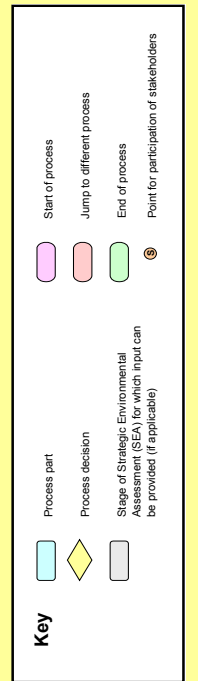
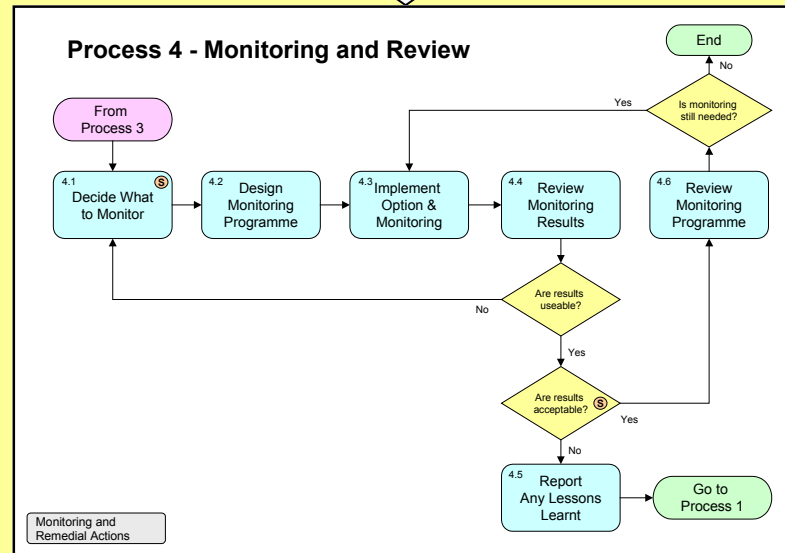
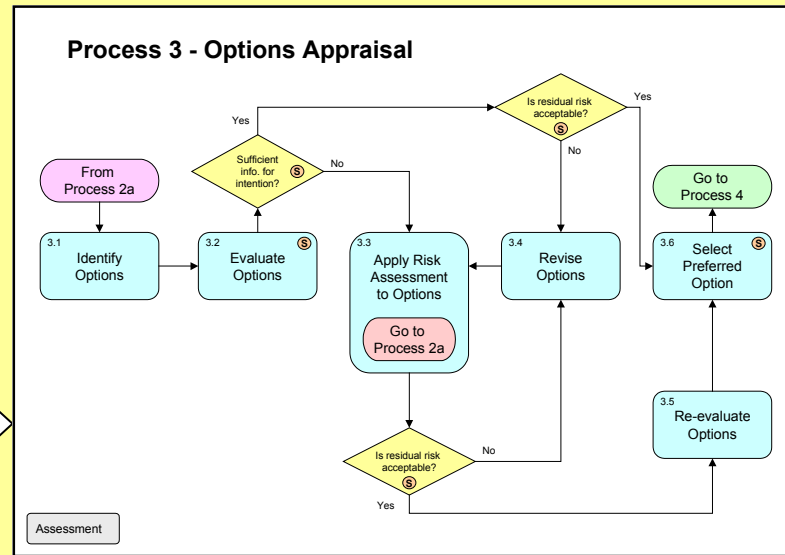
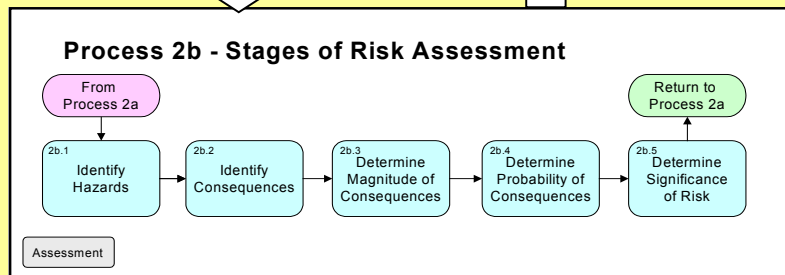
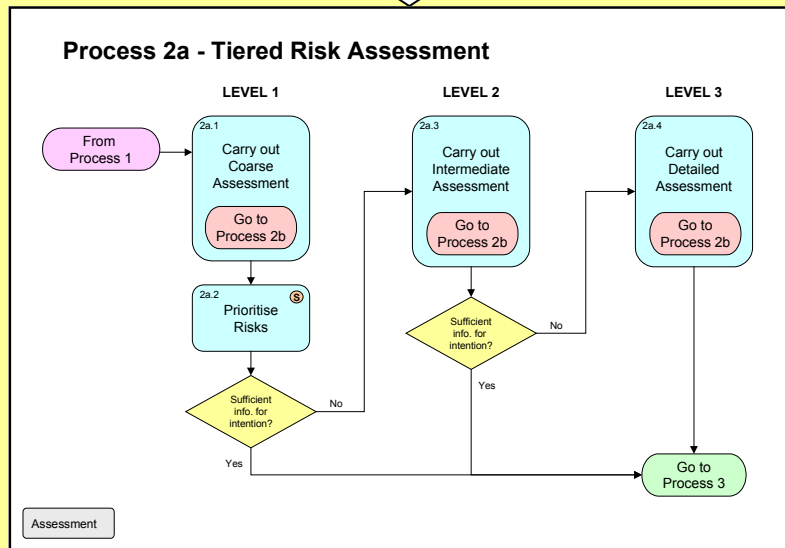
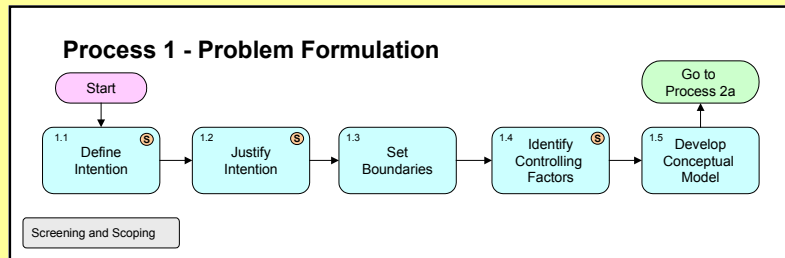
The Project Team would like to take this opportunity to thank the Project Board and those who participated in the consultation exercises during Phases 1 and 2 for their invaluable contribution to the success of the project.

Project outputs will be available shortly via the Defra/Environment Agency joint flood and coastal management R&D website. In the meantime these can be found at http://www.hrwallingford.co.uk/projects/flood_risk_assessment/index.html

If you would like to know more, you can contact Dr. Suresh Surendran (Client Project Manager) at suresh.surendran@environment-agency.gov.uk or Helen Udale-Clarke (Contractor Project Manager) at hud@hrwallingford.co.uk.

R&D OUTPUTS: FRA GUIDANCE FOR NEW DEVELOPMENT: PHASE 2 FD2320/PR1

Generic Approach to Assessing and Managing Flood Risk for New Development



APPENDIX C.6

PROJECT OUTPUTS RECOMMENDED FOR TRIALLING/PILOT TESTING

The following recommendations are made regarding what should be tested. At this stage no distinction is made between the reasons for testing, i.e.

- to provide credibility and buy-in from stakeholders
 - to confirm the appropriateness of the results, or
 - to check usability
1. Application of the Generic Approach, in particular
 - a) to assist with sub-regional planning and local development frameworks (probably via SFRAs)
 - b) by both decision-makers and those undertaking the assessments (in parallel)
 - c) to work more closely with the flood management planning and sustainability appraisal processes
 - d) to initiate stakeholder engagement at appropriate times (linked to Guidance Note S2.4)
 - e) to assess brownfield development (linked to Guidance Note S3.4)
 - f) to assess appropriate mitigation measures (linked to Guidance Note S3.5)
 - g) to encourage the consideration of appropriate monitoring and review mechanisms (Process 4 – Monitoring and Review)
 2. Use of the guidance and tables on flood risk indicators (Guidance Note D2.1 and D2.1 TOOL1), in particular to assist the EA in providing advice to regional or local planners regarding
 - a) scoping assessments (Process 1 – Problem Formulation) and then
 - b) to determine whether a more detailed assessment is required (Process 2a – Tiered Risk Assessment)
 3. Application of the flood risks to people calculator (D2.1 TOOL2), in particular
 - a) Whether it produces realistic results in a range of circumstances¹⁸
 - b) Whether it is easy populate with data
 - c) Whether it is easy to use, etc.

¹⁸ For example, it is not advisable to apply the calculator for determining ‘acceptability’ of risk for development that is defended up to a very high return period standard (very low probability of inundation) as there is not a recognition of the ‘significance’ of the risk.

4. Use of the milestones and minimum requirements presented in the guidance on site-specific FRAs, in particular to assist the EA in ensuring that developers and LPAs carry out the decision-making processes in the appropriate order
5. Application of the principles of audit and control (Guidance Note S2.3) and use of the checklist (S2.3 TOOL), which is likely to require modifications for particular stakeholder needs
6. Application of the guidance on development behind defences in Guidance Note S3.2 Risk to People Behind Defences, in particular
 - a) the simple approach
 - b) the intermediate approach¹⁹
7. Application of the guidance on safe access and exit in Guidance Note S3.3
8. Use of the digital versions of the Activity Chart, Information Chart and supporting documents as a demonstration of the potential for a web-based tool, in particular to determine
 - a) Whether it makes the framework, guidance and tools more navigable than a paper system
 - b) Whether it is less daunting for those being trained or using it than a paper system
 - c) Whether users learn more quickly
 - d) Whether it encourages more use of other R&D outputs and other cross-references, as the links are provided
 - e) What add-ons could be provided to increase usability
 - f) Whether bespoke versions are needed for different user groups

¹⁹ The detailed approach is already being applied and therefore does not need testing.

APPENDIX C.7

EXAMPLE DISSEMINATION PRESENTATION

ONLY AVAILABLE IN THE PAPER VERSION OF THIS REPORT

APPENDIX C.8

EXAMPLE DEMONSTRATION PRESENTATION

ONLY AVAILABLE IN THE PAPER VERSION OF THIS REPORT

APPENDIX C.9

EXAMPLE COSTS FOR PROJECT TEAM TO CARRY OUT FURTHER DISSEMINATION OR DEMONSTRATION OF PROJECT OUTPUTS

The following costs are based on Type 1 or Type 2 events only. These being:

- Type 1 - Simple dissemination of the project outputs, or
- Type 2 - More detailed demonstration of project outputs to enable pilot testing/trialling to be undertaken.

Full training of practitioners (Type 3), which would be carried out once the pilot testing/trialling has been undertaken and the policies and processes to support the framework are in place, cannot be scoped until these activities have been completed. Further details can be found in Section 6.4.7 of this report.

Costs per event (Type 1 or Type 2)

- | | |
|--|-------|
| 1. Daily rate per speaker | *£600 |
| 2. Travel costs per speaker (estimate only) | £75 |
| 3. Overnight accommodation and subsistence per speaker (estimate only) | £100 |

Overnight accommodation would only be required for distant venues. Assuming the events would take place at the EA's region offices, this would apply to events held at Warrington, Leeds, Cardiff or Exeter.

Additional costs for Type 2 events

Type 2 events would require preparation above and beyond the material already provided by the project. Therefore, the following one-off costs would be incurred.

- | | |
|---|--------|
| 1. Preparation of workshop material, including: | *£1200 |
| ▪ Presentations | |
| ▪ Demonstration Exercises | |
| ▪ Handouts | |
| 2. Workshop materials printing and packaging (assuming 30 delegates max.) | £500 |

Therefore, the overall cost of carrying out a series of Type 2 events will depend on how many events are carried out and where.

* This cost has increased by 4% from those suggested earlier in the project, due to new rates being applied for the 2005-06 financial year.

It should be noted that these costs do not include any of the logistical activities associated with running these events, such as:

- Booking and paying for venues
- Booking and paying for catering
- Inviting delegates
- Sending out material prior to the event

APPENDIX C.10

SAMPLE MARKETING LEAFLET FOR INTRODUCING THE PROJECT OUTPUTS

Project Outputs

These include the framework, guidance (see below) and associated tools. At present, these should be considered as R&D recommendations only; they do not represent Defra or EA policies. However, practitioners should still find the best practice guidance and tools useful to support decision-making.

Decision Guidance

What's needed for development planning?

- D1.1 National Development Planning
- D1.2 Regional Spatial Strategies
- D1.3 Local Development Frameworks
- D1.4 Planning Applications

Which indicators can be used?

- D2.1 Flood Risk Indicators

Which type of assessment can be used?

- D3.1 National Flood Risk Assessments
- D3.2 Catchment Flood Management Plans
- D3.3 Shoreline Management Plans
- D3.4 Strategic Flood Risk Assessments
- D3.5 Flood Risk Assessments

Support Guidance

How to navigate the framework

- S1.1 Introduction to the Framework
- S1.2 How to use the Activity Chart
- S1.3 How to use the Information Chart
- S1.4 Glossary and Abbreviations

How to manage the assessment processes

- S2.1 Reporting
- S2.2 Information Management
- S2.3 Auditing and Control
- S2.4 Stakeholder Engagement
- S2.5 Linkage to Statutory Requirements

Key issues

- S3.1 Climate Change
- S3.2 Risk to People behind Defences
- S3.3 Safe Access and Exit
- S3.4 Brownfield Development
- S3.5 Mitigation Measures

Efficiency

Enables users to carry out activities in a timely manner reducing duplication of work, by using outputs from existing assessments (where possible) and by including timely links to flood defence and environmental strategies.

Effectiveness

Enables users to communicate the assessment and decision-making processes to stakeholders in a transparent and unambiguous manner, through both reporting and auditing mechanisms.

Evolution

Enables monitoring and review of processes, decisions and flood risk to improve practices and implementation of the framework in the future. Designed as an evolving tool for users to incorporate lessons learnt, new research and development and new legislation as and when it comes on-line.

Project Details

Research project FD2320 was funded by Defra, within the Risk Evaluation and Understanding of Uncertainty Theme of the combined Defra/Environment Agency flood management research programme.

The project was delivered by HR Wallingford with sub-contractors CIRIA and CEH Wallingford.

For further information you can contact:
Helen Udale-Clarke (Contract Project Manager) at h.udale-clarke@hrwallingford.do.uk, or
Dr Suresh Surendran (Client Project Manager) at suresh.surendran@environment-agency.gov.uk.
Alternatively visit the Defra/EA flood and coastal management R&D website <insert web address>

Framework for Assessing and Managing Flood Risk for New Development

The Project

The Defra/EA R&D Project FD2320 has developed a science and risk-based framework designed to enable a consistent approach to the assessment and management of flood risk for new development across England and Wales.

The project developed this framework by simplifying existing processes, guidance and tools and integrating these with the latest findings from other research projects.

At the core of the framework is a generic approach (see inside) that can be applied at all decision scales.

This is based on the *Guidelines for Environmental Risk Assessment and Management* (DETR *et al*, 2000)

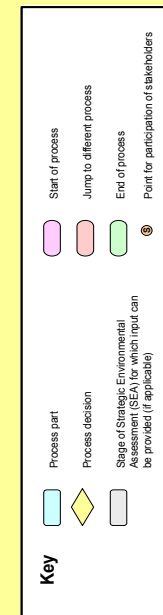
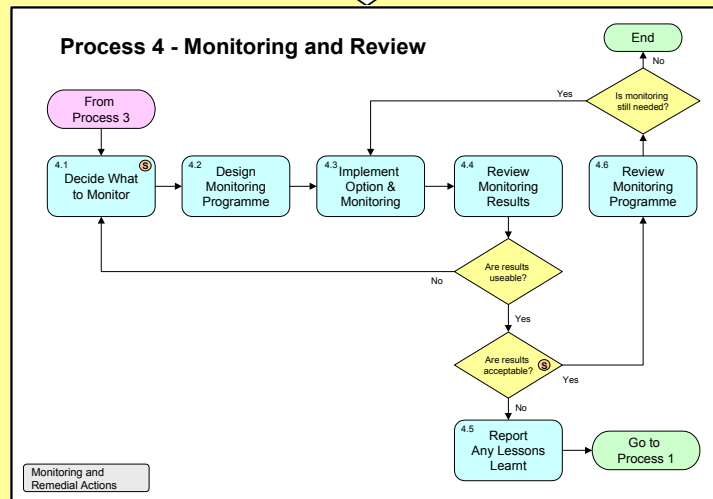
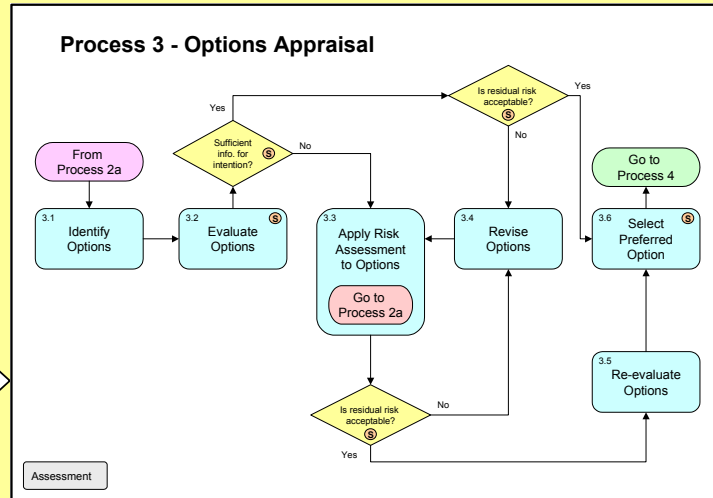
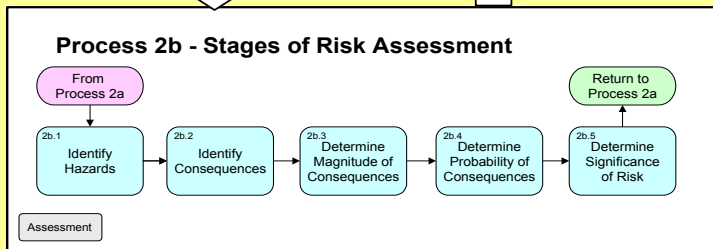
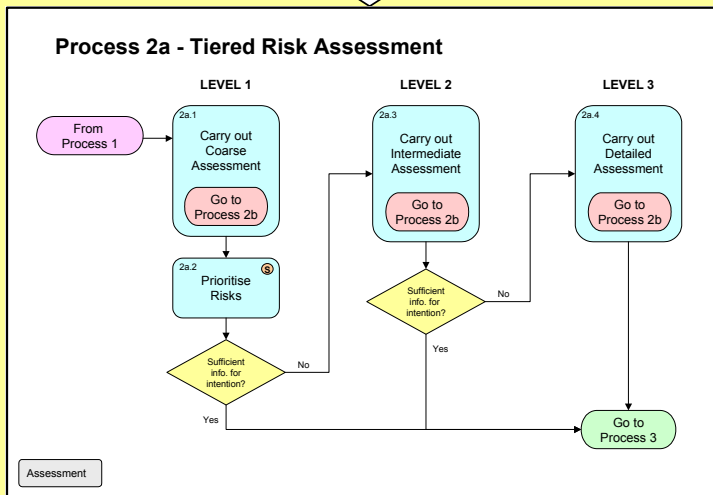
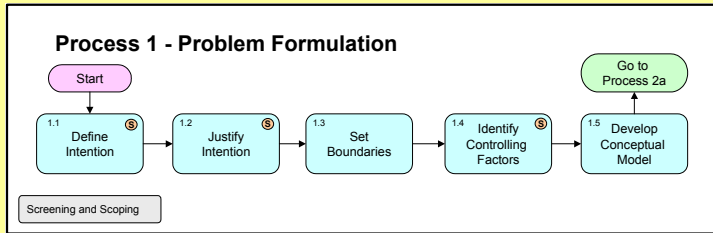
The Future

It is intended for the guidance to be updated as new science becomes available. This can be provided within the new framework, ensuring users are always accessing the latest information.

The project outputs are currently being developed into appropriate policies and practices by stakeholders groups.



Generic approach to assessing and managing flood risk for new development



APPENDIX C.11

EXAMPLES OF ORGANISATIONS THAT ARE INVOLVED IN DISSEMINATING INFORMATION OR TRAINING FOR LOCAL PLANNERS

Royal Town Planning Institute (RTPI) <http://www.rtpi.org.uk/>

The RTPI's activities include:

- Publishing a weekly paper called 'Planning' that is distributed to all of the planning community.
- Producing regional newsletters.
- Providing local and web-based networks for CPD.
- Running conferences.

Town and Country Planning Association <http://www.tcpa.org.uk/>

The T&CPA is a planning pressure group/interest group that campaigns for the reform of the UK's planning system to make it more responsive to people's needs and to promote sustainable development. The association produces a monthly magazine 'Town and Country Planning'.

Planning Summer School <http://www.planningsummerschool.org/>

The summer school is held annually in September. (The Councillors Summer School is held the week before.) It should be noted that this is not part of the RTPI, but is technically a separate organisation.

Planning Officers Society <http://www.planningofficers.org.uk/>

(Formerly the District Planning Officers Society and the County Planning Officers Society)

Local Government Association <http://www.lga.gov.uk/>

The LGA generally assists and liaises with Local Authorities across all of their functions.

Individual Local Planning Authorities

Contact or selection of appropriate LPA involvement could be made through the following channels:

- The EA's development control contacts
- Those LPAs currently with a need to complete SFRAs
- Those LPAs currently involved in other R&D pilot studies, such as Bradford City Council and the AUDACIOUS project

Appendix D

Monitoring and Review Plan – Support Material

Table D.1 Potential Performance Indicators: Summary Details

Table D.2 Potential Performance Indicators: Information Management Details

Table D.3 Existing EA Flood Risk Management Performance Indicators

Table D.1 Potential Performance Indicators: Summary Details

Category	Questions	Reference	Potential Indicators	Level of Planning Process				Scale of Assessment				Required Trend	Target	Target Timescale (years)	Existing Indicators (see Table 3)	Possible Actions				Comments
				National	Regional	Local	Site	NaFRA	CFMP or SMP	SFRA*	FRA*					Framework	Training	Information	Links	
Time	Are decisions made within the required deadline?	1	% within deadline				●	○	○			Increase	100%	2		●	●	●	●	
	Is advice provided within the required deadline?	2	% within deadline	○	●	●	●			●	●	Increase	100%	2		●	●	●	●	
	Are less hours spent in total on consultation?	3	Average time per consultation	○	●	●	●			●	●	Decrease				●	●	●	●	
	Are less hours spent on the analysis (or its review)?	4	Average time per consultation					●	●	●	●	Decrease				●	●			●
	Are less hours spent finding information?	5	Average time per consultation					●	●	●	●	Decrease							●	
	Does less time elapse before making decision?	6	Average time per consultation				●		○			Decrease								●
Cost	Are salary costs for the total process less?	7	Total salary cost per year	○	○	●	●	○	○	●	●	Decrease	£10m		13a	●	●	●	●	
		8	Average salary cost per consultation	○	○	●	●			●	●	Decrease				●	●	●	●	
	Are less costly solutions found?	9	Capital expenditure/number of properties protected			○	○		○			Decrease	£15K per property	5	12					●
		10	Actual capital expenditure/planned capital expenditure per project			○	○		○			Decrease			17					●
Approach	Is an appropriate approach adopted?	11	% of EA planning liaison and development control teams using the framework			●	●			●	●	Increase	100%	2				●	●	
		12	% of planning authorities using the framework			●	●			●	●	Increase	100%	3				●	●	
		13	% of appropriate applications decided using Standing Advice				●				●	●	Increase	100%	3				●	●
Science	Is appropriate science used?	14	% score from framework check list regarding science					●	●	●	●	Increase	100%	1		●	●	●		
	Has the precautionary principle been applied?	15	% score from framework check list with regard to the precautionary principle	●	●	●	●					Increase	100%	1		●	●	●		
Decisions	Are EA objections sustained by planning authorities?	16	% objections sustained		●	●	●					Increase	100%	3	1			●	●	
	How many objections are mitigated by appropriate flood management measures?	17	% objections mitigated			●	●					Increase	100%	3				●	●	
	How many EA decisions match EA policy?	18	% decisions match policy				●					Increase	100%	1		●	●	●	●	
	Does EA advice match EA policy?	19	% advice match policy	○	●	●	●					Increase	100%	2		●	●	●	●	
Risk	What proportion of properties are within flood risk zones?	20	% properties in flood risk zones 2 and 3	●	●	●	●					Decrease		5					●	
	What proportion of properties within flood risk zones have appropriate protection?	21	% properties in flood risk zones that are defended to the required standard of protection	●	●	●	●					Increase	100%	5	4a, 4b					●
	What proportion of properties within flood risk zones have appropriate flood warning?	22	% properties in flood risk zones that meet flood resilience standards	●	●	●	●					Increase	100%	5						●
		23	% properties in flood risk zones are covered by effective action plans	●	●	●	●					Increase	100%	5	2, 2a					●
	24	% properties in flood risk zones that receive Agency approved flood warning service	●	●	●	●					Increase	100%	5	3, 3a					●	

● indicator suitable, ○ indicator could be used, but less suitable *this is an external assessment, so reference here is to the Agency's role of reviewing the assessment rather than carrying out the assessment

Table D.2 Potential Performance Indicators: Information Management Details

Ref	Performance Indicators	Information/Data Source	Potential problems obtaining data	Responsible Groups											Information Management Details							
				Policy	Strategy Planning	Capital Works	Operation & Maintenance	Flood Event Management	Planning Liaison	Development Control	Research & Development	Customer Service	Planning Authorities	Developers	Public	Is the data available? (Y/N)	Is the data accessible? (Y/N)	Is the data accurate? (Y/N)	How often is the data updated? (months)	How often should the data be collected? (months)	How often should the PI be calculated? (months)	
1	% decisions within deadline	Record of time out compared to deadline									●											
2	% advice within deadline	Record of time out compared to deadline								●	●		●									
3	Average total hours per consultation	Timesheet bookings								●	●			○	○							
4	Average hours spent on the analysis (or its review)	Sub-division of timesheet bookings	Information probably too detailed to obtain							●	●			○	○							
5	Average hours spent on finding information	Sub-division of timesheet bookings	Information probably too detailed to obtain							●	●											
6	Average time elapsed before decision	Record of time in and time out								●	●			○	○							
7	Total salary cost per year	Timesheet bookings		●	●					●	●			○	○							
8	Average salary cost per consultation	Timesheet bookings								●	●			○	○							
9	Capital expenditure/number of properties protected	Mapping and NFCDD			●	●								●	●							
10	Actual capital expenditure/planned capital expenditure per project	Capital programme			●	●								●	●							
11	% of EA planning liaison and development control teams using the framework	Request direct to EA planning liaison and development control teams								●	●											
12	% of planning authorities using the framework	Request direct to planning authorities	Obtaining info. from planning authorities							●				○								
13	% of appropriate applications decided using Standing Advice	Development control teams records	Obtaining info. from planning authorities								●			○								
14	% score from framework check list regarding science	Completed check lists	Requires check lists to be completed		●					●	●	○										
15	% score from framework check list with regard to the precautionary principle	Completed check lists	Requires check lists to be completed		●					●	●											
16	% objections sustained	Development control teams records	Obtaining info. from planning authorities								●			○								
17	% objections mitigated	Development control teams records									●			○	○							
18	% decisions match policy	Development control teams records									●											
19	% advice matches policy	Planning liaison and development control teams records								●	●											
20	% properties in flood risk zones 2 and 3	Mapping and NFCDD		●	●					●				○								
21	% properties in flood risk zones that are defended to the required standard of protection	Mapping and NFCDD		●	●					●				○	○							
22	% properties in flood risk zones that meet flood resilience standards	Mapping and NFCDD	Obtaining info. from planning authorities								●			○	○							
23	% properties in flood risk zones are covered by effective action plans	Mapping and NFCDD	Obtaining info. from planning authorities						●					○	○	○						
24	% properties in flood risk zones that receive Agency approved flood warning service	Mapping and NFCDD							●					○								

● primary responsibility (regarding both data collection and an indication of performance), ○ secondary responsibility, i.e. if this group operates best practices then it will contribute to an improved performance

Table D.3 Existing EA Flood Risk Management Performance Indicators

No.	Name (short name in bold)	Relevant Framework Element(s)	Responsible Groups											Information Management Details*									
			Policy	Strategy Planning	Capital Works	Operation & Maintenance	Flood Event Management	Planning Liaison	Development Control	Research & Development	Customer Service	Planning Authorities	Developers	Public	Is the data currently available? (Y/N)	If available, is the data accessible? (Y/N)	If available, is the data accurate? (Y/N)	How often is the data updated? (months)	How often should the data be collected? (months)	How often should the PI be calculated? (months)			
1	Improve the regulation and management of flood defence through working with local planning authorities in relation to development on the flood plain. (objections to major development sustained)	S2.3 Audit and control																Y	Y	Y	3	3	3
2	Increase the percentage of people in the floodplain who receive an appropriate flood warning service and take effective action to help themselves and reduce flood damage (ENGLAND)	S2.4 Stakeholder participation					●											Y	Y	?	?	?	12
2a	Increase the percentage of people in the floodplain who receive an appropriate flood warning service and take effective action to help themselves and reduce flood damage (WALES)	S2.4 Stakeholder participation					●											Y	Y	?	?	?	12
3	Improve the proportion of properties (homes and businesses) within the indicative floodplain that have been offered an appropriate flood warning service (ENGLAND)	4.1 Decide what to monitor D2.1 Flood risk indicators (FRI 27)					●											Y	Y	?	?	?	12
3a	Improve the proportion of properties (homes and businesses) within the indicative floodplain that have been offered an appropriate flood warning service . (WALES)	4.1 Decide what to monitor T3.1 Flood risk indicators (FRI 27)					●											Y	Y	?	?	?	12
4a	Increase the number of houses which benefit from reduced flood risk (ENGLAND) as a result of Capital Improvement schemes funded by GiA	3.2 Trade-off analysis D2.1 Flood risk indicators (FRI 26)		●														Needs minor changes	Y	?	?	?	12
4b	Increase the number of houses which benefit from reduced flood risk (ENGLAND) as a result of Capital Maintenance schemes funded by GiA	3.2 Trade-off analysis D2.1 Flood risk indicators (FRI 26)				●												Needs minor changes	Y	?	?	?	12
5	Decrease the proportion of major infrastructure within the floodplain that are at risk of not being available for its intended use at times of flood.	3.2 Trade-off analysis						●										N	-	-	?	?	12
6	Decrease the proportion of major environmental assets within the floodplain that is at risk of being damaged by flooding.	1.4 Identify controlling factors		●														N	-	-	?	?	12
7	Produce Catchment Flood Management Plans (CFMPs) for all principal catchments in England in accordance with Defra guidance	D3.2 Catchment Flood Management Plans		●														Needs minor changes	Y	?	?	?	12
8	Increase the proportion of urban flood defence structures and linear defences in good condition or better .	D2.1 Flood risk indicators (FRI 25)				●												Y	Y	?	?	?	12
9	Reduce the proportion of urban flood defence structures and linear defences in poor condition or worse .	D2.1 Flood risk indicators (FRI 25)				●												Y	Y	?	?	?	12
10	Create areas of new potential BAP habitats as a result of flood management activities (saltmarsh, mudflat & other)	1.4 Identify controlling factors		●		●												Partially	Partially	?	?	?	12
11	Optimising economic return from relevant Flood Risk Management activities (Net present value)	3.2 Trade-off analysis		●	●													Partially	Partially	?	?	?	12
12	Improving the effectiveness and efficiency of investment in asset management (Cost per property)	3.2 Trade-off analysis		●	●													Partially	Partially	?	?	?	12
13a	Improve efficiency by reducing the cost of decision-making and overheads and savings from procurement best practice	<i>This does not relate to a framework element, but is the closest indicator for measuring the success of this project.</i>		●	●													?	?	?	?	?	?
13b	As part of the above target, reduce the cost of developing and implementing capital flood defence schemes (% of total relevant costs)	Not relevant to this project			●													Partially with minor changes	Partially	?	?	?	12
14																							

*Information obtained from draft Smart Targets review

Table D.3 Existing EA Flood Risk Management Performance Indicators continued

No.	Name (short name in bold)	Relevant Framework Element(s)	Responsible Groups											Information Management Details*							
			Policy	Strategy Planning	Capital Works	Operation & Maintenance	Flood Event Management	Planning Liaison	Development Control	Research & Development	Customer Service	Planning Authorities	Developers	Public	Is the data currently available? (Y/N)	If available, is the data accessible? (Y/N)	If available, is the data accurate? (Y/N)	How often is the data updated? (months)	How often should the data be collected? (months)	How often should the PI be calculated? (months)	
15	Reservoir safety	2b.1 Identify hazards				●									Y	Y	?	?	?	3	
16	Availability of flood warnings	See 3 and 3a					●								Y	Y	?	?	?	12	
17	Flood Risk Management Capital Programme Implementation (% planned compared to actual spend)	This does not relate to a framework element, but could measure the success of this project.			●										Y	Y	?	?	?	3 cum.	
18	Length in km of COWs submitted to Defra/WAG for enmainment	Not relevant to this project	●												Y	Y	?	?	?	3	
19	Number of High Level Target reports submitted to Defra/WAG	S2.1 Reporting S2.3 Audit and control	●												Y	Y	?	?	?	3 cum.	
20	Length of flood defences protecting urban areas falling into condition category 1	See 8 and 9				●									Y	Y	?	?	?	12	
21	Length of flood defences protecting urban areas falling into condition category 2					●										Y	Y	?	?	?	12
22	Length of flood defences protecting urban areas falling into condition category 3					●										Y	Y	?	?	?	12
23	Length of flood defences protecting urban areas falling into condition category 4					●										Y	Y	?	?	?	12
24	Length of flood defences protecting urban areas falling into condition category 5					●										Y	Y	?	?	?	12
25	Number of structures protecting urban areas in condition category 1					●									Y	Y	?	?	?	12	
26	Number of structures protecting urban areas in condition category 2					●										Y	Y	?	?	?	12
27	Number of structures protecting urban areas in condition category 3					●										Y	Y	?	?	?	12
28	Number of structures protecting urban areas in condition category 4					●										Y	Y	?	?	?	12
29	Number of structures protecting urban areas in condition category 5					●										Y	Y	?	?	?	12
30	Has the asset database (NFCDD) been updated in accordance with the risk-based inspection programme for Main River	S2.2 Data management		●		●									Y	Y	?	?	?	3	

*Information obtained from draft Smart Targets review

Appendix E

Project Terms of Reference

**Joint Defra/Environment Agency research programme for Flood and Coastal Defence.
Risk Theme.**

Project Title: **Flood Risk Assessment Guidance for New Development - FD2320**

Start Date: **15/12/03**

Duration: **15.5 months**

Main Contractor: **Mr. Richard Kellagher**, HR Wallingford Ltd

Sub-contractors: **CIRIA and CEH**

Abstract of the Research:

Objective

The aim of this project is to focus on the requirements of an appropriate Flood Risk Assessment (FRA) and develop a consistent approach and appraisal methodology for site specific and strategic FRA's, when considering land use development. It will utilise the new knowledge, tools and techniques, developed under the Defra/Agency Flood and Coastal Management R&D programme for flood risk assessment and alternative technologies available for prevention & local protection from flooding. The proposed R&D will produce the guidance for FRA and management of flood risk within the new development. It will be built on recent Agency/Defra R&D – the “*User guide for Initial Stormwater Storage Assessment for New Developments*”. This guidance will be upgraded to FRA for the individual site scale and will be extended to sub-catchment and whole catchment scales in a form to support the use of MDSF for planning new development.

Use of results

- A consistent risk assessment approach used by the Environment Agency and local authority planners for development control
- An ability to quantify the change in risk due to new development and climate change and to quantify risk on existing development (people and properties)
- Clear risk based understanding to Defra and Agency on what is considered to be “appropriate and inappropriate” development in flood risk areas
- An ability to rapidly appreciate the tiered FRA approach and establish the relationship between planning decisions at different “levels”.
- An understanding of integrated flood risk management measures such as drainage planning by the development industry and regulators
- The development of appropriate guidance for flood risk limitation
- Input into and use of ongoing R&D and other initiatives (RASP, PAMS, CFMPs, SMPs)

Purpose

The Government's Flood Management policy is to reduce the risk to people, property and environment and to encourage sustainable development.

The R&D is needed to provide national procedures and guidance to support effective implementation of the Government's and Agency's Policies, Procedures, work instructions and Guidance (e.g. Planning Policy Guidance – PPG25) related to flood risk assessment & risk management for new development. A national risk based approach to impact assessment of development for regulators does not exist and this study aims to provide an integrated framework and guidance to allow risk assessment from the individual development site through to the strategic, catchment & national scale.

Recently completed a Defra/Agency R&D project under Engineering theme was aimed at individual development planning proposals for assessing stormwater runoff. The proposed

project builds on this and will be directed at providing tools, techniques and guidance in assessing and managing impacts.

Scientific context

It will build on the recent research at the scale of the individual site to local sub-catchment and whole catchment scales using the new knowledge, tools, techniques and alternative technologies available for flood risk assessment, prevention & protection recently developed under the Defra/Agency Flood and Coastal Management R&D programme. It will result in developing a consistent approach and appraisal methodology for site specific and strategic FRA's, when considering land use development. It will quantify risk, which is not possible under current methods of dealing with developments.

This research will fully exploit a number of parallel Defra / Agency research projects (particularly Risk review, RASP, MDSF, Risk to people, PAMS) and initiatives (e.g. CFMPs, SMPs). In addition, there are links into EPSRC's AUDACIOUS and WaND and other projects dealing with drainage and flood risk. These projects look at flooding and risk in the urban context, specifically targeting new developments and quantifying sustainability. Other relevant R&D projects including by CIRIA (RP627), HR Wallingford & CEH will be reviewed and contribute to the proposed project. Tools and techniques will be developed that will contribute to these R&D projects.

Scientific Objectives

Overall objective

Develop an integrated framework for 4 levels of Flood Risk Assessment (FRA) for 4 scales and, in particular, developing tools, procedures and guidance to enable flood risk assessment related to new developments at the "Sub-catchment" scale. The other 3 scales within the framework are:

- National policy decisions by measuring the impact on catchments of proposed large scale new developments
- Strategic catchment scale planning of proposed large scale new developments
- Individual development planning of proposed new developments

Input into these other 3 scales of FRA, in which R&D is well advanced, will be as needed to ensure an integrated and seamless approach to carrying out FRA for new developments.

Phase 1 objectives

1. Review existing guidance and procedures related to flooding
2. Review existing Flood Risk Assessment and Management tools and techniques
3. Consultation workshop
4. Scope requirements for, and structure of, FRA framework for new development
5. Scope requirements of integrated suite of tools, procedures and guidance for flood risk assessments
6. Identify data needs and information management and explore existing and future linkages to the NFCDD and its relationship with the application to each of the FRA procedures
7. Establish the scope of integrated flood risk issues involved in advising on planning applications and when setting catchment/national planning policy.
8. Establish scope of issues for monitoring planning and development

9. Detailed definition of Phase 2 tasks and conceptual outline of deliverables.

Phase 2 objectives

1. Develop hierarchical risk assessment methodologies aimed at supporting different planning decision needs at four scales:
NATIONAL - support national policy decisions by measuring the impact on catchments of proposed large-scale new developments
CATCHMENT – support strategic catchment scale planning of proposed large-scale new developments
SUB-CATCHMENT– support sub-catchment scale planning of proposed new developments where the proposals will have a measurable impact in terms of flood risk.
SITE – support Individual development planning of proposed small and large scale new developments.
2. Provide a basis for quantification of risk indicators.
3. Develop integrated software tools and guidance for application of existing tools to assist in applying them to the four scales of FRA.
4. Provide decision guidance for risk assessment for new development.
5. Provide decision guidance for risk management within new development.
6. Develop a Communications and Implementation Plan.
7. Develop a Monitoring and Review Plan.

Interdependence Objectives

Phase 1 must be carried out before Phase 2 and recommendations to be agreed.

Output of the project will be based on current best practice and methods and therefore it is not dependent on the success of any particular sub-elements of the project.

Output from related Defra / Environment Agency / EPSRC on-going research will influence, to some degree, the methods and details for carrying out FRAs for new developments.

Factors which might cause delays

There is nothing to prevent the commencement and project activities from taking place.

Certain tools and procedures will be in an interim form based on current science and data. In these cases, the project will detail what the long-term aspiration for such tools might be.

Approaches and Research Plan

Phase 1

1. ***Review existing procedures*** – Existing policy guidance requirements, including TAN15, PPG 25, PPG 23, PAG 4, and Agency practice and procedures will be summarised. The proposed review will lead to discussion and recommendation for future needs.
2. ***Review existing Flood Risk Assessment and Management tools and techniques*** - This includes recent and on going Defra / Environment Agency R&D projects (e.g. Risk review, Risk to people, *RASP, MDSF, PAMS*) and initiatives (e.g. CFMPs, SMPs). Other relevant R&D projects by CIRIA, EPSRC and others include:
 - *Development and Flood Risk – Guidance for Construction Industry,*
 - *Sustainable water management in land use planning, and development and flood risk),*

- *WaND*
- *AUDACIOUS*
- *the proposed EPSRC project on Flooding,*
- *OST's Foresight.*

3 *Scoping Framework requirements* – Define framework for FRA for development which utilises existing and developing tools and methods which enable an integrated approach to effective implementation of current policy and planning guidance.

4 *Tools, Procedures and Guidance* – Scope out requirements for tools, procedures and guidance to enable an integrated approach to flood risk related to development to be evaluated at 4 scales:

- National,
- Catchment,
- Sub-catchment,
- Site.

5 *Data and Information* – Identify data needs and information management. Linkage to NFCDD – Summarise status of NFCDD and future direction. Establish the links, which can be developed for the FRA in phase 2 that will best make use of the information in the NFCDD and allow updating of the NFCDD from the risk studies.

6 *Flood risk issues for development (local and national planning)*- Establish the scope of issues involved in planning guidance for Flood Risk Assessments when advising on a planning applications or setting catchment/national planning policy. This would build on work recently carried out or still under research. These include the CIRIA projects RP627 Sustainable water management in land use planning, and RP675 development and flood risk, the WaND and Flood Risk EPSRC projects, and ongoing research at HR Wallingford on RASP, MDSF, PAMS and CFMPs. This would be considered from the perspectives of both the Developer and the Regulator. Indirect, but related planning issues such as monitoring of planning guidance and development and sustainability measures in terms of flood risk will also be considered.

7 *Consultation Workshops*

Workshops will be held to provide the following:

1) Discussion groups of selected relevant Regulator representatives to refine customer needs and debate Framework proposals for FRA for developments. This would be structured to look at each of the 4 scales separately, and also how they need to integrate.

2) Discussion groups for both Regulators and Developers to brainstorm for development issues on FRA guidance requirements, tools development and prioritise requirements. Meetings for these two groups may best be conducted separately.

3) *Feedback and discussion with Regulatory representatives on initial proposals for tools, procedures and guidance to be developed in Phase 2.*

8 *Detailed definition of Phase 2 tasks*

Define in detail on the proposed approach for the risk assessment methods needed for the different decision scales to fit into an integrated national FRA methodology. This will detail the tools to be developed and methods in phase 2 to assess planning impacts to evaluate risks and hence judge the appropriateness of development proposals.

The report will also detail the planning guidance and procedures to be produced in Phase 2 for use at the 4 scales of FRA. This includes the issue of monitoring the effectiveness of

planning guidance and development and consideration of sustainability factors in terms of flood risk.

The links between the 4 scales of FRA to other R&D initiatives and current policy requirements will be mapped out to demonstrate the integrated nature of the strategy and to assist in providing a clear understanding for all parties involved in development planning.

An outline of the dissemination strategy will be produced. Initial discussions will be held to agree practical issues of venues, methods and material which will best ensure effective national implementation of the FRA for Developments. The dissemination strategy will be developed in more detail in phase 2.

Note: A range of potential additional items directly and indirectly related to the proposed R&D has been identified as part of this proposal development as being needed to provide information for regulators to fully assess all pertinent aspects of new development. The customer needs identified during this proposal preparation that cover detail broader issues are attached in appendix 1. With these, possibly further customer needs will be identified, during Phase 1. It is proposed that in Phase 1, the issues related to the key customer / R&D needs (differentiated between science, development, policy and process) will be identified, prioritised. An Inception Report will be produced which clearly identifies the work to be carried out in Phase 2. It may be possible to include some of these additional issues in Phase 2, but it is likely that many will be outside the scope of Phase 2.

Phase 2

1. Framework and methods for FRA for developments

- Develop hierarchical risk assessment methodology aimed at supporting different planning decision needs.
 - *National scale* – High-level policy support to evaluate development targets and their impact taking into account the RASP High Level methodologies or integration of CFMPs.
 - *Catchment scale* – To support the understanding of cumulative effects of development where tools / models exist based on CFMP analysis and its further development.
 - *Sub-catchment* – To support the determination of planning decisions for single or multiple developments, where the developments are significant with respect to the receiving catchment. Cumulative effects of development rather than residual risks of individual developments will be targeted.
 - *Site flood management planning* – To support the planning requirements and tools needed to meet best practice for individual developments in respect of:
- 2. Stormwater management within and from the development
- 3. External flood risk to the development (from the surrounding area or river or coast)
- 4. Wastewater management within and from the development related to sewer flooding
- 5. Coincident fluvial/pluvial/coastal and sewer flooding risk to the development
- 6. Floodplain compensation
- 7. Flood resistance of buildings
- 8. Emergency access/egress related to flood risk

- Detail the structure and tools within the framework. Show all links to existing procedures and policy requirements and also distinguish between elements to be produced in Phase 2 and those to be improved and developed in the future.
- Detail the differences in approaches used for different scales and the links between scales. These will include reporting in the language used in current risk research of Sources, Pathways and Receptors such as the report for FD2302 *Risk, performance and uncertainty in Flood and Coastal Defence – A review*.

2. Quantification of risk indicators

Select and agree indicators and parameters for quantification of risk. Investigate and provide a robust basis for values used in the quantification of risk parameters. Analysis of information and data to determine the degree of robustness of each parameter will be carried out.

3. Software tools

Simple tools will be developed for Regulator use to assist in decision guidance. These will use information from the NFCDD and other sources and can also contribute information back into the database.

The tools will be designed to meet the needs for each of the 4 scales of FRA for developments. These will be targeted at Regulators, but there may be the need to produce tools that Developers might also use to meet FRA requirements.

These tools will be paper or software based; the latter based on spreadsheets or bespoke written packages to facilitate the methods for each of the 4 scales of FRA for developments.

Tools will be produced for both FRA methods and other requirements such as procedures for monitoring development and measuring the effectiveness in reducing flood risk.

4. Decision guidance for Risk Assessment

This will outline how the Agency staff should interface with the tools developed and run/used by themselves and/or Local Authority/developer/consultants. This includes identification of the change in risk caused by new developments and show the level of flood risk on the existing development. Particular attention will be placed on producing guidance for a consistent risk assessment approach to be used by the Environment Agency and local authority planners for development control and to maximise effective national implementation.

This guidance will facilitate the efficient use of tools developed in this phase. This would also be based on present regulations (e.g. TAN15, PPG 25, PPG 23 – and its proposed update, PAG 4) considering new knowledge, tools and techniques. The availability of alternative technologies available for flood prevention & protection will also be considered.

The guidance will also be aimed at developers, consultants and researchers, and will provide information specifying tools and procedures and output for flood risk assessments for development.

Decision guidance will be written to address all the issues agreed in Phase 1. Discussion and feedback from regulators and other selected groups will take place to refine the output.

5. Decision guidance for Risk Management

Decision guidance will be written to address all the issues agreed from Phase 1. Discussion and feedback from selected groups will take place to refine the output. Guidance will extend to a range of related issues such as:

- procedures for measuring attributes of sustainable development in terms of flood risk
- procedures dealing with climate change
- best practice characteristics for design of developments in flood risk areas and best practice stormwater and wastewater management techniques

Information will be produced which encourages appropriate development design to limit flood risk. Associated guidance on criteria and how these criteria should be modified by the nature of the development (brownfield/greenfield, regeneration and broader sustainability issues) will be produced.

The guidance will give planning advice using best practice guidance for flood risk assessment & risk management for new developments. Issues to be addressed will include:

- The identification of data and information needed
- Consideration of the longer-term risk related to maintenance and reduction in performance of all drainage structures and other sustainable urban flood risk management techniques.
- Adaptive methods for dealing with the uncertainty related to climate change.

6. A Communications and Implementation Plan

CIRIA will lead this activity and develop a plan for training and awareness raising in the water industry. A programme of seminars will be organised around the country to which all relevant regulatory personnel and developers will be invited.

7. A Monitoring and Review Plan

This will provide a method for assessing the progress and successes of reducing inappropriate development in flood risk areas and also a process for reviewing the outcomes and implementation of development schemes.

The definition and agreement of indicators needed to measure achievements in terms of appropriate developments will be determined.

A methodology of monitoring to ensure systematic procedures are applied will be developed and agreed.

Milestone	Target date	Title
Phase 1		
1	15/2/04 month 2	Inception report – Review and scoping FRA Framework requirements, Tools, Methods and Guidance and recommendations for phase 2
2	1/3/04 month 2.5	Workshop to refine customer needs, discussion on FRA structure, data requirement and recommendations for phase 2
3	31/3/04 month 3.5	Interim report (Phase 1 report) - incorporating review and out come of workshops, analysis of data requirement and Information management and summarising all issues of planning, monitoring and other related to FRA for development – defining Phase 2 activities and programme for FRA for developments
Phase 2		
4	15/9/04 month 9	Draft Technical Report 1 (TR1) - Framework and methods at 4 scales of FRA for developments, Quantification of Risk Indicators
5	15/12/04	Software Tools

	month 12	
6	1/1/05 month 12.5	Draft Technical Report 2 (TR2) – FRA Guidance for <i>Risk Assessment</i>
7	15/1/05 month 13	Draft Technical Report 3 (TR3) – FRA Guidance for <i>Risk Management</i>
8	1/2/05 month 13.5	Draft Project Record 1 (PR1) Communications, Implementation plan, Monitoring, Review plan and other supporting information (Reviews from Inception report and information from workshops)
9	15/3/05 month 15	Final TR1, TR2, TR3 & PR1
10	31/3/05 month 15.5	Project Dissemination and project closure

Staff effort

David Ramsbottom (Rank 9) River catchment management (MDSF, CFMPs)

Paul Sayers (Rank 9) Flood Risk evaluation (RASP)

Jonathan Simm (Rank 9) Sustainable use of resources, Risk, Sustainable Construction

Richard Kellagher (Rank 9) SuDS, Stormwater management and design, climate change

Steven Wade (Rank 8) Hydrologist, Water resources, climate change

Craig Elliott (CIRIA) (Rank) Water industry guidance documents – Editorial, Dissemination and Training

John Packman (CEH) (Principal scientist) Urban hydrologist, Catchment tools specialist – Advisor to the project

Communication of results & Technology transfer

Web based information (Environment Agency/ HR Wallingford / CIRIA)

Guidance output and Procedures structured to meet AMS requirements

Promotional literature items

Journal articles

Papers at conferences

Benefits

The main benefits of this work will be:

- A consistent risk assessment approach used by the Environment Agency and local authority planners for development control
- An ability to quantify the change in risk due to new development and climate change and to quantify risk on existing development (people and properties)
- Clear risk based understanding to Defra and Agency on what is considered to be “appropriate and inappropriate” development in flood risk areas
- An ability to rapidly appreciate the tiered FRA approach and implications of national development plans

- An understanding of integrated flood risk management requirements such as drainage planning by the development industry and regulators
- The development of appropriate integrated approaches for flood risk limitation and adoption
- Input into ongoing R&Ds and other initiatives (RASP, PAMS, CFMPs, SMPs)

Appendix 1 to FD 2320

Additional information of importance for FRA for new developments to be assessed for inclusion in phase 1 for phase 2.

A range of potential research items has been identified to provide the information needed by regulators to fully assess new development. The approaches given above cover the core technical methodology needed for Flood Risk Assessment for new developments and important related issues that will be covered, subject to the outcome of phase 1.

Items identified during proposal preparation that cover broader issues are listed below. These are specifically not included in this proposal.

- model land use planning policies for assistance on developing regional strategies and local development frameworks
- developing models of planning documentation and standard responses to planning applications
- Funding arrangements and payment mechanisms for the provision & maintenance of associated risk mitigation measures (e.g. SuDS) over an appropriate time horizon, including legal instruments to secure compliance and simple collection methods.
- Methodology for identification of surface water problem drainage areas linked to Amp Water Industry requirements & service levels, and provision of map layers on GIS as outputs
- Methodology/process for production of lines on plans for functional floodplain and methodology for updating over time having regard to actual events. This will link with the Agency's flood mapping strategy and Flood Zones project.
- Consider peoples perceptions of flood risk and how can we positively influence these to have greater regard for flood risk.
- Methodology for development and maintenance of a register of appeal decisions and how to turn this into guidance for practitioners
- Consideration of strategic solutions rather than a piecemeal approach and how can this happen. Issues will include the role of the Agency, the possibility of the LFDCs becoming receptacles for monies until a strategic scheme is carried out, etc.
- Dissemination activities training and implementing the FRA procedures.

Appendix F

Downstream Impacts of Urbanisation on Flooding – An Initial Review

Downstream Impacts of Urbanisation on Flooding – An Initial Review

The following note is based on information and analysis provided by John Packman (CEH Wallingford). These are the conclusions drawn from a scoping study undertaken as part of this project, to see if guidance could be provided on estimating the downstream impacts of new development.

Urban drainage systems, unless incorporating balancing ponds or SuDS (Sustainable approaches mainly based in soakaways), can lead to increased risk of downstream flooding, typically increasing flood discharges by a factor of between 3 (for clay catchments) and 7 (for chalk catchments). For planning purposes it would be useful to know how far downstream such urban impacts must be considered, or will they decay (or be concealed) by downstream rural environments. To address this question, the Flood Estimation Handbook Calculation (FEHCAL) spreadsheet from the Modelling and Decision Support Framework (MDSF) was amended to allow the urban extent of individual subareas to be easily adjusted. The effect on flood flows at successive locations downstream was thus investigated.

It should be recognised that the FEHCAL spreadsheet is not a truly distributed approach, and should be considered as a first approximation. It evaluates mean time to peak for each location within the catchment, but assumes a fixed triangular form of unit hydrograph, ignoring any tendency towards a twin peaked response. This assumption is probably reasonable when combined with the relatively smooth FEH design storms, but not for assessing response from observed storms.

The FEHCAL spreadsheet was used to try to find some simple rules for predicting how the effect of urbanisation decays downstream. In principle, any decay must be catchment specific, depending on how the urban and rural responses combine. Thus different decays would be found whether the downstream catchment contributes along a single channel or as a number of discrete tributaries. Moreover, the decay will depend on the downstream runoff characteristics (e.g. for clay or chalk areas). For these reasons, the FEHCAL spreadsheet should properly be applied on a case by case basis.

However, the two figures presented in this note have been derived using FEHCAL, and do give some broad indication of the likely decay rates.

It should be noted that the figures presented are based on results derived for typical, conventional urbanisation, i.e. without balancing ponds or SuDS. They are also based on the area downstream being fully rural. The “attenuation” of the urban impact is likely to be less if the downstream area includes some urbanisation.

URBEXT is derived by the FEH from the 25*25m land-use estimates on the ITE1990 land use map. URBEXT is defined as (urban area + 0.5 suburban area) / Total catchment area. An URBEXT value of 0.5 might represent a catchment that is 20% (central) urban, 60% suburban and 20% park.

Figure 1 was derived using the basic subarea layout of the Croal catchment, but assuming initially a fully rural catchment with a uniform Standard Percentage Runoff (SPR) of 40. Reasonably dense urbanisation (URBEXT = 0.5) of the uppermost subareas gives the range of local increases in 2-year flood peak shown at the right hand

end of the graph (i.e. where the urban proportion of the catchment is 1.0). Moving downstream through the rural subareas, a reasonably consistent trend is obtained with the reducing proportion of the catchment area that is urban.

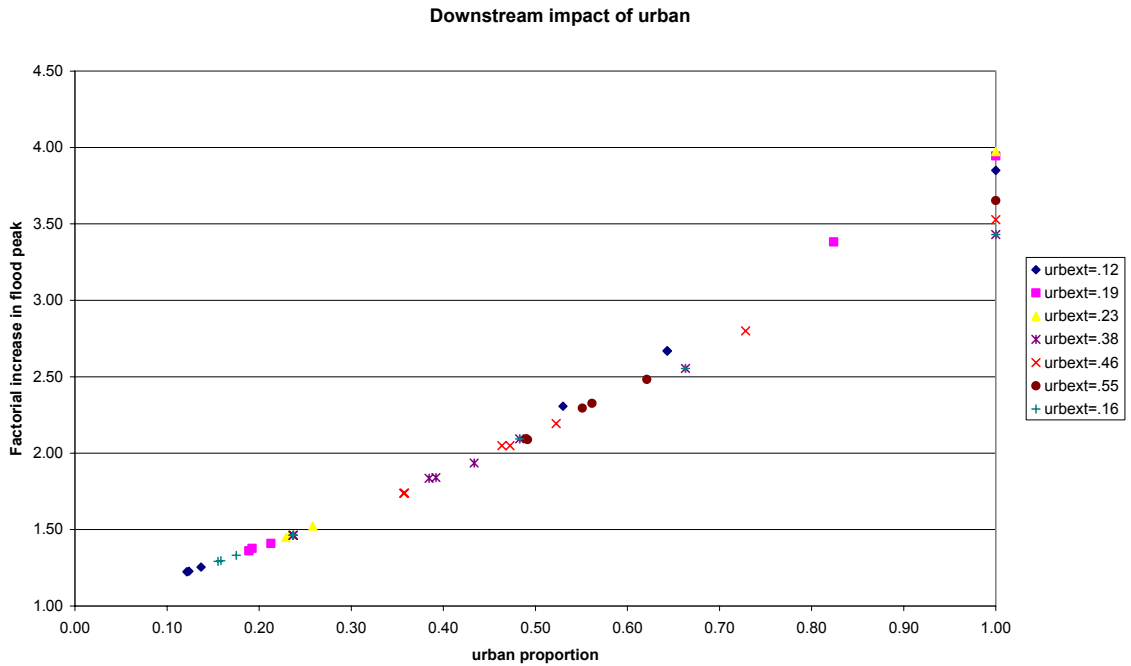


Figure 1: Sample reduction in urban impacts for uniform initial rural conditions

Figure 2 was derived for the same basic subarea layout as before, but with a lower SPR of 20 applied to half of the catchment. The greatest impact of urbanisation in these low SPR subareas is clear, as is the greater spread of the decays downstream.

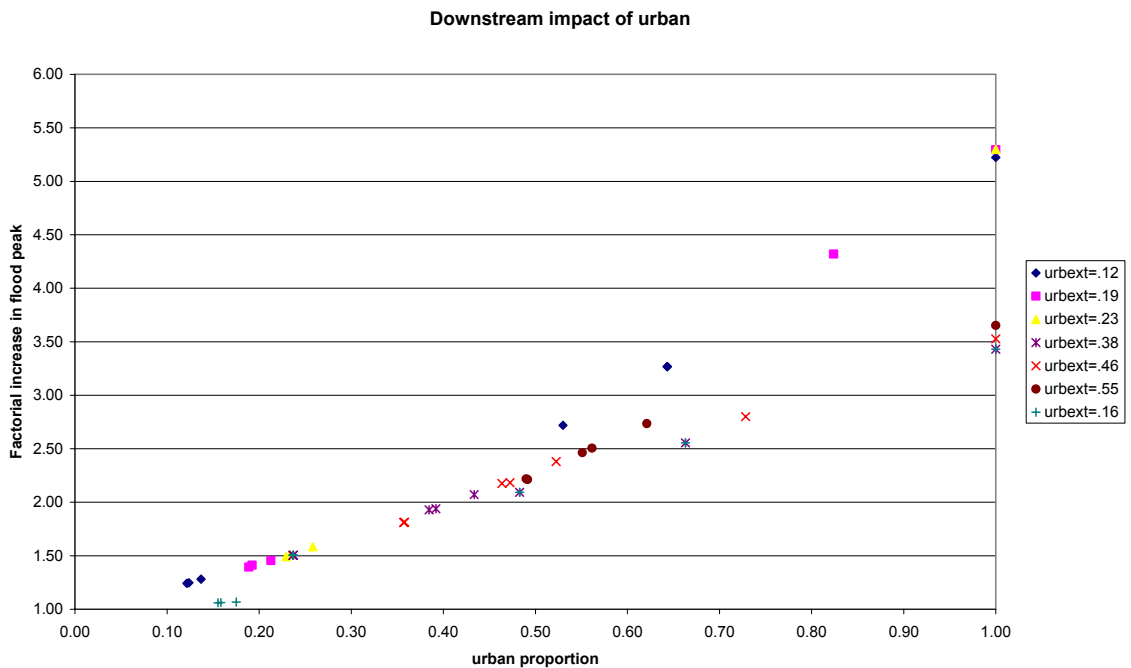


Figure 2: Reduction in urban impacts for disparate initial rural conditions

These figures show the difficulty in providing general guidance on the downstream extent of urban impacts. Further sample catchments might be used to identify typical figures, but case by case use of the FEHCAL spreadsheet is likely to prove a better option.

The effect of storage ponds could be included by increasing the flow times through subareas (as described in the MDSF guidelines), but the effect of SuDS would be better assessed by using an “equivalent conventional URBEXT”, such as $0.2 \times \text{URBEXT}$, but any recommendations regarding this would require significant testing.

The currently available FEHCAL spreadsheet requires a reasonable level of expertise to be used effectively. These initial calculations have been based on a modified version of the spreadsheet. Further work would be required to make these modifications user-friendly and a guidance note would need to be developed to accompany the tool. However, a reasonable level of expertise would still be required.

Appendix G

Feedback from Trial Dissemination Workshop

Results from Trial Dissemination Workshop

Date: 18 May 2005

Venue: Environment Agency, Exeter House

Delegates who provided feedback:

Name	Role	Location
Brian Richards	Development Control Team Leader	Blandford, Dorset
Brett Grosvenor	Development Control Officer	Cornwall
Keith Lead	Development Control Team Leader	Wallingford, Thames
Dave Hughes	Development Control Engineer	Bridgwater
Helen Knowles	Development Control Officer	Bridgwater
Steve Maddison	Development Control Team Leader	South West/Devon Area
Tim Preece	Development Control Engineer	Bridgwater/ North Wessex
Frank Newell	Development Control Engineer	Bodmin
Lucky Wehalle	Development Control Team Leader	London
Simon Dart	Development Control Engineer	Devon
Katherine Burt	Planning Liaison Technical Specialist	Blandford
I Hoger	Development Control Engineer	Exminster, SW Region
John Marks	Development Control Engineer	Devon area, Exminster
Andy Bremford	Development Control Engineer	Blandford
Malcolm Brushett	Development Control Engineer	Blandford
Jayne Purser	Development Control Engineer	Blandford
Nigel Smith	Development Control Officer	Bridgwater
Steve Moore	Development Control Technical Specialist	Devon Exminster
John Southwell	Development Control Engineer	Bridgwater

Results of the Questionnaire Regarding Pilot Testing of Project Outputs

The delegates were asked to score the importance of pilot testing individual items in the project outputs. The top ten items are listed below. Full results are provided at the end of this appendix.

	Item
1	S3.2 Risk to People behind Defences
2	S3.3 Safe Access and Exit
3	D3.4 Strategic Flood Risk Assessments
4	D3.5 Flood Risk Assessments
5	D2.1 TOOL2 Flood Risks to People Calculator
6	S3.5 Mitigation Measures
7	Activity Chart
8	Information Chart
9	S3.1 Climate Change
10	How Assessments of Flood Risk are used

Results of the Questionnaire Regarding the Workshop

The delegates were asked to score the workshop using a second questionnaire. The results of this are presented below.

1. The presentations were **good**.
(*Good = 12, Adequate = 7, Poor = 0*)
2. The subject material was **as expected**
(*Better = 4, As = 12, Poorer = 2, Different = 1*)
3. The quantity of information provided was **about right**.
(*Too much = 5, About right = 14, Too little = 0*)
4. The information provided was **very relevant** to the work of those attending.
(*Very = 10, Partially = 9, Not = 0*)
5. The workshop was the **right length**.
(*Too long = 2, Right length = 16, Too short = 1*)
6. The discussions were **adequate**.
(*Good = 8, Adequate = 10, Insufficient = 1*)
7. The handouts were **good**.
(*Good = 11, Adequate = 7, Insufficient = 1*)
8. The objectives of the day were **adequately met**.
(*Exceeded = 2, Adequate = 12, Not achieved = 2, Don't know = 3*)

The delegates were also asked to respond to the following statements and the scores are presented below.

	Strongly Agree	Slightly Agree	Slightly Disagree	Strongly Disagree	Not Applicable	No comment
Today's introductory dissemination workshop has no relevance until the appropriate policies and processes are in place		3	10	7		
Today's introductory dissemination workshop should be carried out for all regions of the EA	10	5	2	3		
Future dissemination workshops should not be undertaken until the appropriate policies and processes are in place		6	8	5	1	
Following on from an introductory workshop, further workshops should be carried out that cover less topics but are more detailed	5	9	2	2		2
This introductory workshop should be scrapped and replaced by more focused workshops for particular user needs	2	6	8	3		1
Further training should include policy and process issues, as well as science	4	8	3	1	2	2
Further training should include case studies	13	3	1	1	2	
Further training should include "hands on" use of tools	6	8	4	1	1	
Further training is not needed	1		4	12	3	
Today's introductory dissemination workshop should be provided for Planning Authorities	4	5	3	7	1	
An appropriately modified version of this workshop should be provided for Planning Authorities	8	7	2	3		

Written Comments Added to Questionnaires

The following is a complete record of the written comments added to the questionnaires. In general, these are a relatively fair representation of the verbal comments provided during the workshop.

Piloting

- The question was asked "Who are we testing for?" The message certainly needs to be put across about tailoring the guidance for DC staff and our various professional partners accordingly.

Implementation

- Linking support guidance to the Agency's AMS is a MUST DO to ensure consistency of approach on issues such as safe access and exit.

- Local FRA guidance to compliment the FRA guidance note is already in operational use on www.pipernetworking.com. Ensuring consistency with this is important.
- Outputs should be in a powerpoint hyperlink format at initial consultation stage, then paper if required, as it is easier to understand the digital version than the paper version at first introduction.
- S3.1 Climate Change and S3.5 Mitigation Measures are essential guidance to Development Control and as such should be tested, modified and made user friendly for use as everyday DC references. There should also be accompanying AMS or policies to help DC to comply with this guidance.
- It is important to add the scope for adding further technical information areas. This is really useful to DC engineers i.e. information on relevant R&D projects and recognised methods, such as wave height calculations, managed retreat, etc.

Further dissemination and training

- The statements presented above (see table) revolve around how and when this R&D might be translated into operational policy and process. This must not happen without ‘practitioners’ advice from area DC and PL team members. Duplication of work by planning and corporate services groups/projects must be avoided e.g. initiatives spurned by Standing Advice on Flood Risk.
- Providing this workshop for Planning Authorities could result in confusion if too much detail is provided. However, a workshop could be useful if it focused just on SFRAs.

Project outputs

- The R&D project was successful in my view. It is very important to have a consistent and readily available reference/guidance and source of information. It is more valuable for showing the technical background to the research conclusions for all levels of assessment. The format is welcomed on the web and worked well for me. I found information that I have not reviewed before.
- It would have been very useful to have known in advance that this R&D was being done. It would also be useful to know whether the original project brief was still relevant and had all the desired outcomes been achieved.
- Despite listening attentively to the presentation, I left confused and concerned that this whole approach is being defined by non-practicing DC engineers. It appears academic in approach, bureaucratic, time consuming, costly and ultimately, if it proves a costly time waster, it won’t be used.
- There was not much actual guidance on FRAs. No specific examples were given, so it’s impossible to see relevance. A massive amount of it is not applicable to everyday work. There must be examples to work through the whole process. Was there any testing on actual applications? It seems like it is designed for HQ and regional use, not area. I can’t see it being used at the area level. It doesn’t even link directly to the AMS procedures. (Note by presenter: this is not actually

true - where AMS exists this is cross-referenced in the guidance.) It would also not be useful for developers who want to be taken through the procedure. I don't see the point of the Risk to People Calculator.

Workshop

- I couldn't read the screen or the report (text too small). If I can give a biological analogy: I want to know about animals, plants, behaviour, etc not sub-cellular DNA, RNA, mitochondria, etc. The presentation was largely at the sub-cellular level!
- I think that a better introduction into the reasons why the R&D came about would be good. I appreciate that it's on the handouts but it's sometimes helpful to hear this from the presenter.
- Clarification at the beginning of the workshop regarding who it is designed for and the level of FRA it is aimed at would be helpful.
- The presentation was of the R&D outputs. The presentation was too focussed on background and implementation issues. You need to consider the needs of the audience. It felt like the presentation was just to justify doing the work, not demonstrating the use of the work. It could be more focussed on the needs of the Agency if it is to act as training. In which case it is more important to promote the use of the software to the Agency staff and not the underlying process. This information should be presented in the morning and the process later.
- It would have been useful to work through some representative test cases.
- Breaking into sub-group sessions to discuss various issues may provide more constructive discussions.
- Present the activity chart as one process (i.e. the methodology behind generating and reviewing an FRA) and leave it at that. The flow charts are too complex for a presentation.
- There was not enough time for all of the discussion. Some of the slides had to be rushed through in order to finish on time.
- The presenter was very clear and concise.
- There was a massive overload of information and I think the introduction to the project should have explained more, i.e. set the scene.
- There was too much information on Project Management themes. There were too many slides. The presentation given was excellent though.
- I trust I am correct in stating that the general feeling was to concentrate more on the user needs (which formed the afternoon session). The process and policy presentation in the morning resulted in many sighs of exasperation from the attendees as they could not see the relevance for them back in the work place. I think a good suggestion was to reverse the presentation and concentrate on the

tools and how to access them first. Then to explain the process and policy later, explaining that although the DC teams do not need to follow it right through unless it is a high level SFRA, they do not need to understand it.

- Thanks for an interesting day. The follow-up is important because the “roll-out” of these workshops does need to be tailored for the teams.

Conclusions Reached as a Result of the Workshop

1. The number of presentation slides was cut by about one third.
2. Greater emphasis was given to explaining who the presentation was designed for, i.e. Environment Agency Regional and Area Staff, primarily involved in Development Planning and Planning Liaison.
3. More background was provided regarding how the project came about.
4. Detailed information on the most relevant guidance notes was provided earlier in the presentation.
5. Detailed information on other tools was provided earlier in the presentation.
6. Detailed descriptions of the generic approach and framework were removed.
7. Those who were able to access the digital version of the project outputs prior to the workshop were the most positive about the deliverables, rather than those who had assumed the Technical Reports were the only outputs. Therefore, it was decided to invest in the development of a website to host the framework, guidance and tools, by this means maximising the likelihood of uptake.

Full Results Regarding Pilot Testing Project Outputs:

	How important is it to test this?					What should it be tested for?					Not enough information	Total Score	Rank	
	Really Important	Fairly Important	Less Important	Not Important	Not Applicable	Credibility	Appropriateness	Usability	Implications	Effectiveness				
Score	4	3	2	1	0									
S3.2 Risk to People behind Defences	12	5	1			9	12	6	8	10		65	1	
S3.3 Safe Access and Exit	12	5	1			6	11	8	8	11		65	2	
D3.4 Strategic Flood Risk Assessments	10	7	1			4	6	8	9	11		63	3	
D3.5 Flood Risk Assessments	13	3	1			7	13	11	8	12		63	4	
D2.1 TOOL2 Flood Risks to People Calculator	9	7	2			8	10	9	4	9	1	61	5	
S3.5 Mitigation Measures	9	6	2	1		4	8	8	8	9		59	6	
Activity Chart	8	5	5			5	5	14	1	5		57	7	
Information Chart	8	6	3			3	7	10	1	3		56	8	
S3.1 Climate Change	7	8	2			7	9	3	10	10		56	9	
How Assessments of Flood Risk are used	7	8	1	1		6	5	3	3	6		55	10	
D1.4 Planning Applications & Decisions	11	2	2			5	9	9	8	9	1	54	11	
S3.4 Brownfield Development	6	8	3		1	4	9	6	8	9		54	12	
D2.1 TOOL1 Flood Risk Indicators Tables	6	8	2			8	8	8	5	5	1	52	13	
Generic Approach	5	8	3	1		3	7	12	4	4		51	14	
D1.3 Local Development Frameworks	5	9	2			4	5	6	9	5	1	51	15	
S1.2 How to Use the Activity Chart	3	12	1	1		2	2	13	2	7		51	16	
S1.3 How to Use the Information Chart	4	10	1	1		3	2	12	3	6		49	17	
S2.5 Linkage to Statutory Requirements	7	5	3			9	3	8	8	7		49	18	
S1.1 Introduction to the Framework	3	7	6	1		3	3	10	3	7		46	19	
S2.4 Stakeholder Engagement	4	6	6			6	7	9	7	5		46	20	
D1.1 National Planning Policy	2	9	5			4	8	4	7	4	1	45	21	
D3.3 Shoreline Management Plans	5	4	6	1		3	6	4	6	6	1	45	22	
D3.2 Catchment Flood Management Plans	4	4	7	1	1	3	7	7	4	5		43	23	
D1.2 Regional Spatial Strategies	2	6	8			2	7	4	5	6	1	42	24	
D3.1 National Flood Risk Assessments	4	3	6	4	1	3	9	8	4	4		41	25	
S1.4 Glossary and Abbreviations	5	1	9		2	5	6	8	6	5		41	26	
S2.1 Reporting	2	5	8	1		3	6	5	4	7		40	27	
S2.2 Information Management	3	4	7	2		3	2	8	3	6		40	28	
S2.3 Auditing and Control	4	1	9	3		6	3	5	3	8		40	29	
S2.3 TOOL Audit Checklist	2	4	8	1		3	2	7	1	6		37	30	

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