



RPA Stakeholder and Policy
Final report Work Package 7.3

RISK COMMUNICATION: Inter-professional Flood Risk Management

**Simon McCarthy
Sylvia Tunstall
Hazel Faulkner**

**Flood Hazard Research Centre
Middlesex University
Bramley Road
London
N14 4YZ**

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OUTLINE SUMMARY

The communication choices, tools and policies in relation to risk communication between science and professionals and within the professional groups was explored in the context of the activities of two professional groups (planners, warners) in the UK. Research focussed on these agencies professional agendas and activities in three different geographical contexts (that of Glasgow's urban area, mid-Trent, and the Lower Thames areas).

In these three areas, the geographical contexts of the groups and agencies involved in flood risk communication in relation to spatial planning or focus on warning activities were hypothesised to have three very differing flood management challenges. We refer to these as differing 'flood footprints', being pluvial, simple onset, complex & contested onset, respectively). The challenges were hypothesised to differ because type and rate of flood onset could be argued to exert an actively differentiating function. However, given the significance of national policy for flood risk communication (McCarthy, 2007) in relation to spatial planning, and the EA's drive for national consistency in policy and practice in all activities, it was not surprising that few differences were found in the professional constraints and contexts with which these groups were faced. Furthermore, there were relatively few variations in the structures, strategies, and communication 'tools' used in the three differing geographical ('flood footprints') contexts.

It appeared that constraints on communication in planning development were greater in Thames area than in the other contexts, which may have been due to greater development challenges and local resource pressures in the locality. Other than this, the few specialised local variations reported by the professional interviewed appeared to be dependent upon historic mechanisms and initiatives that were in place before nationally consistent approaches and mechanisms were introduced. It is important to note, however, that even with imposed national consistency, such flexibility at a local level remains an important aspect of effective communication.

The temporal variations in choices about communication tools and mechanisms that these professional groups employed was more apparent in the warnings field than in the 'planning for development' field. The aspirations of the latter group is to mitigate the consequences of an event well in advance of that event, where clearly the professional agenda of flood warners is focused around communications in the time-pressed immediacy of an event so that their activities follow the hazard cycle. For flood warners, during these differing phases, a range of different tools are utilised in warning both at the preparatory and event management phases.

At the time of this research great changes were taking place in both warning and planning which were considered could be acting both as a threat and opportunity in the respective FRM activities. Technology was viewed by respondents as a key driver of progress in both flood warning and planning development. Common to both was spatial probability modelling combined with decision matrices which introduced possible consequences to inform a risk based decision support approach.

A range of professionals' degree of engagement with (or 'ownership of') the uncertainties associated with such techniques was revealed in the research. Respondents were of the opinion that greater understanding and transparency was required in this aspect of communicating risk. There was great concern about the lack of understanding in this area and the vague certainty currently associated with the information provided by such techniques. Expert champions or 'troubleshooters' were viewed as a possible way forward to resolve interpretation and oversee standards of output concerns.

Although technology is a key driver facilitating change in FRM, other contextual issues in turn facilitate the use of that technology in decision making. Resources, expertise, knowledge, professional relationship and time are a few of the key constraints that can act on the ability to utilise the technology usefully. If such issues are not addressed then it could be argued decisions informed by advances in technology may not be timely or actionable. The importance of understanding the requirements of the professional recipient of communication and the constraints acting in FRM is emphasised by this research.

GLOSSARY OF TERMS

Selected and adapted from FLOODsite Language of Risk: Project Definitions March 2005, Report T32-04-01

Accuracy - closeness to reality.

Catchment area - the area from which water runs off to a river.

Bias - The disposition to distort the significance of the various pieces of information that have to be used.

Confidence interval - A measure of the degree of (un)certainty of an estimate. Usually presented as a percentage. For example, a confidence level of 95% applied to an upper and lower bound of an estimate indicates there is a 95% chance the estimate lies between the specified bounds. Confidence limits can be calculated for some forms of uncertainty (see knowledge uncertainty), or estimated by an expert (see judgement).

Consequence - An impact such as economic, social or environmental damage/improvement that may result from a flood. May be expressed quantitatively (e.g. monetary value), by category (e.g. High, Medium, Low) or descriptively.

Damage potential - A description of the value of social, economic and ecological impacts (harm) that would be caused in the event of a flood.

Design standard - A performance indicator that is specific to the engineering of a particular defence to meet a particular objective under a given loading condition. Note: the design standard will vary with load, for example there may be different performance requirements under different loading conditions.

Development control – Processes whereby physical developments such as new or altered building and infrastructure in particular areas are regulated and controlled.

Efficiency - In everyday language, the ratio of outputs to inputs; in economics, optimality.

Emergency management - The ensemble of the activities covering emergency planning, emergency control and post-event assessment.

Evacuation scheme - Plan for the combination of actions needed for evacuation (warning, communication, transport etc.).

Event - The conditions which may lead to flooding. An event is, for example, the occurrence in *Source* terms of one or more variables such as a particular wave height threshold being exceeded at the same time a specific sea level, or in *Receptor* terms a particular flood depth. When defining an event it can be important to define the spatial extent and the associated duration.

Flood - A temporary covering of land by water outside its normal confines.

Flood control/defence (measure). A structural intervention to limit flooding and so an example of a risk management measure.

Flood damage - damage to receptors (buildings, infrastructure, goods), production and intangibles (life, cultural and ecological assets) caused by a flood.

Flood forecasting system - A system designed to forecast flood levels before they occur:

Flood hazard map - map with the predicted or documented extent of flooding, with or without an indication of the flood probability.

Flood level - water level during a flood.

Flood management measures - Actions that are taken to reduce either the probability of flooding or the consequences of flooding or some combination of the two.

Flood peak - highest water level recorded in the river during a flood.

Floodplain - area of land bordering a watercourse, estuary or coast over which water flows in time of flood or that would be naturally flooded in the absence of engineered interventions.

Flood protection (measure) - to protect a certain area from inundation (using dikes etc).

Flood risk zone - delineated geographic area within which flood risk is in a particular range.

Flood risk management - Continuous and holistic societal analysis, assessment and mitigation of flood risk.

Flood warning system (FWS) . A system designed to warn members of the public and professional agencies of the potential of imminent flooding. Typically linked to a flood forecasting system.

Harm - Disadvantageous consequences - economic, social or environmental (see Consequence).

Hazard - A physical event, phenomenon or human activity with the potential to result in harm. A hazard does not necessarily lead to harm.

Hazard mapping - The process of establishing the spatial extents of hazardous phenomena.

Hierarchy - A process where information cascades from a greater spatial or temporal scale to lesser scale and vice versa.

Ignorance - Lack of knowledge

Intervention - A planned activity designed to effect an improvement in an existing natural or engineered system (including social, organisation/defence systems).

Inundation - Flooding of land with water. This can refer to deliberate flooding, to reduce the consequences of flooding on nearby areas, for example.

Judgement - Decisions taken arising from the critical assessment of the relevant knowledge.

Knowledge - Spectrum of known relevant information.

Likelihood - A general concept relating to the chance of an event occurring. Likelihood is generally expressed as a probability or a frequency.

Mitigation - see Flood management measures.

Natural variability - Uncertainties that stem from the assumed inherent randomness and basic unpredictability in the natural world and are characterised by the variability in known or observable populations.

Pathway. The route that a hazard takes to reach Receptors. A pathway must exist for a Hazard to be realised.

Performance - The degree to which a process or activity succeeds when evaluated against some stated aim or objective.

Performance indicator - The well-articulated and measurable objectives of a particular project or policy. These may be detailed engineering performance indicators, such as acceptable wave overtopping rates, rock stability, or conveyance capacity or more generic indicators such as public satisfaction.

Policy - The defined aspirational goal of governance within an organization, evolved from 'organisational mission'.

Policy space mapping - A mental map of the intellectual and operational space involved to achieve goals, and which leads to policy guidelines which facilitate the delivery of policy.

Post-flood mitigation - Measures and instruments after flood events to remedy flood damages and to avoid further damages.

Precautionary Principle - Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Pre-flood mitigation - Measures and instruments in advance to a flood event to provide prevention (reducing flood hazards and flood risks by e.g. planning) and preparedness (enhancing organizational coping capacities).

Preparedness - The ability to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations.

Probability - A measure of our strength of belief that an event will occur. For events that occur repeatedly the probability of an event is estimated from the relative frequency of occurrence of that event, out of all possible events. In all cases the event in question has to be precisely defined, so, for example, for events that occur through time reference has to be made to the time period, for example, annual exceedance probability. Probability can be expressed as a fraction, % or decimal. For example the probability of obtaining a six with a shake of four dice is $1/6$, 16.7% or 0.167.

Probabilistic forecasting - Method in which the variability of input values and the sensitivity of the results are taken into account to give results in the form of a range of probabilities for different outcomes.

Project Appraisal - The comparison of the identified courses of action in terms of their performance against some desired ends.

Proportionate methods - Provide a level of assessment and analysis appropriate to the importance of the decision being made.

Receptor - Receptor refers to the entity that may be harmed (a person, property, habitat etc.). For example, in the event of heavy rainfall (the source) flood water may

propagate across the flood plain (the pathway) and inundate housing (the receptor) that may suffer material damage (the harm or consequence). The vulnerability of a receptor can be modified by increasing its resilience to flooding.

Recovery time - The time taken for an element or system to return to its prior state after a perturbation or applied stress.

Residual life - The residual life of a defence is the time to when the defence is no longer able to achieve minimum acceptable values of defined performance indicators (see below) in terms of its serviceability function or structural strength.

Residual risk - The risk that remains after risk management and mitigation measures have been implemented. May include, for example, damage predicted to continue to occur during flood events of greater severity than the 100 to 1 annual probability event.

Resilience - The ability of a system/community/society/defence to react to and recover from the damaging effect of realised hazards.

Resistance - The ability of a system to remain unchanged by external events.

Response (in context) - The reaction of a defence or system to environmental loading or changed policy.

Risk - Risk is a function of probability, exposure and vulnerability. Often, in practice, exposure is incorporated in the assessment of consequences, therefore risk can be considered as having two components: the probability that an event will occur and the impact (or consequence) associated with that event.

Risk = Probability multiplied by consequence.

Risk analysis - A methodology to objectively determine risk by analysing and combining probabilities and consequences.

Risk assessment - Comprises understanding, evaluating and interpreting the perceptions of risk and societal tolerances of risk to inform decisions and actions in the flood risk management process.

Risk communication (in context). Any intentional exchange of information on environmental and/or health risks between interested parties.

Risk management - The complete process of risk analysis, risk assessment, options appraisal and implementation of risk management measures

Risk management measure - An action that is taken to reduce either the probability of flooding or the consequences of flooding or some combination of the two

Risk mapping - The process of establishing the spatial extent of risk (combining information on probability and consequences). Risk mapping requires combining maps of hazards and vulnerabilities. The results of these analyses are usually presented in the form of maps that show the magnitude and nature of the risk.

Risk mitigation - See Risk reduction.

Risk perception - Risk perception is the view of risk held by a person or group and reflects cultural and personal values, as well as experience.

Risk reduction - The reduction of the likelihood of harm, by either reduction in the probability of a flood occurring or a reduction in the exposure or vulnerability of the receptors.

Scale - Difference in spatial extent or over time or in magnitude; critical determinant of vulnerability, resilience etc.

Social learning - Processes through which the stakeholders learn from each other and, as a result, how to better manage the system in question.

Social resilience - The capacity of a community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of self-organisation, to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures.

Spatial planning - Public policy and actions intended to influence the distribution of activities in space and the linkages between them. It will operate at EU, national and local levels and embraces land use planning and regional policy.

Standard of service - The measured performance of a defined performance indicator.

Severity - The degree of harm caused by a given flood event.

Source - The origin of a hazard (for example, heavy rainfall, strong winds, surge etc).

Stakeholders - Parties/persons with a direct interest (stake) in an issue.

Stakeholder Engagement - Process through which the stakeholders have power to influence the outcome of the decision. Critically, the extent and nature of the power given to the stakeholders varies between different forms of stakeholder engagement.

Strategy (flood risk management) - A strategy is a combination of long-term goals, aims, specific targets, technical measures, policy instruments, and process which are continuously aligned with the societal context.

Strategic spatial planning - Process for developing plans explicitly containing strategic intentions referring to spatial development. Strategic plans typically exist at different spatial levels (local, regional etc).

Sustainable Development - Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable flood risk management - involves:

- ensuring quality of life by reducing flood damages but being prepared for floods;
- mitigating the impact of risk management measures on ecological systems at a variety of spatial and temporal scales;
- the wise use of resources in providing, maintaining & operating infrastructure and risk management measures;
- maintaining appropriate economic activity (agricultural, industrial, commercial, residential) on the flood plain.

Sustainable flood risk management strategy - An approach which;

- aims to be effective in the long term, and

- can be combined ('integrated') with other international, national and regional activities (transport, environment, conservation etc.).

Susceptibility - The propensity of a particular receptor to experience harm.

System - An assembly of elements, and the interconnections between them, constituting a whole and generally characterised by its behaviour. Applied also for social and human systems.

Tool - mechanism whereby a policy guideline is delivered as management - in our context referred to as *Flood Risk Communication Tool* (see list in Figure 1).

Uncertainty - A general concept that reflects our lack of sureness about someone or something, ranging from just short of complete sureness to an almost complete lack of conviction about an outcome. Sub-categories include:

Knowledge uncertainty - Uncertainty due to lack of knowledge of all the causes and effects in a physical or social system. For example, a numerical model of wave transformation may not include an accurate mathematical description of all the relevant physical processes. Wave breaking aspects may be parameterised to compensate for the lack of knowledge regarding the physics. The model is thus subject to a form of knowledge uncertainty.

Decision knowledge uncertainty - Uncertainty due to lack of knowledge of all the parameter ranges within a management decision system.

Statistical model uncertainty - Uncertainty associated with the fitting of a statistical model. The statistical model is usually assumed to be correct. However, if two different models fit a set of data equally well but have different extrapolations/interpolations then this assumption is not valid and there is statistical model uncertainty.

Validation - is the process of comparing model output with observations of the 'real world'.

Variability - The change over time of the value or state of some parameter or system or element where this change may be systemic, cyclical or exhibit no apparent pattern.

Variable - A quantity which can be measured, predicted or forecast which is relevant to describing the state of the flooding system e.g. water level, discharge, velocity, wave height, distance, or time. A prediction or forecast of a variable will often rely on a simulation model which incorporates a set of parameters.

Vulnerability - Characteristic of a system that describes its potential to be harmed. This can be considered as a combination of susceptibility and value.

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1. INTRODUCTION

1.1 Background

Over the last few years, flood management policy has moved away from flood defence, towards flood risk management (Environment Agency, 2003) and together with Defra's July 2004 consultation document, 'Making Space for Water' (MSW) (DEFRA/Environment Agency, 2004) a different range of professionals have been brought to the forefront of policy formulation. In this new climate, the challenge for professional agencies is to tailor flood risk communication tools and strategies not only for their changing professional agenda, but in a manner that is sensitive to their specific legislative, financial and geographical contexts, and the scale at which they are obligated to make decisions. As new methods to assess and model floods become available from the expanding field of Flood Risk Science the use of the potential these tools offer as risk communication tools is being revisited. Although it may well be some time before a new generation of risk communication approaches are fully incorporated into the toolkits of these agencies, new communication strategies are now actively being devised. This is both in the context of real-time emergency response to floods and in flood risk mapping by conducted by planners and engineers.

The Environment Agency (2004) suggests that these shifts of emphasis create opportunities for a fresh look at the strategies and tools that they (and other agencies) use. We refer here not only to tools and strategies to achieve realistic reduction in flood risk for those living in flood-prone areas, but also tools and strategies to '*translate*' flood risk and uncertainty from the findings of 'normal science' in a way that maximises accessibility for those whom they are obliged to deliver a 'service' (taxpayers, clients). We can define this form of communication as '*translation*'. The translation challenges between agencies and those living in flood-prone areas will form the basis of the work package 7.5 (WP 7.5 Social dimensions of flood risk communication and management), a crucially important communication process. In the research for WP 7.3 we explicitly focus upon inter-professional communications. Thus we aimed to explore risk communication between professionals in flood risk management and the role that professional agendas and contexts play in forming flood risk perceptions and communication strategies and needs. In addition, the research aimed to investigate the full range of innovative flood risk communication possibilities ('*tools*') that are available to these agencies, and to explore how professionals' needs might best be matched to the tools available. Figure 1 shows the hypothesised constraints, choices and tools available to stakeholders in their selection of effective communications strategies as we represented them at the outset of the research (Inception Report 2004).

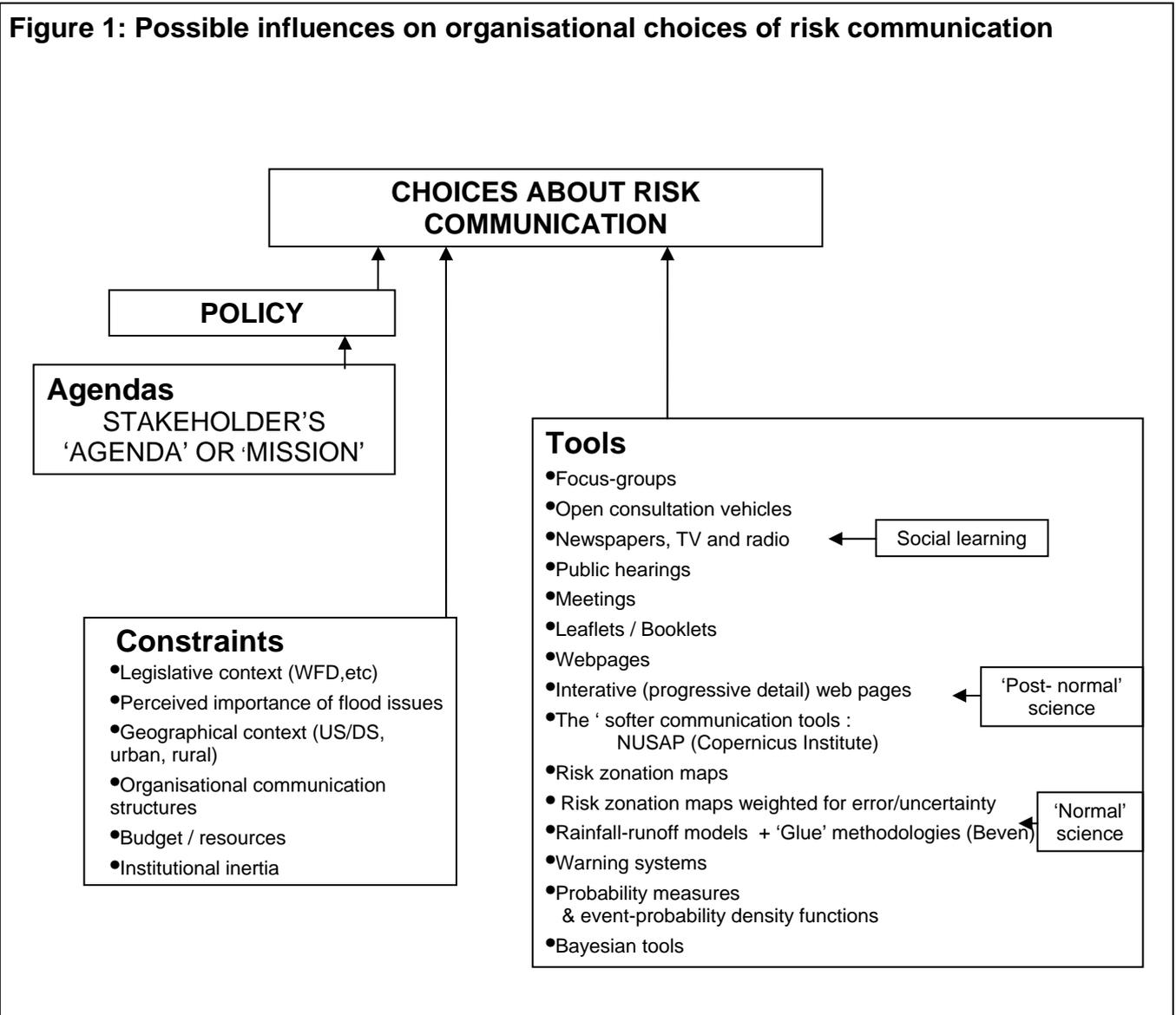
Specifically, the research for WP7.3 set out to address the following questions:

1. Who are the key professional groups and what are their professional agendas?
2. What are the needs, strategies and communication tools presently used by professional agencies, and their strategy towards (in particular) stakeholders in flood affected area?
3. What are the constraints on professional agendas and policies; and how do these constraining factors influence attitudes towards risk and uncertainty communication?
4. Geographical context: how do temporal and spatial factors influence attitudes towards risk and uncertainty communication?
5. How can we best align views, strategies and communication tools?

The many professional domains involve a range of varying sub-cultures within which traditional conceptual formulations and presentations of flood risk can be assumed to have evolved for everyday usage. Thus, for our research approach we chose three contrasting

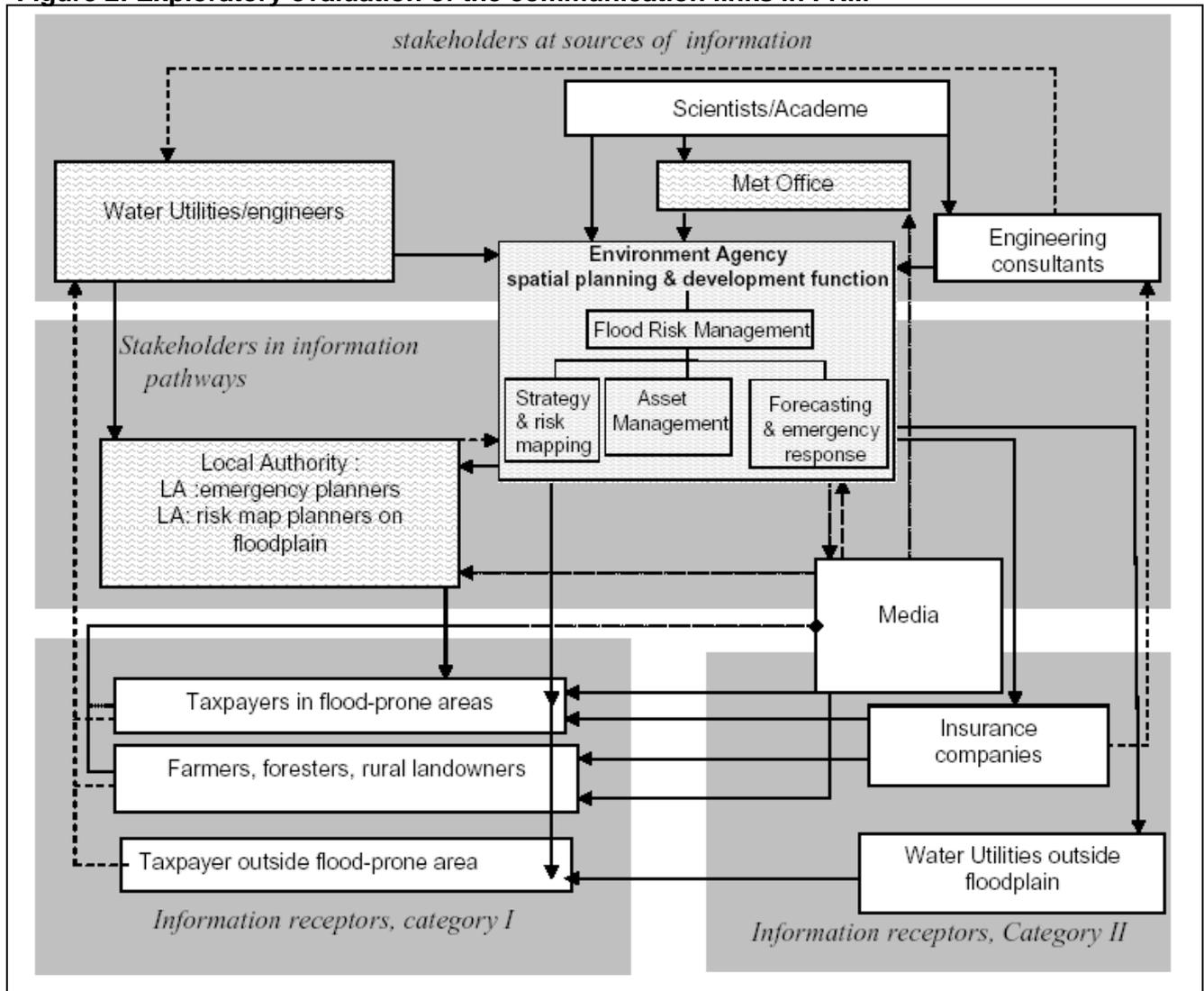
flood risk management (FRM) professional settings within which to explore the range and diversity of risk communication challenges.

Figure 1: Possible influences on organisational choices of risk communication



The group of professional agencies involved in flood risk communication that we selected as our study group were (a) flood warners and incident response managers within the Environment Agency; (b) land-use change agents and flood plain planners involved in communications about generic flood risk; (c) and the insurance industry. These were selected because a preliminary assessment of the entire field of FRM communication in the UK showed these groups to be occupying nodal positions within the communication web through which flood risk information is translated (Figure 2).

Figure 2: Exploratory evaluation of the communication links in FRM



1.2 Understanding risk communication

Intra and inter-organisational communication theory and also risk communication research address different aspects of the communication challenge facing FRM. Such aspects include the contextual issues of organisational approaches to how communication is managed, how communication is delivered effectively and the drivers and constraints on communication.

Focused on commercial organisations, three theoretical paradigms of how communication is managed in organisations have developed: the rational, the natural-systems and the open-systems paradigms. The last, the current dominant paradigm, emphasises the importance of communication from the external environment of an organisation as an influence on that organisation's ability to successfully pursue its goals. In FRM, government-funded organisations are charged with policy and operational goals specifically related to inter and intra-organisational communication of flood risk. For the insurance industry it was illustrated (McCarthy, 2007) that commercial concerns dominate. Informed by the three theoretical paradigms Miller (2003) describes three theoretical approaches to communication delivery characterised by the content, direction, channel and style of the communicated message (Table 1).

Table 1: Communication by organisational approach

Communication	Classical Approach	Human Relations Approach	Human Resources Approach
Content	Task	Task, social	Task, social, innovation
Direction	Vertical (downward)	Vertical & horizontal	All directions Team based
Channel	Usually written	Often face to face	All channels
Style	Formal	Informal	Both esp. informal

Miller (2003: 57)

Miller explains how there has been an evolution in inter-organisational communication from the 'classical' top down directed communication approach (informed by the work of theorists Max Weber, Henri Fayol and Frederick Taylor) to the 'human relations' approach (influenced by Abraham Maslow, Frederick Herzberg and Douglas McGregor) towards the 'human resources' approach (informed by Robert Blake & Jane Mouton, Rensis Likert and William Ouchi). Both the human relations and human resources approaches emphasise the importance of relationships in the communication process. However, the human resources approach utilises all relevant communication channels and all directions grounded in team based working. Miller describes how each of the approaches has been influential in commercial management over time but now a combination of the approaches can occur within a single organisation at any one time. Specifically in relation to the communication of risk, Fischhoff (1995, p. 140) identified eight developmental stages within organisations (Figure 3).

Figure 3: Stages of risk communication, adapted from Fischhoff (1995, p.140).

- | |
|--|
| <p>All we have to do is get the numbers right
 All we have to do is tell them the numbers
 All we have to do is explain what we mean by the numbers
 All we have to do is show them that they've accepted similar risks in the past
 All we have to do is show them it's a good deal for them
 All we have to do is treat them nice
 All we have to do is make them partners
 All of the above</p> |
|--|

In this model, each stage describes an approach to communicating risk and is dependent upon the previous stage being accomplished but in so doing does not replace it. Applied to intra-communication between organisations and the public, the model proposes an evolution in the communication approach occurring within organisations, moving from a technocratic to a partnership approach. Fischhoff notes that not all organisations need be at the same stage of development in the model and might perhaps be unaware of the learning that has been undertaken by other organisations in order to facilitate moving to the next level.

The policy environment of any field affects the way it operates. At a national level, government and institutional policy can direct not only the attention of organisations but also initiate the marshalling and prioritisation of resources to be applied. Thus policy constructs the environment within which the organisations act through the 'process of attention and interpretation' (Pfeffer and Salancik, 1978, p. 13). In this way policy and the organisations themselves can influence the nature of the risk environment, which will need to be acted on. But also in defining the risk environment the decision choices available in the management, and within that, the communication of the risk can be constrained (Perrow, 1984; Clarke, 1992; Freudenburg, 1993).

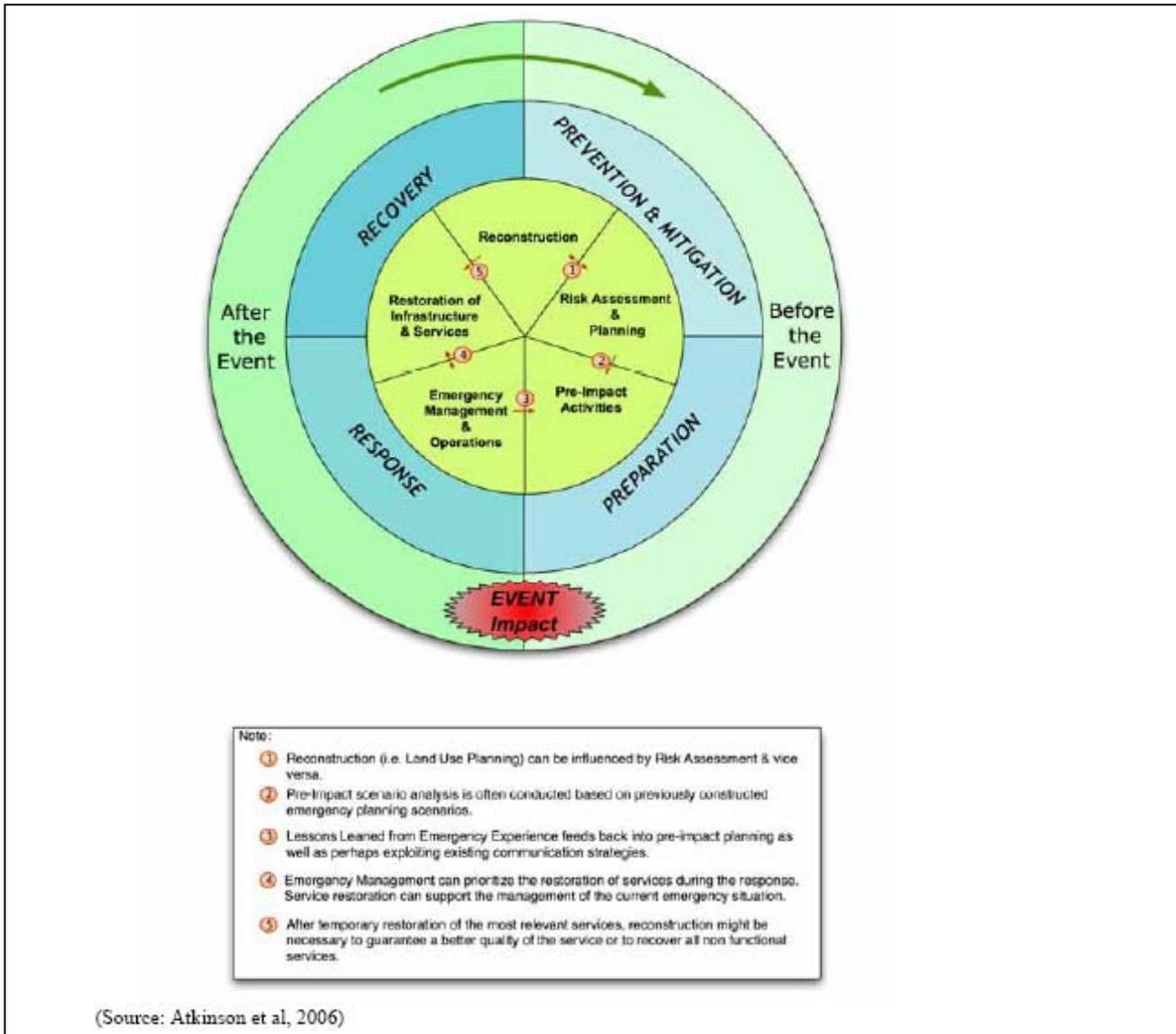
But the situation is not static: policy develops over time. Two dominant processes of policy change appear to affect FRM and thence flood risk communication at a national level which in turn it is proposed filters down to regional and area levels. The first, 'incremental' change is gradual and occurs over years at times when no flood events or only minor local events occur. The second, 'catalytic' change happens in the aftermath, and as a result of, a flood event recognised by national government as greater than regional significance (Johnson et al., 2005; Penning-Rowsell et al., 2006). So the rate of development in policy and in this way the focus on differing risk communication activities may vary in time.

The reason for change or employment of a communication strategy might be more concerned with organisational self-interest. Particularly if an organisation is charged with specific activities in relation to a hazard and the event highlights deficiencies in the organisation to undertake its role. Drawing on examples from hazards other than flooding, Chess (2001) describes how risk communication strategies can be undertaken by organisations to re-establish their legitimacy when undermined or challenged by a hazard event.

At an operational implementation level (regional and area) availability of resources and human relations issues have a potential role in constraining the risk communication choices organisations make at interfaces within and between those organisations, e.g., constraints related to issues of access to, trust in, and comprehension of information. Equally, the development of knowledge and technology relevant to the hazard might provide opportunities and ways of better defining and communicating the risk. Consideration of these various issues potentially inform and constrain all levels of decisions regarding communication approaches. Thus contextual constraints are a key focus of interest and methodological approach in WP 7.3. and of this report.

The communication challenges faced in FRM are closely associated with the FRM cycle of events and possible activities. The general hazard cycle is portrayed in Figure 4. It illustrates how a hazard event can be portrayed as divided into two temporal phases: Before and After the event. Before activities such as Prevention and mitigation, and Preparation can be undertaken and during / after activities in the form of Response and Recovery activities. Communication is central to these activity phases.

Figure 4: The hazard management cycle



The characteristics of each of the phases are as follows:

Prevention and mitigation: Dependent upon the responsibilities of organisations and groups involved they will follow different methodologies to analyse and produce results for the hazards, vulnerabilities and risks. In many mapping can be used to aid planning and develop emergency plans.

Preparation: Validation of plans can be undertaken by simulation exercises. Communications to promote readiness, resistance and resilience approaches is undertaken. Models might be created or refined.

Response: Timely and clear targeted communications are required. Forecasts, telemetry, models and warning levels are employed. Procedures and emergency plans are operated. Here efficient and reliable communication channels are necessary to assure timely decision making and activities between actors.

Recovery: Information is required on the consequences and performance of activities. Adaptation is the preference to a return to a normal state.

1.3 Tools for articulating risk and uncertainty: scientists' views

Risk is defined as the likelihood of an event and the consequences if that event occurred. A component of communication risk is uncertainty that underlines the source of the information and the information itself and was one of the aspects investigated in this research.

In the initial stages of the work of Flood Risk Management Research Consortium, Hazel Faulkner, (RPA 7 and Florian Pappenberger, RPA9 undertook an investigation of the tools for articulating risk and uncertainty that scientists used and the ways in which communication of risk and uncertainty might be optimised. A brief four question questionnaire was distributed to consortium members and a total of 38 responses were returned: 13 from consultants, 20 from academics and 5 from agency staff including Environment Agency staff; one respondent was classified as both as a consultant and as an academic. The responses from these different categories of scientist were analysed separately. Participants were asked what risk and uncertainty estimation methods they used at present. A very wide range of methods were indicated including, for example:

- Confidence limits
- Monte-Carlo analysis
- GLUE
- Bayesian methods
- Risk registers for risk assessment
- Ensemble forecasting
- EA's Risk Assessment for Strategic Planning (RASP)
- Subjective assessments using a scoring system from high to low on field reconnaissance sheets
- Qualitative evaluation of stakeholder perspectives.

The survey revealed that the flood related contexts in which the methods were used were also very varied. For example, the methods were employed in looking at the impact of climate change, societal risks, uncertainty in flood risk estimation, urban flood risk prediction and in communicating risk to all stakeholders.

The scientists were also asked what they considered to be the most effective way of disseminating risk and uncertainty estimation methods beyond the scientific community to bridge the gap between scientists and practitioners. There was substantial support for one day meetings and for a software library and manuals. Published reports and guidance documents on the use of methods were also recommended. There was a less positive response to 2-5 day CPD workshops with practical sessions as a dissemination method. The use of websites and online guidance for registered users and learning 'toolkits were also suggested as effective ways of disseminating methods.

Thus, the survey indicated that a very wide range of methods for estimating risk and uncertainty are used by scientists, in a variety of flood related contexts and indicated that scientists saw scope for enhancing the understanding and use of methods beyond the scientific community. This small study provides a background context for the research which is the subject of this report: the communication of risk and uncertainty among professionals concerned with risk flood risk at the local level. Further details of the study are available in Pappenberger and Faulkner (2004).

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2. METHODOLOGICAL APPROACH

The research undertaken for Work Package 7.3 focused on risk communication between professionals. Figure 5 presents an overview of the research design proposed for the Work Package and shows how this research fits in with the research proposed for Work Package 7.5.

Figure 5: Proposed research design

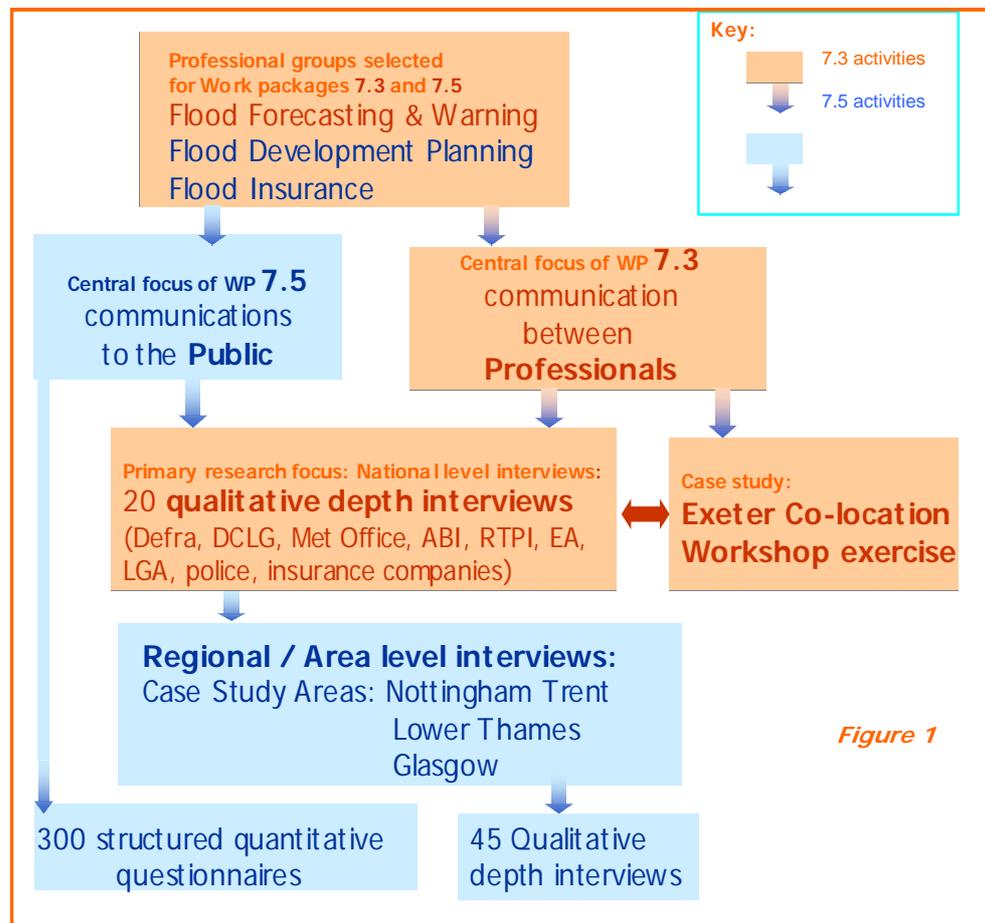


Figure 1

As already outlined our research approach focused on three key contrasting professional flood risk management settings within which a range and diversity of risk communication challenges were explored:

1. Spatial planning and development control
2. Flood forecasting and warning
3. Insurance

Focusing on these three selected professional concerns, we firstly identified the full range of innovative flood risk communication possibilities that are available. The theoretical development in the field of Risk Communication were then researched, and part of that challenge has involved assessing the tools and language used by both science and practitioner from a semiotic perspective. To explore the way that professionals' agendas and contexts act to influence or constrain their current flood risk communication needs and choices, these issues were then evaluated by interviews with practitioners in all three professionals groups. We asked both about the effective communication of both flood risk, and the uncertainties involved in risk estimation.

In order to meet the research objectives outlined, the research was undertaken in two phases:

Stage 1, Flood risk communication at national level

Stage 2, Flood risk communication in specific local geographic settings

2.1 Stage 1: The national context

The research at the national level of flood risk management in England and Wales provided the broad context for the study of local level risk communications. It aimed to provide an understanding of the current status and constraints on flood risk communication at this level of management. It was hypothesised that national policy would be a significant constraint on local level risk communication and therefore that it was important to understand how key professionals communicated with each other and contributed to the development of policy at national level in the three flood risk management settings selected for investigation. It was beyond the scope and resources available for WP7.3 to consider the rather different national context in Scotland in systematic detailed research. Thus the national level research covered England and Wales only.

The national level research involved the following activities.

1. Qualitative in depth interviews with key national informants involved in FRM and flood risk communication. The fieldwork was undertaken from July 2005 to March 2006.
2. A review of national policy documents and papers produced in the period 1998/2000 to 2006
3. Attendance at seminars and conferences in the relevant policy areas: e.g. Joint OPPM/CIWEM Conference 'Consulting on PPS25 & Practice Guide' 16 February 2006, Defra Conference 2006.
4. Other project cross disciplinary research activities and workshops.

Twenty-one national level informants were interviewed from the organisations shown in Table 2.

Table 2: National level sample design and number of interviews

Informant's organisation and Main topic of interest	Flood forecasting, warning and response	Spatial planning and development control	Insurance
Department for Environment, Food and Rural Affairs (Defra)	2		
Environment Agency	4	1	
Met Office	2		
Police	1		
Local Government Association	1	1	
Independent consultant	1	1	
Communities and Local Government		1	
Royal Town Planning Institute		1	
Association of British Insurers			3
Insurance companies			1
Insurance brokers			1
TOTAL	11	5	5

Although the informants are listed under their main topic of interest, a substantial number had more general interests that extended beyond that one area and responded accordingly.

Interviews were undertaken by two researchers mainly at the informant's organisations. National FRM policy has developed rapidly over recent years and therefore the time frame of the interviewing is of some significance. Each interview lasted about 90 minutes. An interview guide (Appendix 1) was used to aid consistency in areas of questioning and to facilitate comparison between interviews, although inevitably some informants focused more on particular topics that were of special interest to them. Interviews were transcribed verbatim from digital recordings and the transcripts were used for analysis. A grounded approach was applied in which concepts were developed from themes within and across the interviews. Concepts were continually tested against the data (Maxwell, 1996). The research was published as McCarthy 2007.

2.2 Analysis of the initial 'Making Space for Water' consultation exercise

The Inception Report for Work Package 7.3, (December 2004) in discussing the methodology, indicated that the researchers would undertake an analysis of the returns from the consultation exercise on the initial 'Making Space for Water' document as the researchers had access to the data disk with all the responses (Defra, 2004). The aim was to provide a background understanding of the perspectives of the professionals engaged in risk communication on the basis of the consultation responses. However, subsequently we were informed that WRc had been engaged by Defra to make a full statistical and qualitative analysis of the responses. Their full report was published in March 2005 (Defra, 2005) and this document has been used to inform the research undertaken in this project.

2.3 Stage 2: The regional/local level context

Whilst flood risk communication challenges viewed at a more *national* scale were explored, it was recognised that there are *local* variations and constraints on risk communication strategy i.e. it is possible that the geographical context of the flooding type (called here the 'flood footprint') generates variations in the tools and the constraints adopted, as well as in the use of FRM language. Therefore, the geographical constraints (upstream or downstream study locations, urban and rural settings) formed the basis of a smaller-scale sample of settings.

Following on from the national level research, research was undertaken in three 'flood footprint' areas chosen to reflect different geographic contexts i.e the urban and rural, and types of flood risk and for their links to other WPs and FRMRC research. These were:

1. The Lower Thames 'flood footprint' : a downstream urban/suburban setting (link to RPA6).
2. The Mid-Trent 'flood footprint: a midstream rural setting (link to RPA4. Williams et al.)
3. The Glasgow 'flood footprint': a pluvial inner urban setting (Link to RPA5)

Within the two fluvial 'flood footprint' areas, Mid-Trent and Lower Thames, the research was again focused on two of the three topic areas in FRM: flood forecasting, warning and response and spatial planning and development control. It was found early on in the national level interviews that local professionals were not involved to any great extent in communicating with each other with regard to flood insurance. Communications on this topic were mainly between professionals such as local authority officers, councillors and insurance agents and members of the public and more directly between national insurance companies organisations and local residents and businesses. Therefore this topic was not pursued at local level.

In Glasgow, the institutional and pluvial flooding context and stage of development of services and approaches there proved to be so different to those in the two English case studies that the focus of the research there had to be rather different and other issues arose.

For example, as in England and Wales, for sewage and overland flow flooding a coordinated warning system had yet to be initiated, developed and implemented. Comparisons with the two English fluvial cases was not possible either geographically or temporally. On analysis it was discovered the focus of the Glasgow case study is directed at the development and implementation of a single important mechanism: the Glasgow Surface Water Management Plan and so the Glasgow case study is presented separately outside this report.

Two of the areas selected for study were different from those proposed in the Inception Report for WP7.3 because further investigation indicated that it would not be feasible to undertake the research in the areas originally proposed: Pont Bryn: link to WP2 and Mid Severn flood plain: link to RPA8.

As the Thames flood footprint area is the responsibility of five local authorities: The Royal Borough of Windsor & Maidenhead, Spelthorne District Council, Elmbridge Borough Council, Runnymede Borough Council and Surrey County Council. It was necessary to select one local authority area as the focus for the study of risk communications between professionals as resources would not allow us to consider all the local authorities there. Runnymede Borough Council was chosen as one of the local authority areas with the highest number of people and properties at risk. In the Mid Trent 'flood footprint' area, Newark and Sherwood was selected as the local authority covering most of the flood footprint area of interest.

Three main methods were used in the case studies:

1. Analysis of local documents such as local development plans/local development frameworks and catchment flood management plans and website information relevant to flood risk communication in the local areas. The relevant documents are noted in the references.
2. Attendance and observation by researchers at local meetings and fora in which flood risk management was discussed. For the Thames case study, these included 3 attendances at meetings of the Thames Flood Forum (29.11.06; 19.2.07; 22.5.07) and three meeting of the Lower Thames Planning Officers Group (22.1.07; 2.4.07; 29.10.07)
3. Qualitative Interviews with key local stakeholders.

As in the national level interviews a contextual approach was adopted in both interviews and analysis in order to address the objectives of the research.

2.4 Selection of key stakeholders in local areas

Our proposal allowed for up to 15 interviews to be conducted with key stakeholders in each case study area and 39 interviews in total were achieved. Informants were chosen purposively i.e as those judged to be most able to give access to information on risk communication in the topic areas of warnings and spatial planning and development control. A snowball sampling technique was used in part, whereby we started with a key stakeholder, for example a manager in the Environment Agency (EA), who was able to suggest others who were, in his or her opinion, in the best position to provide information. Those respondents were in turn asked to suggest the most appropriate additional informants within the key organisations, the EA and the local authority and elsewhere, involved in the risk communication process. For example, in spatial planning and development control, the EA officers with direct responsibility for the local authority area were chosen for interview. Within the local authorities those responsible for community safety or emergency planning were interviewed to give insights into planning for, and response to, flood incidents.

Some of those interviewed had general rather than topic specific involvement in flood risk communication (Table 3). For example, managers with general flood risk management

responsibilities within the EA and EA mapping and data management officers whose work covered both flood warning area mapping and development control were included amongst those interviewed in the general category. Individuals in other organisations involved in risk communication e.g. consultants and developers were included. In the Lower Thames case study, the interviews included in addition to 'professionals' defined here as those whose paid employment involved flood risk communication with other professionals and the public, some informants from community groups were included. This was because these groups were significantly involved in flood risk communications processes involving professionals as well as the public.

Table 3: Interviews conducted for the case studies

THAMES CASE STUDY				
Organisation	Topic area			
	Flood warning	Spatial planning / Development control	General FRM	All stakeholders
Environment Agency	2	4	2	8
Runnymede Borough Council	1	2	1	4
Other organisations	-	-	3	3
All organisations	3	6	6	15
TRENT CASE STUDY				
Organisation	Topic area			
	Flood warning	Spatial planning / Development control	General FRM	All stakeholders
Environment Agency	1	2	3	6
Newark and Sherwood District Council	1	1	-	2
Other organisations	-	-	1	1
All organisations	2	3	4	9
GLASGOW CASE STUDY				
Organisation	Topic area			
	Flood warning	Spatial planning / Development control	General FRM	All stakeholders
SEPA	2	4	2	8
Glasgow City Council		2	1	3
Scottish Executive				2
Other organisations e.g.				2
All organisations	2	6	3	15

2.5 Interviewing and analysis of the interview data

The interviews were undertaken over an extended period from February 2006 to April 2008. This allowed for some changes and developments in policy and its implementation to be followed through! Almost all of the interviews were conducted face to face in most cases at the work place of the respondent. Two interviews were undertaken by telephone. The discussions followed a topic guide (Appendix 1) that ensured that comparable topics were raised with stakeholders. However, this was used flexibly in order to allow for the substantial differences in the involvement of stakeholders in aspects of the topic and the wide range of risk communication mechanisms and practices employed. The stakeholders were given assurances of confidentiality - their names would not be attached to the comments they made and generally respondents made clear that the views they were expressing were personal ones and not necessary those of the organisation to which they belonged. Inevitably, in interviewing a limited number of people from a number of organisations, within which opinions may vary greatly, the responses captured in the interviews cannot be taken as reflecting the average view of staff within the organisation or the organisations' 'official view'. They are used to illustrate findings from analysis that indicate the essence of comments is supported from other the interviews and other research sources.

The interviews which lasted between one and two hours in length were digitally recorded and fully transcribed in all but two cases (telephone interviews). They were analysed in the same manner as the national interviews and but this time using a broad scale grid with which to code and theme the responses. In this case responses to specific themes were sort rather than building from responses to themes as in the national interviews.

2.6 Limitations of the research

The research has some obvious limitations:

1. The stage 2 research was focused on three case study areas only. The areas were atypical in that they had experienced a flood event in recent years: in 2003 in the Thames, in 2000 in the Trent and in 2003 in Glasgow. Thus, risk communication in the case studies took place in a different and arguably a more favourable context than exists in many areas at risk which have not experienced a recent flood event.
2. The research focused on three significant issues within flood risk management, spatial planning, flood warning and response and insurance. However, a salient concern generally and in our case study areas, is with flood risk management through structural flood defences. This issue was not addressed in the research.
3. The stage 1 and stage 2 interviews due to limitations of resources covered a limited number of individuals, roles and organisations. Furthermore, the experiences and views were those of the particular individuals that we interviewed.
- 4, The research was undertaken over a period in which policy was changing and being implemented rapidly. Some of our findings might have been different had the research been carried out during a period of policy stability.

2.7 References

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3. THE FLUVIAL 'FLOOD FOOTPRINTS' AREAS

Description of the Glasgow pluvial flood footprint area is included in the separate report.

3.1 The Thames 'flood footprint' area

The Lower Thames Strategy Study area covers Reaches 3 and 4 of the Thames floodplain to the west of London. It extends from the Jubilee River at its confluence with the River Thames just upstream of Datchet, to Teddington Lock downstream. However, the main focus of the study of flood risk communication between professionals was on the wide flood plain area of Reach 3 from Datchet to Walton Bridge. This flood footprint area is the responsibility of five local authorities: The Royal Borough of Windsor & Maidenhead, Spelthorne District Council, Runnymede Borough Council and Surrey County Council. One of these, Runnymede Borough Council was selected. A specific area within Runnymede called Chertsey was chosen for the study of the social dimension of flood risk communication and management and involved a quantitative survey of local residents (Work package 7.5).

Table 4 shows the large numbers of properties and people at risk in the Lower Thames particularly in the wide floodplain of Reach 3.

Table 4: Estimated properties and people at risk in the two Lower Thames reaches.

Lower Thames Reach Return Period	Properties affected	People at risk (assumes 2.5 persons per property)
Reach 3 Datchet to Walton Bridge		
1 in 100	9,800	25,000
1 in 200	11,500	29,000
Reach 4 Walton Bridge to Teddington Lock		
1 in 100	1,900	4,750
1 in 200	3,000	7,500

Source: Halcrow Group Limited 2005

In January 2003, about 500 properties suffered internal flooding from the Thames and its tributaries in the worst Thames flooding since 1947 (Onions 2003). An estimated 128 properties were flooded from the Thames in the Lower Thames area in that event. The Chertsey Bourne, a small urban tributary of the Thames flooded an additional 128 properties in Chertsey in Runnymede Borough at the same time in a separate but linked event, which had a return frequency of only 1 in 23.

The possibility of providing a flood alleviation scheme for the Lower Thames area has been investigated in past years. In 1992, a Floodplain Management Plan study (Halcrow 1992) had looked at options for flood alleviation between Datchet and Chertsey. However, it was not until the extensive flooding of January 2003 that the EA commissioned the Lower Thames Strategy Study to revisit the issue for the whole of the Lower Thames area. *Phase 1* was undertaken between September 2003 and January 2004. Because of significant changes in land use in the Datchet to Walton Bridge area between 1992 and 2004, information on these changes was sought from local planning authorities. *Phase 2* was undertaken between May 2004 and January 2005, and looked at a wide range of options for the Lower Thames including catchment wide storage, community based options, structural

and non-structural options. As result five alternative strategies have been identified by which the EA could manage flood risks in the Lower Thames. Each strategy represents different degrees of structural (engineering), non-structural and community based options. *Phase 3* aimed to identify the most appropriate and achievable option for the long term management of flood risk in the Lower Thames. In particular, it examined the feasibility and acceptability of diversion channels, river-bed reprofiling and community-based options. The public response to community based options in Reach 4 was researched through a pre-consultation survey study in 2005 (McCarthy et al. 2006, 2008). However, by November 2006, it became clear that the EA would not be able to obtain central government (Defra) funding to carry out the major engineered components of the strategy such as diversion channels because the priority scores were too low to make the work a national priority (Environment Agency 2006).

The Chertsey Bourne had initially been the subject of a separate strategy study. However, it was decided in November 2006 to integrate the Chertsey strategy into the Lower Thames Strategy as Chertsey residents were at risk both from the Thames and the Chertsey Bourne. This was not welcomed by Chertsey residents and organisations who felt that their chances of gaining a flood alleviation scheme were reduced by Chertsey being incorporated into the wider strategy. Thus, the examination of risk communication among professionals in the Lower Thames area took place in the context of raised awareness and concern about flood risk as a result of the flood event and of disappointment that no major flood alleviation works for the area were likely in the near future.

Furthermore, the January 2003 event in the Lower Thames was widely regarded by local people as having been exacerbated by the operation of flood alleviation scheme for Maidenhead, Eton and Windsor, called the Jubilee River, immediately upstream. In order to defuse demand for a public inquiry about the flood event, the EA set up Flood Risk Action Groups and initiated an inquiry under an independent chair into the causes of the 2003 flood event and the functioning of the Jubilee River. Its report (Onions 2004) concluded that the peak of the event was not affected by the Jubilee River but also recommended that the EA should review the operating instructions for its gates. The issue of causes of the flood event and the role of the Jubilee River and its operating instructions have remained a preoccupation of some community organisations and individuals and a significant contextual factor in risk communication in the Lower Thames.

Runnymede Borough Council (RBC) area

Runnymede Borough lies in north west Surrey about twenty miles south west of central London. It has three main town centres, Chertsey, Egham and Addlestone, the first two being located close to the Thames. The Borough also contains a number of smaller villages and suburban areas. The Thames and the River Wey form its northern and eastern edges. In the northwest, the Borough contains part of Windsor Great Park. The Borough extends over 7,800 hectares. At the time of the 2001 Census the Borough contained about 32,000 households and 78,000 people at a density of about 10 people per hectare.

About 78% of RBC's land is in the Green Belt making it an attractive place to live and work but also does limit development. Furthermore, 28% of the Borough's land and 33% of its urban land is at risk from flooding. Over a quarter of the properties within the Borough are at risk in a 1 in 100 year event. The mitigation zone of the Thames Basin Heaths SPA and SAC constitutes another major constraint on development in the Borough. In addition, there are six SSSIs and 42 Sites of Nature Conservation Importance in the Borough. Development restrictions and high demand for housing are reflected in high property prices. It has a strong local economic base with the service sector employing 83% of the workforce, as in the rest of Surrey with manufacturing accounting for only 5%. (RBC February 2006 Core Strategy DPD)

3.2 The Trent ‘flood footprint’ area

The River Trent Fluvial Strategy Study (Environment Agency 2005) covers the River Trent from Stoke on Trent to Newark on Trent. The Trent ‘flood footprint’ case study area comprises a small section of the Trent catchment downstream and to the east of Nottingham i.e. the reach from Stoke Bardolph to Bleasby (Figure 6). For the study of communications between professionals, the focus is on Newark and Sherwood District Council (N&SDC), Nottinghamshire, whose area of responsibility covers most of the reach in question.

Figure 6: Trent case study area



● Reach: Stoke Bardolph to Bleasby

Source: Streetmap.co.uk

Within the Trent ‘flood footprint’ area, a total of 523 properties are at risk of flooding in a 1 in 100 year event out of the total of 14,519 at risk for the Trent catchment as a whole. Table 5 shows the numbers at risk in a 1 in 100 year flood event at specific locations in the case study area (taking into account the protection offered by current flood defences). The numbers of properties at risk in the Trent case study area are a very small fraction (1/ 20th) of the numbers at risk in the Thames case study area.

Table 5: Estimated properties at risk in the Trent case study area

Location: hot spots not an exhaustive list of all flood risk locations	Estimated number of properties at risk in a 1 in 100 year event
Shelford	76
Gunthorpe	215
Caythorpe	61
Hoveringham	114
Bleasby	57
Total	523

The most recent major flooding on the Trent occurred in November 2000, an event with a 1 in 20 to 1 in 50 year return period depending on the location along the Trent (EA 2005). Generally, in the Lower Trent area the EA’s flood defences were reported to have performed well and prevented much property flooding. However, within the case study area, Gunthorpe, as yet undefended was the worst affected settlement with 20 properties and 5 caravans flooded. Other locations suffered less with only one property flooded in Stoke Bardolph, five in Hoveringham and three properties plus 12 caravans in Bleasby. All the flooding was from

the River Trent and none of the areas within the case study benefited from flood defences. Newark outside the study area was badly affected with 46 properties and 60 caravans flooded and the Nottingham to Newark railway was closed by the flooding (Environment Agency Midlands Region, Autumn 2000 Floods Review Regional Report).

Nottingham's flood defences which are nearing the end of their life (considered to be 75 years) are in need of renewal up to the 1 in 100 year standard. Currently some of Nottingham's defences are estimated to be at a lower standard than the 1 in 100. Over 9,500 properties are considered to be at risk in the City of Nottingham during a 1 in 100 year event and as a result options for schemes here attain high priority scores (EA 2005). However, building flood defences in Nottingham, is likely actually to increase the flood risk downstream in the villages in the case study area and this obviously creates a problem for Gunthorpe, Caythorpe, Hoveringham, and Bleasby. Furthermore, flooding could become more frequent with climate change at locations such as Gunthorpe, Caythorpe and Hoveringham and villages on the periphery of the floodplain could experience flooding in locations previously considered to be at little risk (EA 2005). Of the villages in the study area, even Gunthorpe with the largest number of properties at risk was unlikely to qualify for Defra funding because of its low priority score and was not included in the top ten priorities for immediate consideration in the Strategy Study (EA 2005). Furthermore the EA recognised that defending Gunthorpe was difficult because it flooded in about four different areas. However, the EA might nonetheless consider providing flood defences there in the future. One of the options that had been considered was to lower a road in the locality. But this option could well be unwelcome to the N&SDC and the County Council because the cost and the implications for emergency planning. Thus, risk communication in the Trent case study area was taking place in a context of recent flooding and in which there was little immediate prospect for flood defences for the case study villages.

Newark and Sherwood District Council (N&SDC) area

N&SDC is a large District covering about 65,000 hectares and extending over about one third of Nottinghamshire. The District is therefore very much larger in area than RBC (only 7,800 hectares). However, the case study area covers only part of the District and excludes the three main towns in the District: Newark, Ollerton and Southwell. The estimated 2004 population of the District as a whole was 110,000. However, 35,000 or more of the population was in these towns. Thus, the case study area is mainly rural with villages and hamlets and open countryside in agricultural use. Overall, the District is lowly populated with about 1.7 persons per hectare compared with Chertsey with 10 persons per hectare. The population density would be even lower in the case study area. About 10% of the District's land area, including part of the case study area is protected by a Green Belt designation where there is strict control over development.

N&SDC as a whole has a wide range of natural habitats, species and designated sites with 19 SSSIs and 438 Sites of Nature Conservation Importance including some within the study area. (N&SDC October 2005 Issue and Options Paper). Overall, therefore the Trent case study area appears to be less constrained by Greenbelt and Nature conservation designations than the Thames case study.

3.3 References

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4. MAIN FINDINGS: PLANNING

This chapter considers flood risk communications in relation to spatial planning in two fluvial ‘flood footprints’ or case study areas in the Lower Thames and Mid Trent. For brevity, these are referred to as Thames and Trent throughout. These footprints are located within the area covered by the Environment Agency’s (EA) South East Thames Area in the Thames Region and the East Area, in the Midlands Region. Spatial planning and development control in England are mainly the responsibility of local planning authorities (LPAs). Runnymede Borough Council (RBC), Surrey and Newark and Sherwood District Council (N&SDC), Nottinghamshire were selected as the focus in our two flood footprint areas, Thames and Trent respectively.

The research aimed:

- To compare the results for the two ‘flood footprint’ areas and identify any differences between them. These variations according to ‘flood footprint’ are noted in the text and summarised in a separate section where appropriate.
- To examine any variations in risk communication within spatial planning over different temporal scales. At the local level, two distinct activities, and thence the risk communications in relation to these activities, take place over different temporal scales:

‘Planning policy’ which involves the production of development plans: the new Local Development Frameworks (LDFs) and Strategic Flood Risk Assessments (SFRAs) covering the local authority area and other planning documents. These activities take place over a timescale of a number of years.

‘Development control’: the decision processes relating to planning applications for specific developments proposals which takes place normally over weeks or months. Local authorities are required to deal with planning applications once registered within a period of about 8-12 weeks although protracted discussions may take place before an application is submitted.

In addition, there are some longer term, ad hoc and routine, communication activities that mainly serve to raise awareness of flood risk and development issues.

Where appropriate, the risk communication relating to the two key activities and temporal scales are considered separately in this chapter.

4.1 Professional organisations and groups involved: constraints and agendas

Figure 7 showing the agencies and groups that may participate in risk communication in planning, covers in general terms both ‘flood footprint’ areas, and both activities and temporal scales. However, variations according to these different temporal scales and activities are noted in describing each of the professional groups and agencies involved. Differences in the groups and agencies involved in the two case study areas are noted in a separate section.

4.1.1 Local Planning Authorities (LPAs)

LPA’s agendas are influenced and constrained by national policy but also by local political, social and environmental factors which impact both on planning policy and on development control. For, example, 78% of RBC’s land is greenbelt and development is restricted by other designations such as the heathland within the Thames Basin SPA and by fluvial flood risk which affects 28% of the Borough and 34% of the urban land. National housing targets and those set by Regional Plans are a key pressure on LPAs (Runnymede Borough Council,

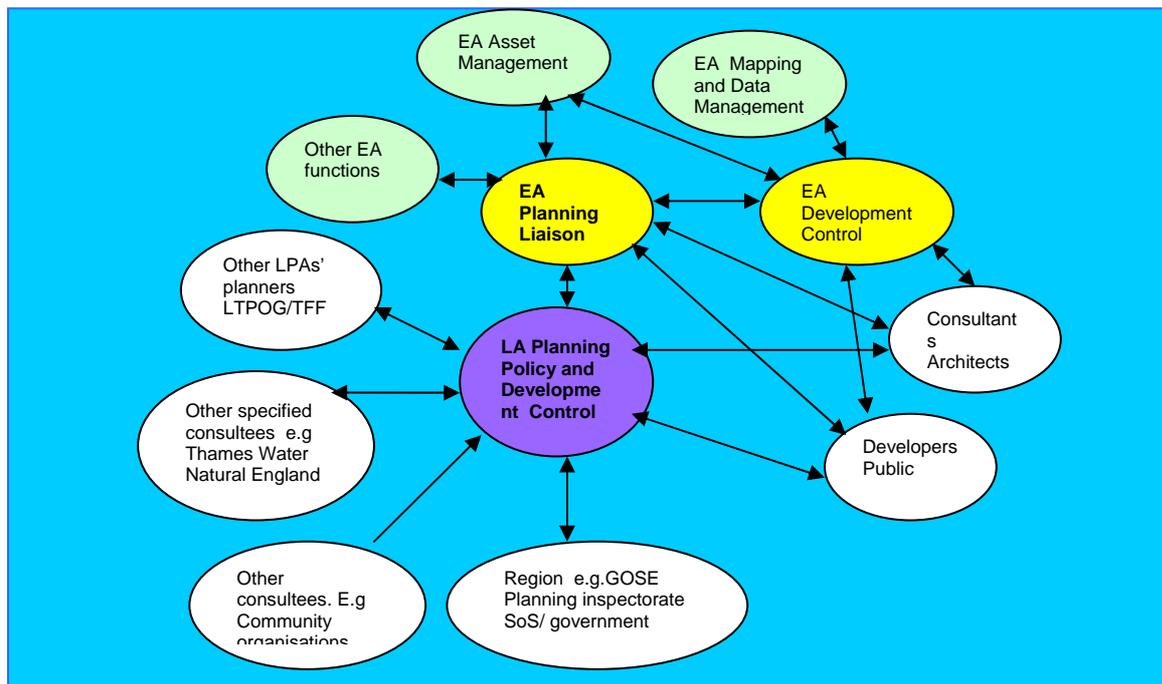
2006). For example, RBC under the South East plan is to provide 165 new dwellings per annum. Newark, where the need for regeneration is a major issue, has been selected as a 'New Growth Point' by government meaning that N&SDC will deliver 20% more housing than it has done in the past. This will require an urban extension or development and releases funding part of which Council wants to spend on flood defences.

Within two local authorities, two separate teams of staff deal with the activities over the different time scales:

'Planning policy' team is responsible for LDFs and SFRA's and other planning policies and strategies:

'Development control team' is responsible for dealing with planning applications.

Figure 7: Agencies and groups involved in planning policy and development control



Planning policy

LPA's Local Development Schemes sets out the documents that will make up the Council's new planning policy framework and the timetable for their preparation and review. Table 6 illustrates the long timescale and the processes involved in the production of each the Development Plan Documents (DPDs) from N&SDC's Draft Local Development Scheme Timetable updated in December 2007. This indicates that risk communication relating to Development Plan Documents (DPDs) is drawn out over a long period and involves a number of stages for each document.

Under national guidance, LPAs must produce the DPDs listed in the table. They may also include optional supplementary planning documents. Many of the documents may include issues, policies or proposals relevant to flood risk. In order to produce a submitted Core Strategy DPD, the document has to go through a number of stages and drafts as shown in Table 6. At the time of the interviews, N&SDC had completed and consulted on an Issues and Options Paper on their Core Strategy, the key plan DPD. They had also prepared a Core Strategy Preferred Options Report by October 2006. RBC made an early start on developing their DPDs and had prepared a Core Strategy Submission document by February 2006. However, as they had had to withdraw this document, they were still

engaged in preparing their Core Strategy. When the new LDFs were proposed in 2004, it was anticipated that the DPDs would be completed within about three years. However, this timescale has proved unrealistic as the experience in the case studies indicates.

The LPA's policy planning in the era of 'spatial planning' has a very wide remit. It is intended to go beyond traditional land use planning by bringing together and integrating policies for the use and development of land with the policies and plans of other local authority service delivery agencies including employment, housing, transport, leisure, greenspace and conservation. Flood risk communication may be a limited albeit an important part of the section's work. As indicated in Table 6, DPDs have to be subjected to initial consultation and engagement and to two formal consultation periods of six weeks duration. Thus, any policies and proposals regarding flooding and flood risk areas contained in DPDs are exposed to a wide range of stakeholders, including developers and members of the public as well as the EA (ODPM September 2004, PPS 12).

Table 6 Newark and Sherwood District Council's Draft Local Development Scheme Timetable updated December 2007 (<http://planning.newark-sherwooddc.gov.uk/pp>)

Development Plan Documents (DPDs)	Issues and Options Consultation	Public participation DPD Preferred Options	Submission to Secretary of State	Pre-Examination Meeting	Examination	Receipt of Inspector's Report	Adoption
Core Strategy	Completed	Sept 2008	April 2009	Sept 2009	Dec 2009	May 2010	June 2010
Site Specific Land Allocation & Policies	May 2009	Nov 2009 2	July 2010	Nov 2010	Jan 2011	June 2011	July 2011
General Development Control Policies	May 2009	Nov 2009 2	July 2010	Nov 2010	Jan 2011	June 2011	July 2011
Adopted proposals map	Not available						

Neither of the Councils had completed their SFRA at the time of the interviews. Consultants for N&SDC (Trent) had completed a Level 1 report in 2007 but the Environment Agency was not yet happy with the report at the time of the interviewing. RBC (Thames) was just embarking on the process of producing their SFRA in 2007.

Development control

RBCs development control section is divided into two geographically based teams. The agenda relating to flood risk for this section is set by national government policy and guidance on development and flood risk i.e. PPG/PPS25 and its Practice Guide and by the hierarchy of relevant adopted plans, Regional Spatial Strategies (RSS) and the local plan and any policies or proposals relating to flood risk they contain. Unlike the policy section, the work of the development control planners is entirely reactive: they have to deal with enquiries and applications as they come in, and they have little control over, the flow of work.

Internally, planners may be involved in consultations on flood risk with a wide range of other officers within the authority. In RBC, the principal engineer who had long experience of flooding in the Borough was a key consultee. For issues of the safety of development proposals within flood risk areas, the Community Safety Officer's or equivalent's advice would be sought as exemplified by the Wapshott Road Enquiry (Appendix 2). The Council's

legal department was responsible for co-ordinating the authority's response to public inquiries including those where flood risk was an issue.

4.1.2 National government, the Government Office for the Region and the Planning Inspectorate

Planning policy

National Government through the Government Office for the Region and the Planning Inspectorate actively oversee, assess and can intervene in the LPAs' development of DPDs. The Government Office must see and assess the Local Development Scheme (the list of DPDs to be produced and the timetable for their production), and their Statement of Community Involvement (sets out methods for consulting the public on the LDF and on planning applications). LPAs have to submit all their DPDs to the Secretary of State for independent examination by the Planning Inspectorate. Inspectors assess the documents for their 'soundness' including their consistency with national and regional policy and plans including national policy on development and flood risk. The powerful role of the Planning Inspectorate in this area is illustrated by the experience of RBC which, following critical comment from the Inspector had no option but to withdraw its Core Strategy document submitted in February 2006 and recommence the process of producing this key DPD, a considerable setback.

Development control

The Inspectorate may become involved in specific planning decisions through a public inquiry where the developer appeals against refusal of planning permission e.g. on flood risk grounds or where national government decides to intervene because of the importance of the planning decision being made. In the Thames case study, unusually, the EA requested that the government call-in the planning application for the Wapshott Road development and the government agreed to hold a planning inquiry because of the importance of the flood risk issues and the new policy context involved. The Wapshott Road case illustrates the planning Inspectorate and national government do not always support the position of the EA on flood risk issues (Appendix 2).

The introduction of a 'Direction' on flooding in December 2006 (DCLG Circular 04/2006 December 2006: The Town and Country Planning (Flooding) (England) Direction 2007) gave additional power to national government and significantly altered the relationship and thence communications between the key stakeholders in relation to development control: LPAs, the EA. The Direction stated that where a local authority is minded to grant permission for a major development in a flood risk areas, despite there being an objection from the EA on flood risk grounds that it has not been able to withdraw, even after discussion with the local planning authority and the applicant, the local authority must notify the Secretary of State of the application. This provides the Secretary of State with an opportunity to check the application's compliance with PPS25 and to consider whether it would be appropriate to call in the application for determination.

The Direction is seen by national government as 'the nuclear option' (Hicks, pers. comm.). It is intended to act as a deterrent to LPAs' ignoring EA advice and to the EA's maintaining objections too readily and to ensure that all parties make every effort to negotiate and find a solution if at all possible. Although there were no cases where the Direction had been used in the case study areas, there were suggestions in the Thames case study that it already had some influence on communications. It was perceived as a constraint on the LPA's taking a different view where the EA had objections on flood risk grounds by one local authority development control officer.

Then we will consult them and obviously take their views into account, but they have this sort of effective veto now don't they,well, its tantamount to isn't it (the Direction) really...

but I guess there are going to be more of these (situations where LPA and EA take a different view), because they then have the right don't they to, for it to go to the Secretary of State, so, and I assume there is going to be, its going to be done by calling an enquiry, not sort of, the fine print of how that will work... (Thames 9).

4.1.3 Environment Agency

Dealing with planning and development control is an Environment Agency (EA) area responsibility. However, the EA areas cover a wide geographic area e.g. RBC is only one of over 30 Boroughs in the South East Thames area. The EA has limited powers in relation to planning and development. Its role is to provide information e.g. in the form of flood risk maps, to advise and seek to influence LPAs and developers with regard to flood risk. Two main EA teams, EA planning liaison and EA development control have responsibility for communications on **both** planning policy (LDDs and SFRAs) and development control (planning applications and FRAs).

Planning liaison is a general non-specialist activity, its officers may come from non-engineering backgrounds and interests and they have main responsibility for liaison with local authorities in relation to all the EA's functions and interests not just flood risk. In Thames, each planning liaison officer has to cover around four Boroughs and these are not necessarily contiguous or catchment based but designed to balance work load and interest for the officers. In the Thames case study, RBC was one of four local authorities allocated to a planning liaison officer. Similarly in the Trent, the planning liaison officer responsible for N&SDC had a total of seven local authorities including the County Council to deal with. Development control officers are more commonly but not always engineers by background and focus specifically on flood risk on a catchment basis both in SE Thames Area and in the Trent and not on local authority areas.

As a Trent EA Planning liaison officer pointed out, planning liaison have responsibility for coordinating responses on DPDs and planning applications across all the EA's functions and interests: flood risk is just one issue but often the key issue to be dealt with.

The Planning Liaison Teams' role is to respond on all Agency issues where necessary resolving conflict decisions and different functions of the Agency. So whereas, there may be one view of flood risk, that may have an adverse impact on bio-diversity interests, and contaminated land issues as well. If there is a conflict in the Agency's different viewpoints, the viewpoints of the different functions, then part of the role is to resolve those so we are giving the view of the Agency. Whereas the Development Control Team is solely one relating to flood risk..... The role of the planning liaison is to influence the decisions on these planning decisions (Trent 6)

In relation to both DPDs and planning applications, the EA has no control over the work flow although the LPAs' Local Development Scheme may give them guidance on when draft DPDs are likely to appear on their desks for comment. The EA is one of about 15 specific consultation bodies that *must* be consulted on DPDs (ODPM September 2004 Planning Policy 12, Annex E Consultees). Similarly, from October 2006 in relation to planning applications where flood risk was a key issue, the EA was made a statutory consultee in Statutory Instrument 2006 No. 2375 The TCP(General Development Procedure) (Amendment) (No.2) (England) Order 2006) for the most developments in Flood Zone 2 or 3: (i.e. excluding very minor developments) and for some other developments. Risk communication on such applications between the EA and the LPA's has become a legal requirement.

For planning applications on major or complex developments up to five or six EA specialists might be consulted by planning liaison but flood risk was often a key issue. (Environment Agency 2006)

Although EA planning liaison were the key contact for LPAs, development control officers were approached by developers, their agents and members of the public about FRA requirements and other queries. A Trent EA development control officer commented:

we deal a lot with developers, all their information comes in through the planning liaison team, but they come through to us, we look at it, give it a technical appraisal, look at the details, as planning liaison says, specifically in relation to flood risk and the principles set down in PPG 25 and PPS 25 as it will be, so we bring out our response in keeping with that guidance and then feed our views back and they are correlated through the planning liaison team with the all rest of the views of the Agency (Trent 1).

Internally, EA development control officers liaise with their mapping and data management sections for information on the confidence in the maps and models that are being used in planning consultations. A mapping and data management officer explained their role:

We don't deal directly with developers or LA's, no. Just Development Control do. They will come to us. A lot of the data is on our server so they can access it, but often they will have a more detailed question about the reliability of it, and where it has come from, who modelled it, when it was modelled, so they have more specific detailed questions about the modelling itself, and also it can be, it will give them a probability or return period for the development, whatever is being developed, so we can, and then the response we send back, we will also copy them in, so they know what information we have provided, so they are not going to give some different information to the same person, which has happened in the past (Trent 3).

Planning liaison and development control officers liaise with Flood Asset Management when there is an issue of using planning gain to fund flood defences and on Catchment Flood Management Plans (CFMPs), strategies and schemes. In the present situation of policy change and uncertainty, EA officers in Thames also reported contacting the Head Office policy adviser and other area's planning liaison and development control officers for guidance on technical and policy issues and for clarification of government policy.

4.1.4 Water Companies

Since LDFs, SFRAs, planning applications and their FRAs are now required to consider flooding from all sources, water companies are important consultees for drainage issues in development plans and for planning applications and their associated flood risk assessments. In the Thames case study, it was Thames Water and in the Trent case study it was the Severn Trent company that was involved.

4.1.5 Developers, their agents, consultants, architects, community organisations

Developers, their agents, consultants, community organisations and members of the public can and do respond to the public consultation that is required for DPDs. Consultants are also used to produce SFRAs for many LPAs. N&SDC had used consultants but RBC were hoping to avoid doing so for their SFRA.

Such groups main involvement in risk communication is in relations to specific planning applications. Developers, their agents, consultant and architects contact the EA development control directly for advice and information on planning applications and the FRA that they are required to provide to accompany almost all planning applications under PPS25. Both the EA and the LPAs encourage pre-application discussions with potential applicants to highlight planning issues including flood risk. Where flood risk is an issue for a development proposal there may be further communication between planning liaison and development control and the developer.

Consultants are increasingly used by developers to produce the FRAs for major developments and now have a key role in risk communication both with the EA and with their client, the developer or agent. For major planning application, consultants may undertake modelling if there is none available from the EA. In this way, the EA is in some situations no longer the key or sole source of flood risk information which is at the heart of flood risk communication. The consultant employed initially by the applicant on the Wapshott Road planning application explained that his role and the developers requirements were not simply to provide information on the flood risk but also to advise them in the new policy context on the policy and its implications for the application. The consultants were able to advise their clients in the early stages that the proposed development sites nearest to the Thames were highly unlikely to be allowed and the developer then dropped them.

So what they (A2 housing, the developers) wanted to know, they clearly had an issue, they knew they had a problem with the flooding on the basis that the flood map and what they wanted to do was in the blue (at 1 in 100 risk from flooding) so that they knew they needed to appoint someone. We had done work for them before so I got a telephone call and in the first instance it's what they want is to know what they're up against really in terms of how... not just physically in terms of flooding, but also on the policy and response to the agency and in relation to things like PPG25 as it was then (Thames 6).

This consultant also gave his view on the role and agenda of developers:

From A2's, from a lot of developer's perspective is that they just.... the prime focus is on building houses and putting people in them.....This (flood risk) is just a complete inconvenience that we're.... in terms of their primary objective, their sole objective is with their housing stock and to get people in houses. This (flood risk) is something to one side, is a hurdle to be jumped in the system and that's the way that they view it. (Thames 6)

4.1.6 Differences between case study areas

The roles and agendas of LPAs and other stakeholders are very powerfully influenced and constrained by national policy. Furthermore, within the EA, there has been a significant drive to achieve national consistency in policy and its implementation across EA regions and areas (McCarthy 2007). Therefore, it is not surprising that only minor variations in roles, and agendas between the case study areas were observed. However, in both areas there were some specific local organisations that were both agencies in the risk communications process and served as communications mechanisms or arenas for communications. These are listed in Table 7 below discussed as mainly awareness raising mechanisms.

There were, in addition, certain individuals in the case study areas who acted as 'champions' and who stood out as communicators in the field of flood risk. For example, in the Thames case study, there was one local planning officer in a borough with severe flood risk issues who had a particularly good grasp of spatial planning issues and flood risk who provided a degree of leadership to planners in the area. His contribution to awareness raising was recognised by a Thames EA development control officer.

I mean he is a really good ally to have.....a really forward looking view and its great at meetings if he is there, I know that I am going to have a fairly easy ride from the others. You know he has a lot of respect from the others, and if he is there I know what I say is going to be endorsed by the rest of them.... (Thames 1)

Many councils do not maintain a drainage engineering capacity since they no longer have key drainage responsibilities. RBC was unusual in still having an experienced principal engineer to advise them on flood risk. He had been with the Council for nearly 20 years and had a wealth of personal experience and local knowledge of flooding and drainage issues in the Borough and with long term experience of flooding and drainage issues there. He was

seen as a special asset by RBC planning officers and as an aid to communications by the EA officers as the following comment from an EA planning liaison officer indicate.

I had a very good meeting with Runnymede about their strategic flood risk assessment the other week and I am so happy they've still got the drainage team. A lot of knowledge, yes. He knows so much about local flooding They should have a fairly easy ride doing their flood risk...flood risk assessment compared to some of the others. (Thames 3)

In the Trent case study, the leader of one of the flood action groups was a key figure in the community as an EA manager explained.

He spends all his time trying to protect everyone's rights so he's well respected in the community, he's seen as a local expert and he styles himself as a flood risk expert,... he understands a bit about modelling,....He can go through the data, he's got time to do that... he tries to find ways of undermining the modelling.. (Trent 5)

In this case it was reported that while there was initial conflict between the EA and this individual. With time a more amicable and productive relationship ensued.

Thus, the presence of a few specific local organisations and of some influential individuals accounted for the main variations in organisations and agencies in risk communication in the case study areas.

4.2 Needs, strategies, and communication tools

The main communications mechanisms and tools identified in the research are summarised in Table 7. Some of these were used in communications in relation to both planning policy, and in relation to planning applications and development control and thus operated across both temporal scales. In addition, many served to raise awareness of flood risk issues in relation to spatial planning generally.

Table 7: List of communication tools, mechanisms and strategies

Tools/mechanisms/strategies for risk communication that relevant to:
Both Planning policy(LDFs/SFRAs) and Development Control
National policy and guidance documents: <ul style="list-style-type: none"> • PPG25/PPS25 • Practice Guide • High Level Target 5 (HLT5)
Development Plans: <ul style="list-style-type: none"> • Regional Planning Guidance/Regional Spatial Strategies/Regional Flood Risk Appraisals • County Structure Plans • LDFs/Local Plans and SFRAs
EA plans, flood maps and modelling: <ul style="list-style-type: none"> • EA National Flood Zone maps, historic and recent flood records, EA flood modelling • Flood modelling by others for SFRAs and FRAs • LPAs' Websites
Planning policy (LDFs/SFRAs)
<ul style="list-style-type: none"> • EAs CFMPs and other non-statutory plans • LPA/EA and others communications on LDDs and SFRAs • Planning Inspectorate: communications on, and examination of LDDs • Local Strategic Partnerships and Community/Sustainable Community Strategies
Development control (planning applications and FRAs)
<ul style="list-style-type: none"> • Pre application discussions with developers • Pre-application form • EA Standing Advice Development and Flood Risk – England March 2007 • EA pipernetworking website • LPA/EA/developer communications on planning applications and FRAs • Planning Inspectorate communications and inquiries on planning applications
Mainly awareness raising mechanisms/arenas
<ul style="list-style-type: none"> • Chertsey Bourne and Thames Flood Forum (TFF) • Trent Forum • Lower Thames Planning Officers Group • Flood Action Groups e.g. G Flag and Thames Awash • Other community and amenity groups e.g. Chertsey Society • Other awareness raising activities

4.2.1 Both planning policy and development control

PPG25/PPS25 and the Draft Practice Guide as national government mechanisms

These documents are central government's key mechanisms for communicating its policy on development and flood risk to Regional Planning Bodies, and LPAs, developers, consultants and any interested parties. LDDs and planning applications have to be in conformity with the national policy presented in these documents. Therefore, a key strategy for all parties, LPAs, developers and the EA is to strive to understand and interpret the detail of these documents and apply it. Planning application decisions on appeal or when called-in as in the Wapshott Road case and LDDs will be scrutinised by the Planning Inspectorate for conformity to national policy. Thus, much of the discourse at the Wapshott Road Public Inquiry was

concerned with the extent to which the application was consistent with government policy as (then) presented in PPG25 and in the Consultation document of PPS25.

An EA officer recognised that the new policies and guidance had themselves been useful flood risk communications tools highlighting flood risk issues.

'Well I think actually PPS25 is a big step towards that with strategic flood risk assessment which does put the emphasis very much on the local authority and gets them thinking about it. I think that's done huge amounts to raise awareness within local authorities, not only on fluvial flooding, but surface water, foul drainage, groundwater flooding, issues that weren't necessarily raised before'. (Thames 3).

A LA planner also acknowledged that PPS25 has been effective in raising awareness.

Councils have always appreciated the consequences of flooding but PPS25 has sharpened our focus. (Trent 7)

Thus the influence of these tools in directing attention and encouraging groups and individuals to take action is clear.

High Level Target 5 (HLT5) Development and Flood Risk

HLT5 for England requires LPAs and the EA to report to government, first, on development plans of all kinds commented on and whether or not they contained flood risk policies or statements; second, for planning applications, where the outcome is known, and where the EA sustained objections on flood risk grounds, on whether or not the decision was in line with the EA's advice. In 2005/7, none of the 13 cases where major development was allowed against EA advice occurred in the case study LPAs (EA 2007, High Level Target 5 Development and Flood Risk in England 2006/7). HLT5 reports are the means by which the performance of the EA and LPAs in planning and development control is monitored by Defra/CLG. The targets and their reporting provide an additional mechanism for communicating national policy objectives and constraining the actions of the LPAs and the EA

Regional planning documents i.e Regional Spatial Strategies, County Structure Plans

LDDs and planning applications decisions also have to be in conformity with a hierarchy of higher level plans i.e. the Regional Planning Guidance, that is being replaced with Regional Spatial Strategies (RSS) and the County Structure Plans that used to cover sub-regional strategic planning but that are now being phased out.

LDD policies and planning application decisions on flood risk have to be consistent with policies in these higher level plans. This was apparent in the Wapshott Road Public Inquiry where not only national policy but also the then Regional Planning Guidance for the South East (RPG9, 2001) (policy INF1) and the Draft South East Plan and its Sustainable Flood Risk Management Policy (NRM3) and another policy (NRM1 which encouraged sustainable drainage solutions), the Surrey Structure Plan (2004) and its policy SE3 on Flooding and Land Drainage, the adopted Runnymede Borough Local Plan policy SV2 (RBC, 2001) and RBCs policy CS11 in its Draft LDF were considered in the applicants' (the LPA and A2 housing) Proof of Evidence (Jenkins, 2006) and formed a significant element in the discourses of other parties. A requirement and a strategy for all parties in this and other planning applications is to demonstrate conformity or in the case of objections to applications, non-conformity with the plans.

EA flood data, maps, modelling and animations

The two main national flood mapping outputs produced by the EA and available on the internet are key flood risk communication tools between agencies and groups of all kinds and members of the public. First, the National Flood Map based on broad scale J flow modelling shows the natural flood plain (i.e. the places that could flood if no defences were in place). It shows for England and Wales flood risk areas, the flood zones as defined for

spatial planning purposes in PPS 25: flood zone 3 (1 in 100 for fluvial flooding/ 1 in 200 for coastal flooding or greater i.e. high probability or major flooding), in dark blue; and flood zone 2 (1 in 100/1 in 200 to 1 in 1,000 i.e. medium probability or extreme flooding) in light blue. As information becomes available, the locations of recent defences (i.e. built in the last 5 years) and the areas protected to the 1 in 100 fluvial or 1 in 200 level coastal are shown as hatched areas on these maps. These maps were specifically designed to be consistent with PPS25 and to be of use to spatial planners. They show the flood plain without defences specifically so that planners are made aware of areas where there is a risk given that defences could fail or be overtopped. The flood map on the internet shows only a small proportion of the information held by the EA based on the national flood mapping.

Second, there is National Flood Risk Assessment (NaFRA) data, a broad brush assessment showing variations in the residual likelihood of flooding (i.e. the risk that remains with flood defences in place). This data and the maps on the internet identify the chances of flooding in particular areas. Three categories of risk as agreed with the Association of British Insurers are shown: low (risk of 1 in 200 or less), moderate (1 in 75 or less but >1 in 200), significant (> 1 in 75) each year are shown for 85 river catchment and coastal cells. On the internet, by clicking on a location in either of the blue areas on the Flood Map, an indication of whether the location is at low, moderate or significant risk will be given. This data is geared to the requirements of the insurance industry. It is stressed that neither the Flood Map nor the NaFRA data provide data to the level of detail for individual properties in an attempt to convey the uncertainty of the data provided in this tool.

The Flood Map data along with any additional information such as historic or modelled flooding data that the EA may hold is the starting point for discussion both for LDFs and SFRA's and for specific planning applications and their FRAs. A RBC planning policy officer explained the reliance his authority was placing on EA flood maps supplemented by information from other sources for its SFRA.

At the same time all of the Boroughs have to produce an SFRA, some of them, most of them have appointed consultants to carry out assessments of where, of the level of risk and where the, where the flood plain might lie in terms of a 1 in 20 event, a 1 in 100 event, a 1 in 1000 event, and also all of those events in combination with the climate change requirements. Interestingly, here in Runnymede, we have taken a cheap approach, we haven't brought in consultants to do that work, we rely wholly on the Environment Agency's flood maps of, again, 1 in 20, 1 in 100 and 1 in 1000, plus climate change built in, but they only build in climate change for the 1 in 100 event, so, but that is, that is the most critical ones so far as, as far as PPS25 is concerned, the 1% event, plus climate change, that is kind of the break point, between acceptable development and unacceptable development, so we are happy to go with that, so we are using the Environment Agency's maps (Thames 5).

A RBC development control officer noted that on receiving planning inquiries or applications: *one of the main things you check out what are the constraints, so we have got that information in various forms, but have you seen our RIM system on our internet.....Runnymede Interactive Management Service, so if you go on to that, you can sort of look at that. The Environment Agency provides us with flooding information....., but periodically and much more, and we have many more sort of updates from them recently. We get a sort of, new set of maps sent through.* (Thames 9).

The EA generates new flood risk information through a programme of modelling to supplement and enhance the national flood map. A Thames mapping and data officer explained that development pressures and thus planning needs now play a part in guiding the modelling programme in Thames area.

What we basically have is a rolling programme; it probably goes out for about five years... How that originally was set up was based on sort of national targets that we

were set for the flood mapping strategy at first, so from 2003 to 2008 I think it was, the figures. What that strategy kind of aimed to do was in addition to having the J Flow for all of the area it would - the detailed modelling for all catchments, so when the programme was first set up it basically was just a chronological order of the catchments that we were going to do the mapping in. As we kind of got more and more into that strategy, and over the last sort of eighteen months or so, different priorities have obviously come up kind of locally, so it's not just the mapping strategy now that drives our modelling, mapping work that we do, it's development pressures, it could be flood defence pressures, it could be a higher - high priority catchments where we need to update the modelling, because you kind of update the modelling sort of every five years maybe on average anyway. (Thames 7)

However, the EA is no longer the sole generator of modelled data. Local authorities may employ consultants to undertake modelling for their SFRA. For major developments, developers commonly also use consultants to produce models for their FRAs to support their planning applications.

A relatively new method of communicating mapped and modelled flood risk data is through computer animation. This allows the speed of onset, velocity, flood routes and spread and depth of flood waters over time to be shown dynamically. This tool was used in the Wapshott Road Inquiry to demonstrate the slowness of onset and spread of flooding there. A RBC development control officer commented on the usefulness of data beyond the mapped flood extent and of this form of visualisation as a means of communication.

I mean it would be useful if we had more user friendly information. I mean now with Wapshott, if anything came up in that area, we would have details of a simulated flooding event. I mean even if we had that for the whole borough, wow, you know, that would be amazing, we could easily see the sort of speed and the depth of flooding, and that would be an amazing resource to have..... (Thames 9)

LPAs' Websites

LPAs' websites are a source of detailed information about both planning policy and planning applications generally. They give access to, for example, reports for LDDs, consultation responses including those from the EA and information on the LPAs progress on its LDF and SFRA. They also provide details of planning applications and their progress, objections, appeals and public inquiries. Included within this information are details relating to flood risk issues.

4.2.2 Planning Policy

CFMPs, Shoreline Management Plans (SMPs) and River Basin Management Plans (RBMPs)

In general, all these plans may have a role in communicating about flood risk. However, given that the RBMPs were not yet available and the two flood print areas were landlocked, only the CFMP was relevant. These non-statutory plans are intended by government to provide input into development plans at both regional and local levels. They are mainly relevant to planning policy. Being catchment based they cover a much wider area than do local authorities. In the Thames, the consultation draft of the Thames CFMP was published at the time when the interviews were taking place and had therefore not had an opportunity to have any impact on planning policy. This document was necessarily very general but it was strongly directed toward spatial planning since it had specific messages for types of catchment areas including undeveloped natural floodplains, developed flood plains with and without built flood defences. Its main messages also addressed spatial planning issues such as development and urban regeneration and flood risk (Environment Agency 2007a). The River Thames CFMP Final Draft Report was published in October 2007 after most of

The project interviews were completed. This document explicitly states its relationship to land use planning:

We hope to use this document to ensure that policies and plans that affect land use planning (and other things listed) in our catchments take into account flood risk management. (Environment Agency 2007b)

The River Trent CFMP main stage report covering the whole catchment of the Trent was also published for consultation in October 2007 (Environment Agency, Midlands Region 2007).

Communications and LDDs

As one EA planning liaison officer stressed, the LDF documents themselves are important communications mechanisms. It was important to ensure that they contained appropriate flood risk policies and land allocations since these inform and constrain planning applications.

So, from the Planning Team's point of view I think a lot of it's going to come through the local development frameworks, the sort of new plans, so if we can get in the policies and our strategies into the local framework and evidence base, then I think we're in a far stronger position,(Thames 3)

This was not simply a matter of offering standard policy statements on flood risk for inclusion as written responses to consultation of LDF documents. Written responses had to be tailored to fit in with the varied style and presentation adopted by the local authorities in their LDDs.

because some councils are doing really detailed long policies, and others are doing nice, short, snappy ones that you can relate to and have a lot of supporting advice with it, and if we're going to have a set policy that's either one of those options, and it doesn't fit necessarily with the document,.....it's got to be based on the style of the document, and the local situation. (Thames 3).

Consultations on LDDs were reported to be mainly through written comments in response to formal consultation with occasional meetings mentioned. LPAs go through a long drawn out process and number of stages and drafts in producing their LDDs. This is illustrated by N&SDC's development of its Core Strategy. The Council as a first stage produced an Issues Report (N&SDC 2003). This was followed by a 'Core Strategy Issues and Options Paper' (N&SDC October 2005). The EA in its written comment expressed concern at the absence of the topic of flooding from the paper and suggested points in the document where mention should be made of this issue. A third report, 'Core Strategy Preferred Options Report' (N&SDC October 2006) did contain a policy on flood risk and the EA's response indicated ways in which the wording of the policy should be strengthened and other points where the sequential approach to flood risk would need to be applied. All the documentation; the Reports, consultation responses and the LPAs responses to consultation were posted on the N&SDC's website and this documentation constitutes another way in which information about flood risk is made available.

Communication and SFRAs

The SFRA's in themselves will make available new flood risk information and will constitute an important new flood risk communication mechanism when in place that will be a key source of information for developers and other parties on the flood risk in the area. The production of SFRA's also generates new communication processes between parties that may be involved: the local authorities, the EA, consultants, water companies and in some instances developers. Much of this communication takes place in written or e mail form but some meetings on SFRA's were reported.

The new requirement on local authorities to produce SFRA's for their area has lead to a demand for data on flood risk beyond that provided by the national flood zone maps. N&SDC required, for example flood maps covering a wide range of return periods (1:5, 1:10,

1:25, 1:50, 1:75 and 1:100) as well as information on the cause, depth and direction of flooding from the River Trent and information on surface water runoff and its management (N&SDC) Strategic Flood Risk Assessment: Brief for Consultants). A RBC policy planner pointed out how the SFRA when completed would be a powerful tool for communicating about flood risk to developers and the public.

Well the SFRA will, yes it will have policies, it will have draft policies in it. What it will say is that, this is the flood risk in our Borough. Therefore, these are the kinds of policies we need to have in response to that to ensure that development is safe, and these are the ways in which we will regulate development to ensure that the development is safe, or that various resilience measures are built into the development that passes various tests you know, sequential test and the, can't remember what the test is called now...(Exception Test) (Thames 5)

The EA clearly has a key role in the production of the SFRA, providing data and commenting on policies and modelling, as the comment from a RBC planner indicates but consultants and developers may be involved as well. Most of these communications will be in written form.

I have already sent a version of the SFRA, this is back in early 2007 to them, just to have a look at, but I hadn't at that time completed the SFRA, and once I have completed it, I will send it again to them for their comments prior to actually going to the council for adoption, because as I mentioned earlier, I will have some draft policies in there, and once, once the EA has said it looks alright, both from a technical point of view and from a draft policy point of view, then it will go forward as a draft policy which we will adopt for developmental purposes; it will be subject to some public consultation, again the EA will be one of the people we must consult on our draft policies, and it will be part of our evidence base which will form the final core strategy anyway, so yes, we will have further communication with the EA. (Thames 5)

RBC in producing their SFRA will benefit from, and draw together modelled data already available for the Lower Thames from various sources.

We also have, when we had the Wapshott Road enquiry, we did employ some consultants to show what the extent of flooding might be upstream and downstream of the Wapshott Road site, and that covers quite a large part of our Borough anyway, particularly along the Thames, and we also have the benefit of Spelthorne having commissioned its' flood risk assessment which didn't just cover their side of the river, but it covered our side of the river as well... so you can literally download that from that (Spelthorne's) website, part of their evidence base. So essentially I suppose, at Runnymede we have relied on EA information, other Boroughs information, now Wapshott Road information, and some local information fromour Principal Drainage Engineer, from his local knowledge, because he has been with the Borough for a long time, so he knows what the, you know whether things have flooded, either Thames flooding or local flooding from sewers, drainage flooding off roads and things like that so, backflow from drains and things, (Thames 5)

A RBC policy planner also reported that working with the EA over the SFRA had made for greater communication and enhanced their relationship.

.... at the end of the day the EA are going to have to look at all the SFRA's anyway and say whether they think the SFRA is up to the job, both in terms of the technical information that has been used and interpret, the way it has been interpreted locally and also whether the policies that are being proposed by the local authority are adequate or not, and address the issues properly, so again, I think the EA is certainly, certainly as a result of PPS25, both we and the EA have been forced into the situation of having to work much more closely together and it has been to our mutual benefit, I think that is the bottom line (Thames 5)

As a Thames mapping and data management officer pointed out, the requirement to produce SFRA had led to new cooperative working relationships and financial benefits to the EA in some instances.

We've kind of been involved probably in about - it could be about six or seven strategic flood risk assessments, to differing levels really, some of them all they've asked for is the data and then that's that, some of the members of my team have been to meetings, talked a little bit about the modelling that we already had, certain areas and things, one of them we actually did a bit of partnering work to get some survey with them, so they wanted to construct a model for a catchment where we had no modelling and it wasn't quick enough for them for their flood risk assessment they carried out a survey and then we basically funded half of it on the understanding that we would then use that data for our mapping in the future, so that's worked quite well, and I think that kind of strategic flood risk assessments or flood risk assessment is almost viewed as a way that we can improve modelling without actually having to kind of bear the full brunt of the costs on the agency and the partnering working, it is quite a positive way forwards, to the advantage of both parties really because they get our expertise internally and we get kind of, you know, shared contribution from them over the mapping, so – (Thames 7)

Planning Inspectorate communications on DPDs

Much of the communication between Inspectors and LPAs and other parties is in written form and consists of letters and reports as Table 1 on the NS&WD LDS indicates. However, meetings are also involved. Routinely, there is a Pre-examination meeting to discuss the arrangements for the examination of DPDs. The communications may involve a wide range of DPD issues but flood risk and how it is treated may be one of them for example, in relation to RBC's submission of their Core Strategy document, a key component of their LDF, the Inspector sent preliminary notes setting out his concerns regarding the draft document. He then called an exploratory meeting at RBC offices in March 2007 involving RBC, the Government Office for the South East, EA and Natural England representatives to discuss these issues. The way flood risk issues were handled was part of the Inspector's concerns with the strategy's evidence base although the Inspector commented that the absence of a SFRA was not a 'showstopper' for the Core Strategy ((Runnymede Borough Council, 2007).

Local Strategic partnerships

The Local Government Act 2000 required LAs to set up Local Strategic Partnerships (LSPs). These are non-statutory partnerships that bring together public, private, community and voluntary bodies within the local authority area. These bodies and their Environmental Task Groups contribute to the development of Community Strategies, relaunched in 2006 as Sustainable Community Strategies. These wide ranging strategies are intended to feed into the LDF documents. The LSPs thus potentially provide another mechanism for raising awareness of flood risk issues and for influencing Sustainable Community Strategies and thence the LDF. Following the introduction of the LSPs, the EA carried out a review of their potential as a means of furthering the EAs interests and the research offered guidance on LSPs and on how EA work with LSPs would need to be prioritised because of the number of LAs (Environment Agency 2003).

However, in the Thames case study, an EA manager was of the view that LSPs were a much less effective mechanism for communicating about flood risk than the Thames Flood Forum because their remit was so wide. Others actively involved with the RBC LSP reported that flooding issues were regularly raised in the Environmental Task Group. In Mid-Trent, no mention was made of LSPs as a mechanism, although a group called On Trent did involve flood issues in their wider concerns for the Trent River.

4.2.3 Development control

Pre application discussions and forms and EA advice

Both the EA and the LPAs encourage developers and householders to contact them before they submit planning applications by telephone, writing or, in the case of local planning officers, in person. These communications can be a valuable way to negotiate appropriate solutions where flood risk is an issue as an EA Thames Planning Liaison officer noted.

so if we talk to the developer about, and point out what the risks are and that there's a hard bit of ground over here, I mean obviously the developer is weighing up the other material considerations and the landscaping and overall look and sorts of impact, and access and things, and relationship to other buildings, but quite often you find that they can re-jig their layouts a bit, or that as I say compensation can be provided and it might just be that...I don't know, the developer hasn't thought about it, so we do try and encourage a pre-application discussion as well. (Thames 4).

In addition, the EA has developed a Pre-Application Enquiry Form available for prospective applicants to fill. The aim of the form is to ensure that when prospective applicants consult the EA, the EA has all the information it needs to provide a timely and meaningful response. It also advises contacting the LPA before submitting an application. The form covers flood risk and drainage issues.

generally we'd suggest that people look at that first (pre application form), fill in the bits they can and then come back to us on the basis that if they give us the relevant bits of information we can get back to them more usefully and more quickly. (Thames 4)

EAs planning website (<http://www.pipernetworking.com/floodrisk/index.html>)

This site is a key EA mechanism for communicating the information that it considers developers and LPAs need to have regarding development and flood risk. It provides guidance on requirements for FRAs for planning applications, a Sequential Test Results Table to enable developers and LPAs to demonstrate that a sequential approach has been adopted and notes on PPS25.

EA Standing Advice Development and Flood Risk - England, March 2007 and Consultation matrix

This is available on the internet (http://www.pipernetworking.com/flood_risk/index.html); it provides the EAs advice to LPAs on the level of consultation with the EA required for planning applications according to the type of development and probability of flooding. The aim of the matrix is to ensure that the EA is approached for a bespoke consultation on flood risk only where necessary and not for low risk and low priority applications where standing advice can be used. This is an attempt thus to ensure that the EA's time is spent effectively.

The aim of the advice is to enable LPAs to make decisions on low flood risk applications without directly consulting the EA by providing standard responses for certain cases identified on a matrix. The matrix also indicates the types of development according to flood probability zones where specific consultation is required. This strategy enables the EA to concentrate on the applications where flood risk is a more serious issue. In the cases where consultation is specified, the EA would provide bespoke written responses and meetings. SE Thames Region reported it has been necessary further to prioritise consultations because of pressure of work. The LPA planning officer commented on the use of the Standing Advice:

So obviously we consult the Environment Agency, we have got the standing advice thing with them, so we don't consult them on every application, but where we are unsure or we want their view on where it is that we are (Thames 9)

Figure 8: EA Standing Advice to LPAs: Consultation Matrix March 2007

A1 Development category	B1 Development (including boundary walls etc.) within 20 metres of the top of a bank of a Main River	C1 Includes culverting or control of flow of any river or stream	D1 Within Flood Zone 3	E1 Within Flood Zone 2	F1 Within Flood Zone 1
A2 Householder development and alterations	B2 Consult EA Note	C2 Consult EA with FRA showing design details of any culvert or flow control structure proposed	D2 No consultation - see standard comment Note	E2 No consultation - see standard comment Note	F2 No consultation - No EA Advice
A3 Non-residential extensions with a footprint of less than 250m ²	B3 Consult EA Note	C3 Consult EA with FRA showing design details of any culvert or flow control structure proposed	D3 No consultation - see standard comment Note	E3 No consultation - see standard comment Note	F3 No consultation - No EA Advice
A4 Change of use FROM Water Compatible TO 'Less Vulnerable' development	B4 Only consult EA if site also falls within Flood Zone 3. FRA Required.	C4 No consultation - no EA advice	D4 Consult EA with FRA	E4 No consultation - no EA advice	F4 No consultation - No EA Advice
A5 Change of use RESULTING IN 'Highly Vulnerable' or 'More Vulnerable' development	B5 Only consult EA if site also falls within Flood Zone 3 or 2. FRA Required	C5 No consultation - no EA advice	D5 Consult EA with FRA	E5 Consult EA with FRA	F5 No consultation - No EA Advice
A6 Operational development less than 1 hectare	B6 Consult EA Note	C6 Consult EA with FRA showing design details of any culvert or flow control structure proposed	D6 Consult EA with FRA and Sequential Test Evidence (and where required confirm Exception Test has been applied)	E6 Consult EA with FRA and Sequential Test Evidence (and where required confirm Exception Test has been applied)	F6 No consultation - see standard comment
A7 Operational development of 1 hectare or greater	B7 Consult EA Note	C7 Consult EA with FRA showing design details of any culvert or flow control structure proposed	D7 Consult EA with FRA and Sequential Test Evidence (and where required confirm Exception Test has been applied)	E7 Consult EA with FRA and Sequential Test Evidence (and where required confirm Exception Test has been applied)	F7 Consult EA with FRA

EA/LPA/Developer consultations on planning applications

In Thames, a RBC development control officer reported that consultations were by letter with the actual application documents accessible on the website but this officer personally often made follow up e mail or telephone contacts.

we now actually only send them a letter and they refer to documentation on our website, we started doing that with our consultees ...like, yes, and that is a fairly recent development within the last few months.....we used to send them a paper copy, I'm not sure on their perception of how that is working I am sure they would rather have a paper copy but who wouldn't, but hey, we are supposed to be saving the planet aren't we, so. So initially it's that, and they are given 21 days I believe, 21 days in which to.....and if we haven't heard and we have got to write it up and whatever, we just phone them or e-mail them, I mean they (EA) are very approachable if you give them a ring, so, yes (Thames 9).

This officer stressed the importance of personal communications as compared with written communications.

most applications where I have consulted them (EA), I would speak to them, I can't speak for other officers who I suspect aren't quite so; I tend to get on the phone and speak to people or e-mail them so you know, you can understand where people are coming from or have something they feel about it because you can't tell in a bland

letter necessarily, and I think its helpful to discuss rather than just accept the black and white in front of you sometimes, so...(Thames 9)

This RBC officer also commented that meetings with the EA were rare communications mechanisms. However, some EA officers reported occasions when they had met with applicants, their agents and local authorities on site or elsewhere to discuss flood risk issues. A consultant described how initially, there were frequent meetings and correspondence with the EA regarding the flood risk on a development site but how communication with the EA ceased once it was clear that they were going to object in principle to the development.

Our role then is interfacing with the Environment Agency; we almost knew what they were going to say, and the architect in terms of developing schemes and influencing the application proposals so that they address the risk issues.We went to see them and through correspondence, yeah. There was, quite important interface really and the agency hold lots of information, we know that, so we need to have access to the data they have all the Thames flood models so we had to obtain a lot of data and information from them technically (Thames 6).

Public Inquiries on appeal against refusal of planning applications or on call-in

Appeals on refusal of planning applications may take the form of written representations, an informal hearing or a full formal public inquiry as exemplified by the Wapshott Road case. Where these involve flood risk issues and usually flood will only be one of a number of material considerations, they represent a failure of other mechanisms of written communication, and meetings and negotiations to resolve differences between parties and reach agreement on development and flood risk.

Major formal public inquiries on planning applications that involve barristers inevitably become adversarial and confrontational between the parties. Inquiries such as the Wapshott Road Inquiry require the production of lengthy written 'Proof of Evidence' documents by the parties and appearances lasting many hours by witnesses for presentation of evidence and questioning by barristers. The process, for example the Wapshott Road inquiry, was reported as being very 'hard' on witnesses as barristers sought to undermine the opposition case through clever questioning. As an example, the Wapshott Road Inquiry allowed for the detailed examination of policy and its application in particular circumstances including where issues of flood risk are key.

Such Inquiries themselves represent influential flood risk communications mechanisms in the evidence and arguments presented and in the presentation of appeal decisions and reasoning behind them in the Inspectors Report and in the Secretary of State's letter in response to the Inspector's report. The arguments and decisions in public inquiries are used in support of further applications and appeals. For example, in the Wapshott Road case, the EA cited the High Court decision on the case, Environment Agency v. Tonbridge and Malling Borough Council (2005) given in a Judicial Review (December 2005) against the development and in favour of the Environment Agency. In this case, it was found that the local authority had failed to apply the sequential test believing that this was not required for a redevelopment site. The Wapshott Road case in which development on previously developed land in a high risk flood zone was allowed against EA advice, the LPA commented will be used by developers as a precedent to support similar forthcoming appeals.

Well everybody, you know, people are now trying to use the Wapshott decision to say well, they can have it, so why can't we, but actually each case is different (Thames 9)

4.2.4 Other risk communications mechanisms

There were other communications mechanism and activities many of them functioning over the long term to raise awareness and many of them specific to one of the flood foot print areas.

Lower Thames Planning Officers Group

In the aftermath of the 2003 flood event on the Lower Thames, the EA and the relevant LAs set up three area based **Flood Risk Action** Groups (**FRAGs**) in response to public demands for a public inquiry and as a means of independent scrutiny of the mechanisms that lead to the recent flooding. Although focused on the past flood they also served to raise local awareness of flooding issues and as a mechanism for risk communication between local councillors, officers, the EA and local flood action and community groups and via community liaison groups to local communities.

The FRAGs had four topic based sub groups including a group on Development in the Flood Plain with a membership drawn from the LAs, the EA and community groups. When the FRAGs ceased to function following the publication of the final report on the 2003 flooding, the Mechanisms of Flooding Report (Onions 2004), a successor body, the Lower Thames Planning Officers Group took over from the sub-group dealing with flood plains. It was decided to confine its membership to professional planners and the EA and to exclude councillors and community groups in order to facilitate free professional discussions. This group meets about quarterly and provides an important mechanism for exchange of information between planners and the EA on both planning applications and on LDFs and SFRAAs.

The River Thames and Chertsey Bourne Flood Forum known as Thames Flood Forum

This, the successor body to the FRAGs is a communication mechanism unique to the Lower Thames. It was established in 2005 under an independent chair not local to the area. It has arranged a programme of quarterly meeting that have attracted around 20 to 30 participants and brings together, councillors, LA officers, EA representatives and community group representatives. Although a key interest of the members is in the Lower Thames Strategy Study which is examining the possible approaches to flood risk management in the area, issues relating to planning and development control are frequently raised at its meetings and it has also held two meetings specifically devoted to development and flood risk. The first of these was addressed by a spokesperson from Communities and Local Government (CLG). The second focused on flood related aspects of government planning policy and good practice guidance introduced in July 2007 and included presentations from a LA planner and from an EA development control officer. Again a CLG official attended and contributed to the meeting. There has also been a session addressed by an EA Mapping and Data Management Officer, the Association of British Insurers (ABI) and others on the issue of flood maps. Thus, it provides an important arena for communication and for raising awareness and social learning among the participants on planning and development control issues.

Flood Action Groups

Following the 2003 floods in the Lower Thames, a number of flood actions groups were set up. Some have remained active including **Thames Awash and Community Support Group South**. These are not professional groups but engage with professionals and provide a link between professionals and the public. The focus of these groups has been on the causes of the 2003 event, the functioning of the Jubilee River and the Lower Thames Strategy Study which is examining flood mitigation possibilities in the area. However, both

these groups attend the Thames Flood Forum and are therefore participants in its discussions on development and flood risk and provide mechanisms through which information on flood risk is communicated to a wider public.

In Trent, a flood action group called **G Flag** was mainly concerned with lobbying for flood defences for Gunthorpe. There was no evidence that it had taken an interest in development and flood risk issues in this particularly rural area.

Community Groups and other organisations

In the Thames case study, two local groups that were represented on the Thames Flood Forum took an active interest in development and flood risk issues: the **Chertsey Society** and the **River Thames Society**.

Although not professional bodies, their representatives were active in risk communication with professionals. For example, the Chertsey Society, a long established amenity group took a particular interest in flood risk and planning matters.

Flooding is a key issue that we take note..... We take an active interest in sort of making representations about structure plans and waste plans and these sort of issues...

We have monitored all the planning applications on a monthly basis so we meet once a month as a committee and then we write letters in on all the relevant things so anything in the flood plain, anything that is built in the virgin flood plain we would certainly be objecting to. Key developments that occur within the flood plain but where already development has occurred, we would again be saying, "look you ought to be thinking about flood resilient designs, sustainable urban drainage" and all this sort of thing (Thames 9)

This organisation has regular quarterly meeting with the RBC's director of planning and also with the local M.P. It organises an annual town forum, a public meeting. At this, the chair makes a presentation which has routinely included the issue of flood risk and planning matters. This meeting was usually attended by councillors, the chief executive of RBC, the Director of planning, other local organisations as well as Chertsey Society members, about 75 people in total. The Chertsey Society uses its newsletter to update members on flooding issues and also contributes articles on flooding to a commercial publication, the Chertsey Directory distributed borough-wide.

The Trent Forum

In the Trent flood footprint area, this is an organisation broadly similar to the Thames Flood Forum. The EA meets with it on a quarterly basis to discuss flood risk issues. It mainly involves the Parish Councils, but also other community groups including G Flag as well as the EA. Although there is no indication that it has taken a particular interest in planning and development control, it may serve as another mechanism for risk communication on that topic.

On Trent Project

This is a major, long term and large scale partnership project embracing the River Trent from Stoke on Trent to the Humber Estuary which aims to achieve a better balance between biodiversity, landscape, heritage, agriculture, commerce and development along the River Trent. It is a partnership project and involves a wide range of public, statutory, voluntary and commercial organisations. It has a Steering Group and organises meetings and conferences for its wider stakeholders. According to its Action Program (On Trent, 2005), land use planning and flood risk is one of its areas of interest. It aims to resist inappropriate development in flood risk areas as well as to enhance biodiversity and landscape through planning. It also notes a lack of a strategic approach to planning along the Trent and hopes to encourage this through the RSS.

Other EA awareness raising activities

The EA in the Thames case study area mentioned specific activities that they had undertaken to raise LPA awareness of the new planning requirements. For example, in the past presentations had been made to councillors at council meetings and consultation meetings had been held in 2006 with LAs to explain the concept of SFRA. EA Thames also reported that they hoped to arrange a workshop for consultant on FRAs in the future.

4.3 Reported constraints

This section examines the views of those interviewed on the constraints and other factors that hamper flood risk communication across the two flood footprint areas and across both temporal scales: planning policy and development control.

4.3.1 Communications at a time of policy transition and uncertainty

An overarching constraint affecting risk and uncertainty communication identified in the research was the fact that communications were taking place at a time of rapid policy change. Defra's initial consultation document Making Space for Water (2004) signalled a change from flood defence to flood risk management using a variety of means to manage risk including the land use planning system. Within the flood risk management approach, a more active role for planning authorities in the management of risk was envisaged. This was reflected in changes in the planning system including the revision of PPG25 and the publication of PPS25 and its Practice Guide and in particular the requirement on LPAs to undertake SFRA for their area. In terms of both development plans and development control, all the professionals were struggling to come to terms with, interpret and implement the new policy requirements. LPAs had to deal with the new form of development plans and the demand for planning to be 'evidence based' and the associated requirement to produce a new form of document, the SFRA. For planning applications, the EA, developers and the LPAs were engaged in a process of trying to understand and apply the guidance in PPG25 and PPS25, the Practice Guide and on FRAs. Policy change had created a very different and uncertain context for flood risk communication. This was evident at the time of the interviewing which spanned the period during which PPS25 was under consultation and the final PPS25 and its Practice Guide were introduced. At the time of the interviews, LPAs and other groups and agencies were in the process of absorbing, coming to terms with and acting on a number of these changes in flood risk management policy and in the planning system.

A consultant commented on the new significance of spatial planning in national flood risk management policy approach.

In terms of flood risk management that's what, say at a high level it is, someone has joined it all up. The fact that DEFRA are seeking to...I mean they are seeking to influence land use well through, CFMP's is their chosen route, and it's within their objectives in terms of flood risk management, is this land use is an important factor. Which never used to appear because they used to wash their hands of it. ...Yes, someone else's job.... But they have now joined that up and yeah I mean it is something that is becoming more, another part of the,That's what flood risk management is, it is joining it all up and there will be more and more situations where you have to say things I suppose ultimately it's putting the burden where it should be, its people making decisions about land use. It's making them aware of what the issues are upfront enough in a way that they know what they are taking on. I think in the past people have lifted the lid at the last moment, discovered that oh my god they've got this big problem and then they go and build some scheme to build their way out of it. I think that's what....DEFRA are trying to stop. (Thames 6)

This consultant also noted that a different way of thinking about flood risk was required under the flood risk management approach.

and within the flood risk management strategy, the definition of flood risk that now is universally (accepted is that) flood risk involved both probability of a flood occurring and a scale of potential consequences, that means that there is this recognition that understanding the consequences in terms of hazards and vulnerability of people is going to become of increasing importance.

Yes like the previous working a lot of stuff you see in there you just (ask): is it in the blue (1 in 100 flood risk area) or out the blue? Most people just seemed to be concerned with that. But there was (now) a lot more focus, because of the definition of risk, on the level of hazard. (Thames 6)

Learning to think and act in terms of this new conceptualisation of flood risk as probability but also consequences was a major issue for all the parties. From experience of working with different local authorities, the consultant commented on the difficult adjustment that was required of LPAs because they have a crucial role and more responsibility under the changed policy approach.

Generally, I think local authorities have got the biggest challenge facing them of anyone at the moment, I feel quite sorry for them really. A lot of stuff in the planning policy in PPG25 and PPS25 has been, to my mind, the thrust of it is to try to get authorities to square up to these problems which is quite right because they're the ones with the power and the control. They're the ones who make the decisions and in a way because I think the way the system used to run in terms of their interaction with the Environment Agency. I think they used to rely on the Environmental Agency in telling them, you know, they'd go and the Environment Agency would tell them yes, no, is it the flood plain? The Environment Agency had this policy where if it's in the blue it's wrong and if it's outside then it's ok. Not as simple as that anymore because it's risk based approach, does require a lot more....A lot more understanding and that's what we are finding.(Thames 6)

Some of those interviewed in the Thames case study also felt that EA officers had yet to come to terms with the new risk based approach set out in PPS25 and were making judgements on probability zones and not taking sufficient account of the risk overall which included the consequences element.

And I am not sure the Environment Agency have kind of really taken on board the, you know, the risk approach and looked at this issue of depth and flooding and you know, I don't think they've defined on you know, say if you are going to get a 2 week warning of flooding, that to them is still you know, developments shouldn't happen, even if there is a very small depth.....I'm maybe not being fair, but that's my perception (that EA are going by probability zones and not taking sufficient account of consequences)...(Thames 9)

A consultant in the Thames case study also thought, citing the evidence of the Wapshott Road case, that the EA at that time was not adopting risk based approach and that was one of the reasons why their objections were not accepted by the Inspector in the Inquiry.

I mean one of the fundamental principles that the agency, and I don't know what they do now, one of the things that they held up (at the time of the Wapshott Road Inquiry 2006) was that if you put more houses, if you increase the density of housing in a flood plain then you increase the risk and that was the mantra, so that you put more people and property in the blue smudge that is the Lower Thames floodplain, then you increase the risk so that was the principle. So thinking through that, well that was...so that's not a risk based approach, that's a policy stance..... (Thames 6)

Thus a major stressor in communications among professionals at the time of the interviewing was the need for all parties to understand, interpret and put into practice the changes in

planning policy and guidance in relation to development and flood risk. This gave rise to tensions between the EA, LPAs and developers over the interpretation of policy.

Policy change and LDDs

Both EA staff and LA staff were having to cope with the new plan process as an EA Thames officer commented.

Yes, and of course as the local frameworks are relatively new it's a learning process for ourselves and the councils. So, it's almost an advantage to be doing one of the later ones than one of the forerunners who are having to maybe go back several stages to comply with what the inspector has said on some of the ones that have gone to them'. (Thames 3)

RBC, for example, experienced difficulty in interpreting the requirements for LDDs to be evidence based. It was also unfortunate in having prepared and submitted its draft Core Strategy relatively early in February 2006 only to find that the requirements including those introduced by the publication of PPS25 had changed.

when it actually came down to appointing the Inspector, he had an initial look at our core strategy and he said that if it were to proceed to an examination in public, it would probably be found to be unsound and the two main reasons for that were lack of evidence base, including a strategic flood risk assessment, because we hadn't submitted, we hadn't done any work on the strategic flood risk assessment at the point in time when we originally submitted...(Thames 5)

The way flood risk issues were handled was part of the Inspector's concerns with the strategy's evidence base although the Inspector commented that the absence of a SFRA was not a 'show stopper' for the Core Strategy. The new act demands that the LDDs should have policies, for example about flood risk, that are locally distinctive and the planning authorities were still coming to terms with these new requirements and policy changes over time. This changing policy context created a problem for RBC which has to adjust its flood plain policies for its Core Strategy because, in the interim, PPS25 had been adopted as guidance

in our first core strategy, which we submitted in February 2006, (predating PPS25) we did have, we had some policies about preventing developments in flood plains, but we have always had that, in earlier local plans..... for instance in the 2001 local plan (predating PPG25), ...They will probably change because I think even since those development control policies were drafted, PPS25 has come more into effect, and we are going to have to have some fairly, we are basically going to be in compliance with PPS25...(Thames 5)

RBC considered the new process to be very demanding and believed that it was not alone in experiencing difficulties in drafting their Core Strategy.

its all, that's another, not exactly a weakness, but it's a problem with the new local development framework process is that, once you have submitted your core strategy, and if it, and if you are, either if you withdraw it, or if it is found to be deficient, if you have just been through the EIP (Examination in Public), then it either, it either stands or it falls, so if its deficient or if you withdraw it, it falls, and you have to start again, right from the beginning. There is no scope for starting at some mid point in the process and just tidying things up. Under the old scheme, under the old local plan process, you used to go to an enquiry and the Inspector used to make various suggestions about how you could improve your local plan, and then if you made those improvements, you could get your local plan adopted. Under the new scheme, where planning, you either succeed or it fails, and if it fails, you have start all over again...

we produced ours (Local Development Scheme) in 2004, and we had a timetable to actually have been adopted by now, on our core strategy, and we would have been if we hadn't have had to withdraw, and I mean the same has happened from a number of other local authorities. Their core strategies have, they have submitted them, they have got to an EIP (Examination In Public) and they've found to be wanting...they are back to square one as well. I think more have actually failed that have succeeded; well certainly that was the case 6 months ago. I think a few of them now have come through the process (Thames 5).

At the time of the interviews, N&SDC (Trent) had only completed its consultation on Issues and Options for its Core Strategy and was consulting on its preferred options paper for its Core Strategy which it did not anticipate submitting until April 2009. However, unlike RBC it recognised the importance of completing its SFRA first as the basis for its Core Strategy.

Policy change and SFRAs

RBC who were just starting the process of producing their SFRA at the time of the interviewing remained hopeful that they would be able to undertake this process without too much difficulty. RBC planners saw some benefits in the new requirement to produce SFRAs, considering that working with the EA over the SFRA had enhanced their relationship and communications.

at the end of the day the EA are going to have to look at all the SFRA's anyway and say whether they think the SFRA is up to the job, both in terms of the technical information that has been used and interpret, the way it has been interpreted locally and also whether the policies that are being proposed by the local authority are adequate or not, and address the issues properly, so again, I think the EA is certainly, certainly as a result of PPS25, both we and the EA have been forced into the situation of having to work much more closely together and it has been to our mutual benefit, I think that is the bottom line. We can see the benefits of working together more closely and as a result, we have worked more closely and we are again seeing the benefits of that as well. (Thames 5)

In N&SDC, the experience and risk communication over the SFRA had been more difficult partly because of uncertainty over the new SFRA process. There had been a hold up because N&SDC thought that the EA would pay for the work initially and the DC would pay them back later.

They had done that in other parts of the country in the northern region but were not prepared to do that in East Midlands Region...the process is quite expensive so we had hoped to get it started that way and to reimburse the Environment Agency. (Trent 7)

Part of the problem was that the Environment Agency have preferred partners or consultants that they use and N&SDC would have had to use those consultants. N&SDC chose to use other consultants employed in conjunction with a developer. A brief was written in September 2006.

Most local authorities no longer had engineers with drainage expertise. They could employ people with additional skills for example engineers to deal with drainage issues. One Thames local authority had called its retired drainage engineer out of retirement to assist with the SFRA. An N&SDC planner felt that the requirements for carrying out a SFRA meant that LPAs now had to employ consultant for SFRAs because the demand went beyond what a local authority staff were competent to deal with.

I am in the hands of the consultants for the flood risk assessment... I am a planner evaluating these things from traditional planning skills, this is all hydrology etc. etc... you would be lucky to find a hydrologist in a council these days wouldn't you.....

Work that could have or used to be done by LAs is now required to be set out or produced in such a way that it is impossible for LAs to do that work, its almost effectively opening up a market for consultants. You do need the experts but the amount of work required means that LAs are hard pressed and a mini industry has been created. (Trent 7)

The LAs are now involved in complicated three way relationships with consultants, who are in high demand and with the EA over SFRAs. An N&SDC planner commented on their experience which illustrates the uncertainty of all the parties involved over what is expected in a SFRA. The consultants produced a level 1 SFRA report in 2007. However, the EA were not happy with it.

The Environment Agency felt that they were not as involved as they should have been.

Consultants are very valuable at the moment. We lost our consultants for a while and they didn't tell me, made more complicated by the fact that they are not 'our consultants' but the developers consultants. The consultants could not understand why the Agency wanted to be more involved in the level 1 report. They (EA) think there should be more detail in the level 1 report before we move on (Trent 7).

A consultant, however, from his experience felt that LAs often had a limited understanding of what SFRAs entailed although there were exceptions.

but I'm not sure the capacity to pick up and do what the local authorities have to do, they're starting from....you know, quite low down, Runnymede are exceptionalthey aren't a typical example....You know, you go to a lot of local authorities and doing the tender interviews for the SFRAs is just totally bizarre because they're tendering these things and every interview you go for you get a different cross section of the local authority. Sometimes it's an engineer and sometimes it's a strategic planner and sometimes emergency planning, and you know, there's no...and always they are at their level of understanding what this actually means for them. (Thames 6)

An N&SDC planning officer had his own doubts concerning his understanding of SFRA documents.

The Level 1 report was understandable and set out in a good way by the consultants.... when we get the final study how much will we have to keep going back to them to ask what does this mean... there is only so much that planners can know really. (Trent 7)

Thus, the requirement to produce SFRAs has created new roles in flood risk communication for the LAs, and for consultants. At the same time these communications are hampered by lack of understanding and experience of the SFRA process on the part of all parties involved. The Lower Thames Planning Officers Group, given uncertainties over the production of LDDs and SFRAs, performed a special function as an arena for social learning: for sharing experiences and understanding of what the processes required. At each session, the members reported on the progress and experiences that they had had in developing their authority's documents. EA representatives were present to contribute their views.

Policy change and planning applications

The period in which the interviewing for the case studies took place spanned the time during which PPS25 was consulted on, and the final PPS25 and its Practice Guide were introduced. A factor affecting risk communication at this time was uncertainty and tension over the interpretation of certain parts of these guidance documents. This was chiefly an issue for planning applications and development control. This lack of clarity in policy guidance and the potential for different interpretations was raised as a major issue and constraint on risk

communication among professionals during interviews mainly in the Thames case study. Some of the points made in the interviews may have been resolved through subsequent further guidance, experience and through appeal processes since the interviews which necessarily capture a particular point in time.

Three areas of uncertainty in interpretation of PPS25 raised in the interviews were: the definition of 'functional flood plains, 'safe' access and the Exception Test.

A Thames EA officer expanded on difficulties in relation to the definition and interpretation of the 'functional flood plain' prior to the publication of the Practice Guide. It was a contentious issue with several local authorities and in a forthcoming planning inquiry on appeal in RBC. The EA Thames officers were involved in meetings with a number of LAs attempting to resolve the issue.

The impression he (Peter Bide, CLG) gave was that the one in 20 is just a starting point as a basis for discussion and so it could be greater, but it could also be less than a one in 20, so...and also it's not restricted to just water compatible, and essential infrastructure if there's re-development there may be scope to replace an existing use with the same use, or lower vulnerability use. So it's just throwing it all open, so whereas it seemed fairly clear in the PPS what you could and couldn't do, I think because of the panic that that's caused local authorities, that he's sort of...the ground's shifting a bit and it's not quite as clear and there may be scope to alter that so...

so I had to have a position on that (the functional flood plain), and it looks as though, well, the hope is the Practice Guide will make it clearer but the worry is that it won't. That's right yes, yes, but it seemed quite clear in the PPS, and yet it shifted. And one of the absolutes in PPS is now changing, so yes.

I'm being hounded by local authorities on a definition on the Functional Flood Plain on different bits and pieces, so we have to put a position together and just hope, and just cover it in caveats, and hope that that will tide us through and it's roughly in line with what DCLG are saying.(Thames 1)

The issue was perhaps a particularly salient one in the Thames case study area because of the large number of riverside properties there.

I really want to see what's going to happen, because I know just from experience houses along the Thames some of them are falling down, and at the moment we're sort of pre-PPS, we're quite happy for people to knock down houses, re-built their houses and they've got voids in they're floodable structures, their floor levels are higher, they've decreased the risk of the inhabitants being flooded, whereas PPS would say 'no, sorry, you can't change your house, you've got to leave it as it is' is that making flood risk better? I'm not sure. (Thames 3)

However, the interpretation of functional flood plain was also of concern to a RBC development control officer:

Environment Agency are sort of, I think we are sort of, struggling slightly with them over the PPS25 and what constitutes the function of a flood plain, because, well we got an appeal at the moment and the enquiry is coming up quite soon, This application which we have refused on the advice of the Environment Agency, so the Environment Agency are calling that a functional flood plain because it has a likely probability, or a probability of flooding of more than 1 in 20 years, and that was a new thing that came in with PPS25, it wasn't in the consultation draft (Thames 9)

The interpretation of what was meant by 'safe' and 'protected access' in the guidance was a contentious issue in the Thames case study area where traditionally 'safe' access had always been interpreted as 'dry' access by the EA and this was contested by RBC. A RBC development control officer gave an example of this issue.

we have had differences of opinion with (the EA over a planning application)... but they have looked at escape for that one, and we took the view because it was old PPG25 before the Environment Agency's powers were sort of strengthened, and they (residents) were you know, having to walk through very small, and very, very small areas of water to get access and we approved that one, but the Environment Agency, because there was some wetness you know, stood by their objection and were not happy that we granted it, so it is, it's a very difficult one, because in our experience, or my experience anyway, the Environment Agency maintain their objections you know if there is even a small amount of water, and they don't seem to sort of take on board the you know, the depth and the likely risks from that (Thames 9).

The issue of whether or not 'safe' access necessarily meant 'dry' access was one of the issues between the parties tested in the Wapshott Road Inquiry. The applicants contested the EAs view that 'safe' meant dry access. The Inspector in his conclusions commented that the EAs interpretation of 'protected access' as a dry escape route was not unreasonable and recognised that it had been used by other Inspectors in appeal situations as an indication of the adequacy of escape routes. However, he did not consider that it was the only interpretation. Taking into consideration the long warning lead time and arrangements for warning and emergency response, the lack of a dry escape route as a reason for rejecting the application was not sustained by the Inspector (Gibbs 2006).

Another concern for an EA planning liaison officer was with a phrase in the Exception Test; *Yes, it's part of the Exceptions Test under..., they've got 'and where possible reduce flood risk overall', and a lot hinges on that tiny little phrase....I'm sure it's going to go to appeal on occasions and we'll test to see how well that goes but...I mean the principle's are good, but it's where the definitions lie and how far you can push it, that's where it's all going to get a little bit interesting.*

Thus, these comments and the evidence of the Wapshott Road Inquiry indicates that there is scope for different interpretations of planning guidance and therefore communication about flood risk can often take the form of detailed discussions about the meaning of words and phrases in the planning guidance documents.

4.3.2 Disjunctures in the planning system due to policy change

Some of those interviewed both from the EA and LPA in the Thames case study pointed out that the pace of change in the national planning system and in relation to development and flood risk meant that plans and policies were out of synchronisation with national policy. National policy was intended to be reflected in regional spatial strategies and regional policies in local plan policies. Planning applications were intended to be in conformity with the whole hierarchy of these plans and policies. Strategic Flood Risk Assessments were intended to provide the evidence base on flood risk for LDFs. However, they were not available in some cases. Furthermore, many plans and the policies on flood risk in them had not yet been altered to reflect the changes in national policy to a flood risk management approach. LPAs were obliged to develop their LDDs without the benefit of adopted Regional Spatial Strategies. Development control officers were operating under difficulties because they were having to consider planning applications in the light of old Structure and Local Plan policies that predated PPS25. The new LDFs were not in place and the approach to flood risk embodied in these old adopted plans was out of date. A RBC development control officer summed up the problem.

unfortunately policy wise, we are in a slightly difficult situation, obviously we have got PPS25 which is helpful to have that, we have got structure plan policy which is SE2 ...And we have got a local plan policy... well obviously the policy SV2 is in our adopted plan which was adopted in 2001, so it was drawn up and adopted at a time when we didn't have PPS25, in fact did it even predate PPG25 I think.....but is not

really a risk based policy..... So the policies are all, sort of, take a slightly different approach. (Thames 9).

An EA Thames planning liaison officer recognised this problem in flood risk communication. *because of course the new guidance and statements that come out from government, well coming thick and fast at the moment aren't they, they're never in track with the local authority's own policy timetables...And the South East Plan is only just going through it's examination.... Way behind several of the local authorities own LDFs so everything's a bit topsy turvy I suppose (Thames 4)*

This was very evident in the Wapshott Road Inquiry at which time there was only a draft PPS25, and many of the plans cited were old or in draft unadopted form only. The pace of change has thus made for a lack of coherence in planning policies including those on flood risk.

4.3.3 The role of consultants in FRAs and planning applications

In both the Trent and Thames case studies, the significant new role for consultants in the planning system and in flood risk communication in producing SFRA's and in modelling for planning applications and their FRAs was acknowledged. However, in Thames, there were strong criticisms of the unprofessional way in which some consultants carried out their work particularly in relation to FRAs for planning applications.

We have a fair, we have quite a few problems with x (named consultant), because they just take their own interpretation. They know what's acceptable and I mean, my personal view is that they're not terribly professional in the way they advise their clients. I think the impression is that they tell them that they're going to do their best to undermine the agency's position and get a development on the site even if they know perfectly well that the information they're using is wrong, that's it's a wrong position to take,... (Thames 1)

In Thames, there was EA concern at the poor quality of flood risk assessments submitted with planning applications by consultants.

I mean we've got....there's one flood risk assessment company that if you put into Google you'd get it up straight away, ... and they weren't certain what Flood Zone 3 was . Which is really quite upsetting because we can't recommend anybody to do a flood risk assessment, or the customer to go and say 'okay you can go and see blah blah blah', we can't say, but they have consistently submitted absolute rubbish. I think it's just a small company but they don't understand what we do, but it's quite upsetting that people are paying them a lot of money to do something that's not particularly acceptable to us (Thames 3)

The EA officer pointed out that the EA was wasting time monitoring poor FRAs and thought that an accreditation scheme for consultants would be a way of ensuring that flood risk assessments were of a sufficient standard. It was also suggested that the EA should mount some workshops to educate consultants in what was required for FRAs to be of an appropriate level and standard.

we've spend so much time going through their flood risk assessments and it's just been a complete waste of time because they do the bare minimum and we're ending up doing a lot more, so we're paying for all this information to put into theirs, and then they're charging their client for their time, so we're wasting a hell of a lot of time doing that, (Thames 3)

Costs were an issue inhibiting good flood risk assessments and thence good flood risk communication by consultants for developers. But cost was also an issue for the EA and the LPA in constraining how far they would go in insisting on improved flood risk information.

Some consultants will do the absolute bare minimum and they will use Environment Agency modelling information that we can submit to them. It's really pushing it as to what you can actually get out of them because they're very reluctant to spend any money and do decent modelling to actually see....they will do the bare minimum of what they can get away with. Whereas some of them will do like a steady state model, and they will look at it, even for just like small sites, and that's really good, but it depends on the consultants as to the detailed model that we get, it doesn't necessarily reflect the amount of development taking place at the site a lot of the time.

It's the developer that defines the amount of money they're going to spend and therefore which consultants they employ and how good the information we get from them is.

We (EA) have to go along the line of raising an objection to their planning application until we actually know what the risk is. Which leads you to an appeal situation, which costs not only the developer but the Local Authority and ourselves a lot of money to go through that situation.

They've (consultants) got their own translation of PPS25 really and they will do the bare minimum that they can do. (Thames 4)

Exemplary consultants whose work was entirely satisfactory were also mentioned in the Thames case study. The quality of consultants work did not emerge as an issue for the EA in the N&SDC area.

Some consultants are involved; it tends to be pretty much the same ones that keep coming back so they pretty much know what you expect. (Trent 6)

4.3.4 Timing: pre-application discussions and flood risk assessments

National planning policy has as an objective that planners should engage in pre-application discussions with developers so that issues with the application including issues of flood risk can be ironed out before the formal submission. For example, the use of a site can be adapted so that development is located on parts of the site at lower risk of flooding. Not all LPAs provide for this service and a balance has to be struck between providing such advice and dealing with live planning applications (CLG 2006 Planning Research Summary, Number 7 2006). However, both RBC and N&SDC planners and the EA staff in the case study areas encouraged such early approaches.

Timing was important. In the Trent case study, an EA development control officer regretted that EA involvement in planning applications often came:

late in the information lead, and so it is virtually as planning permissions was about to be given or denied, that we were brought in, we have been working harder to try and get in earlier, and pushing very hard the principles of pre-application discussions, so that we can actually get out there, influence before a final design is made, and make sure we are actually getting something that we will really want rather than a compromise because it is so late that 'I'm sorry, you can't change this, this and this and you will have to put up with that'.(Trent 1)

The failure of developers to engage in pre application discussions and to produce flood risk assessments were cited by the EA and LPA officers in the Thames as factors constraining flood risk communications.

Some of them (developers) are very reasonable and they will talk to you beforehand, they will try and iron out problems and they are not coming in to have a fight, but a significant number of them don't talk to you beforehand. (Thames 9)

Time pressures also affected LPAs ability to pursue pre-application discussions.

We suggest to people that they talk to us beforehand and we try and bottom out issues and some people do, some people don't, but unfortunately those things take a while for us to go back to them on, because we have to prioritise with doing the planning applications, sort of slightly caught in a loop. they vary, but and as I say, often we don't, we try not to register (the planning application) until we think we have got everything (including the flood risk assessment), but if they decide that they want it registered anyway and they want it dealt with and they are not going to justify it and you refuse it, then often, you refuse it and then they will start trying to whittle the reasons for refusal away....., unfortunately you don't always know what you are going to get, but often they don't do enough work on flooding and flood risk assessment and often just aren't you know, very adequate really for the Environment Agency to assess, so what can they do other than object. (Thames 9)

The EA, in the view of RBC development control staff bore some of the responsibility for the failure of developers to submit FRAs.

and with flood risk assessments, the Environment Agency are quite slow in responding to the basic information they need to put in a flood risk assessment, and that I'm sure frustrates the outsider who thinks well blow them, I'm not going to wait for them, we are just going to, so there is a sort of, I don't know, a tension in the system isn't there it, but I don't know what the answer is. ... Well they should do (provide FRAs), but as I say, we can't refuse to register an application if they insist on it, but it would be refused if they don't provide one, so, I don't know what the answer is to that.(Thames 9)

From the perspective of the EA in the Thames case study, the LPAs were also at fault in failing to ensure that the EA staff were party to pre-application discussions and for in a minority of cases forwarding planning applications without FRAs.

And from my point of view, I look constantly at planning applications and pre-planning advice to try and get as much as we can in before the planning application's submitted, but it doesn't always seem to be the case, we don't hear from the councils necessarily they're having pre-planning discussions, but that's the sort of way they're going, trying to get as much done before an application is submitted as we can.

... what should be happening is they shouldn't be submitting a planning application to us in a flood zone, when there isn't a flood risk assessment accompanying the application, which has to varying degrees speeded up the process quite a lot. We haven't gone back to them at the end of the 21 day period and said 'look you haven't got a flood risk assessment, we need to refuse it and get a flood risk assessment through', it should all be coming in at the same time..... probably in about 75% of the time ...it is. (Thames 3)

In the Trent case study area, there appeared to be, for some EA officers at least, different concerns and a different approach with more emphasis on adopting a flexible approach to developers and their FRAs and on developing good cooperative relationships with them.

maybe the Developer doesn't need to do a whole flood risk assessment, we often, where it is in areas that are slightly grey, we try, we try and be a little bit pragmatic and in say, 'well give us some information, a topographic survey for instance first, and then we can look at that and really see if there is a flood risk problem or how severe that is and then give you more advice on how far further you need to... ... I am aware that maybe not everyone does that, not all officers of the Agency do that, but we have found it is helpful not only balancing out the risk but in building relationships with various parties, so they know that they can trust us and they will come to us and we are not going to ask outrageous demands on them that they go

'oh, we are not prepared to do that, we will just bang on and do it another way', sort of thing. (Trent 1)

It may be that greater stability over time and place as compared with Thames area in the developers that the EA had to deal with made this approach possible and desirable.

based around much of the larger towns, where there are specific developers who tend to do a lot of the house building and, the light industrial, or something like that, so there are names that crop up at regular intervals, based generally around specific areas, and it is easier then, to know who you are dealing with and they know what you want from them (Trent 1)

However, in Trent EA planning liaison too there was support for pre application discussions and for LPAs that would not allow planning applications to be submitted without a flood risk assessment.

I find that works best for us in terms of the relationship that we have generally with the customers, where it is the local authority asking questions about what needs to go in for risk assessment or the developers, than by taking it into a two stage process, pre-application stage etc, I think it makes it the least painful for them as well as time isn't critical. (Trent 6)

raising the profile of risk as well is helpful, with things such as, particularly PPG25 and PPS25 flood risk assessment. When that first came in there was a bit of thinking by the local planning authorities as to whether or not it was required, and I think that gradually they have got worn down by us and we do think that it is much higher up the list now, they are looking to see if there are flood risk implications, or in a few authorities, they are not registering a planning applications without doing flood risk assessments. . (Trent 6)

4.3.5 Communications with water companies

Since planning policy and development control activities now have to take account of all forms of flooding, flood risk communications have to involve the water companies. In the Thames case study, both LA and EA officers were critical of the contributions of Thames Water which was seen by the EA as less ready to share information than Southern Water. Some felt that this was due to their having a very different agenda and perspective as private companies on flood risk communications which have cost implications.

I mean I don't want to give Thames Water a bad name but I mean generally when there are meetings to discuss flooding, flooding problems, flood risk, you can almost guarantee that Thames Water will not turn up.(Thames 12)

I think the water company could be a bit more forthcoming about local issues, rather than having a responsive approach Thames Water tends to be reactive rather than proactive (Thames 5).

None of these problems was reported in Trent case study.

4.3.6 Communications issues and constraints within organisations

Both the EA and the LPAs were constrained in their risk communications by arrangements within their organisations.

EA Internal communications problems and understanding of, and expertise in mapping and modelling

In both Trent and the Thames flood footprint areas, communications were constrained to some degree by internal communications problems between development control, planning liaison, mapping and data management and other flood risk management activities and by

internal levels of understanding and expertise on mapping and modelling. An EA development control officer observed.

There have been some issues where we weren't told about the quality of the models and sometimes we base quite a lot of faith and too much faith in the accuracy of flood models and they're not that accurate and we need to make sure that we are told what the sensitivity is and how accurate those models are. (Thames 1)

This officer pointed out that a flood risk management policy demanded better internal communications and a joined-up approach.

I think we probably need to communicate more. There is a problem internally in that we don't communicate as effectively as we should and it's only now that flood risk management have....will have to completely re-think the way we do things because of no Defra money for schemes. (Thames 1)

In the Thames, the mapping and data management team leader had produced a glossary of modelling terms to aid internal communication and had held seminar meetings with EA flood risk management staff in order to explain modelling. The new national flood maps had caused difficulty internally according to a Thames mapping and data management officer.

I mean so many times my team will come to me and say oh so and so said they don't like the mapping and I then have to go and explain what the mapping is and then they are okay, now, that's within the agency, that's, never mind externally. (Thames 7)

What the flood map (new national flood mapping showing the undefended outline) is kind of representing is the possibility that there is a risk in an area so I think they are only really starting to understand as a team, kind of what that actually means.... A couple of the team have spent a lot of time reading the policy (on national flood mapping), looking at it, understanding it, picking out what are the crucial factors and then looking at our published information, saying does this comply with it, yes or no? If yes, then we are happy with it. It may be that internally people still don't like the modelling, but from a flood mapping perspective which is our first priority, it's okay. (Thames 7).

EA staff turnover was also seen as an impediment to internal communications and understanding of the role of Development control (DC) in the Thames.

With other functions as well we do need to regularly inform them of what we are doing (in DC) and because there such a high turnover with the agency, so many new staff that you give a presentation to a team and you need to renew it every couple of years because of staff turnover. (Thames 1)

In both Thames and Trent flood footprint areas, having staff with sufficient expertise and understanding of modelling was an issue both with regard to the EA's own models and those produced by external consultants for FRAs and SFRAs. Trent was lucky enough to have recently acquired a staff member with the required expertise as a mapping and data management officer pointed out.

That is something before, that was the case, I think there but now x is here, he understands all the mathematics behind it and everything so he will audit it and if they are not up to a certain standard he will say, so back and change this bit and that bit until he is happy with it. (Trent 3)

However, in Thames, recruiting and retaining staff with expertise in mapping and data management especially in the face of staff cuts was a real problem. This was particularly true of modellers because the work that the EA offered was not very interesting as a Thames EA officer noted.

because ever since I joined the team I think everyone in my team in the last two years is either new or in a different job to what they were two years ago, so it's been

a very - it's been a real change in the team, and I think that now, hopefully if I can retain them all, and that's one of my concerns is that if they don't enjoy their jobs so much.....

I mean if you think about the modellers, they have gone elsewhere - they've ended up going to consultants because the work that they want to do isn't what the agency wants, and it's kind of almost wrong of them to have kind of employed them in the first place, because you are never going to be able to retain them,(Thames 7)

Poor salaries compared with those paid by consultancies and poor promotion prospects in the view of this officer in EA mapping and data management in Thames made it difficult to retain staff.

The salary just isn't comparable in the market place but I worry that in a couple of years time if neither of them ever wants to be a team leader or, you know, where do they go? No-one's going to stay as a technical specialist in the agency for the next thirty years or something, so it is kind of a concern. (Thames 7))

A Thames manager shared this concern and reported that this made the EA very dependent upon consultants and in a poor position to monitor and challenge their work both for the EA and for developers or local authorities.

I worry considerably about mapping and modelling in particular, and the outputs that we get from it. I think it's a big challenge for us because we do not have any hydraulic modellers in this department, we are not able to retain hydraulic modellers because we don't pay the salaries to retain hydraulic modellers. We - but we still need to have people who have an understanding of the models and who can actually understand the issues. We almost need sort of hydraulic troubleshooters who can pick a model up, understand what the issues are, work with a consultant to get it fixed and then sort of power shoot into the next thing, and we just do not have that capability.

we are completely reliant on the consultants. I think we quite often we get taken for a ride a little bit by the consultants in terms of determining what sort of model we should have and how long it's going to take and so on and so forth, I don't see any easy solutions in terms of making that situation better (Thames 8)

Time constraints, volume of work and staffing levels and turnover

Both in the Trent but perhaps more acutely in Thames, time constraints, the volume of work and the number of staff in EA planning liaison and development control available cope with it were cited as constraints upon effective, good quality communication and outcomes. In Thames, there was a possibility that further DC and PL staff would be lost due to a staffing review and this would mean that further low risk applications would not be considered to reduce the work load.

Time I think, not having enough time to do all the things I want to do. There is no real corporate barriers as far as I know. I have a very supportive manager and we think very much along the same lines...

I think they (EA DC engineers) are, they have to be more constrained in some respects, because they have to respond within a time because the system requires that decisions have to be made (within a time) and because if we don't get our response in time then people don't know about flood risk. (Thames 1)

According to the '21 day rule', the EA has to respond to planning applications within 21 days. Their performance in this respect is subject to an annual report.

I mean in the recruitment freeze we're getting less and less people in our team but more and more work, so you spend less time on each individual application, so you are not getting more from each application, you can't make it better because you don't have the time, so sort of : get it out of the way and the next one...so you don't have time to sit down and think and go through say a drainage scheme and say 'we

could have some SUDS here, we could put a swale here, we could get a balancing pond.., you don't have the time to sit with the developers and consultants and go 'ok we could put this here' and push and push and push....I think with more time, with more money, then we could probably get a lot better schemes for people, it's a bit upsetting. (Thames 3)

For Local Development Documents (LDDs), EA are similarly time constrained by the six week period available for formal consultation including internal consultation and response on the documents.

We involve everyone, but with these documents (DPDs), some of them are quite big and we've got,if we are going to talk to everyone, there's five or six teams that we need to get around in a short period, it's not always feasible. (Thames 3)

An EA Thames planning liaison officer made the point that time pressure meant that it was difficult to devote adequate time to DPDs because there were always planning applications to process within a time limit and insufficient time to think about the issues and make quality responses.

Especially on the time, time is always pushed too the limit. We're always almost responding right at the end of the 21 days or agreeing to have the extensions so when we're not doing planning application work you suddenly realise you've got the local environment (development) framework that you've also got to do and it doesn't leave a lot of time to actually think about, well, how can I break down these barriers? How can I make people understand? You're just constantly jumping from one thing to the next. (Thames 3)

In the Trent area, an EA planning liaison officer noted:

We have only managed by not having staff turnover. We have been fortunate in that respect that we haven't had that turnover...I know when I came here there were 5 in the team, and apart from one retirement everyone else is still here. (Trent 6)

In contrast, an EA Trent development control engineer reported both a high volume of work and staff turnover.

According to figures that I have just got out for this meeting earlier, we (in this area) have the highest number of planning applications that goes through this office of any other office in the country and of flood risk, we are second or third on that, we do have a very high amount of information that is coming through....

We see our team, when we came here 5 years ago, certainly in development control, there were 2 or 3 people who had on, 30 years plus experience, now I am the most experienced at 6 years and most people are 2 or 3 years but we are probably better placed than some, as you say down in London where people are moving around a lot. (Trent 1)

For N&SDC development control officer, fast EA staff turnover was not a problem but the time pressures and volume of work that EA staff experienced in relation to the production of their SFRA was.

The Environment Agency can be very helpful and are very keen to get involved but they are incredibly busy people and have a number of other authorities to help in the county.....The people we contact at the Environment Agency have been effectively the same people we have always contacted over that period. You do get the feeling that they are stretched. It's not a question of not knowing who to or who you are speaking to, its more have they got the time..... You can't keep slicing bits of the Environment Agency away because the local authorities need support it's not something they can do themselves. (Trent 7)

Others in Thames commented on high EA staff turnover and felt that this made it difficult to develop good relationships and understanding between the EA and others involved in the planning process.

EA National consistency and local knowledge

A major drive within the EA has been to establish nationally consistent ways of working and national guidance to achieve this for all EA functions. The rationale for this is that developers operate at regional and national scales and need to find consistency in EA planning responses between regions and areas and within areas. At the same time, local circumstances and site characteristics can vary so greatly so that it is difficult to impose rigid national rules. This dilemma is recognised in the planning field where national guidance allows LPAs some flexibility to deal with local circumstances. This dilemma was apparent to staff in the Trent case study. EA development control staff there recognised the importance of adopting a consistent approach and agenda on planning matters within the area.

Consistency is what we want, it's not just a case of applying rigid rules, there are complexities involved, and this then comes down to interpretation by the members of the planning team and unless they are all checking everything with each other, there is likely to be variations between them...., consistency is something which we do strive for. (Trent 6)

The difficulty of applying national rules given area variations was recognised

The problem is, I think that all sites are different and you can have a set of rules, but do the same rules, you have your procedures, and everything there, but if you apply that to East Anglia, can you apply it in a similar manner in the middle of Derbyshire, where the topography, your land forms, your ground conditions, everything is very different, and being able to have one set of rules that fits all is very difficult, so there is always going to be a certain element of interpretation, I think. (Trent 1)

In the absence of head office or regional guidance, liaison within and between areas among staff was a way of promoting this.

We meet as a DC group, the technical specialists and team leaders meet on about a six weekly cycle and discuss these issues and to be fair, consistency of approach is one that usually features quite highly because more and more, we know we have got to, you know if someone comes here and then moves over to Birmingham and they have got a totally different answer to the same question, then it doesn't look good for us. (Trent 1)

At the same time, in the Trent case study, EA planning liaison and development control staff expressed concerns about their office based, bureaucratised way of working and about the loss of the local information that comes from site visits. These working modes are possibly due to the drive for nationally consistent working and also to time pressures. LPAs too have the advantage of covering a smaller scale area than EA staff and of having detailed local knowledge of their own patch. This lack of on site experience and knowledge disadvantaged the EA in their risk communications.

local knowledge in your head. Someone that seen the place, or seen what happens or knows the lie of the land, or something on a map, a site is flat. Just having that feel for the ground, for what is going on there is key I think to being able to give good advice. (Trent 1)

it has become much more to do with planning applications and more office based and decisions are made based on the information which is provided either in the applications coming in and the information we have got on the monitor, and the people deal with the responses, are detached from reality. What's it actually like out there on the ground? A lot more rational common decisions are comments to be

made by the planning authorities, based on knowledge of the sites in a lot of the cases.

...it is within the systems. Again, it's a computer, its texts and maps rather than.....
(Trent 6)

It was feared that this lack of local on-site knowledge could on some occasion lead to a loss of EA credibility with local authorities.

One concern I have is that, whether it be advice is coming from development control or the decisions are being made by people in planning is that sending or following the guidance and coming up with an objection to a proposal, my biggest fear is that when that goes to appeal, the first time anybody looks at the site, either with the inspector on the day or they are sitting there waiting to be cross-examined, they are presented with this evidence which is blindingly obvious if they have been at the site, it doesn't do your credibility... and credibility is a big issue for us in terms of the relationship with the planning authority...(Trent 6)

EA Lack of advice and guidance from Head Office and regions

Planning liaison and development control are EA area functions. However, in the context of fast changing national policy, area staff in both the Trent and Thames felt lacking in guidance to help with policy interpretation. Head Office was not always forthcoming with advice and in Trent staff felt that they did not have the required local knowledge. In the absence of guidance from above in the organisation, area staff had to use their own judgement in interpreting policy and communicating about flood risk.

What we have lost is someone to turn to if we need advice. The regional level of planning has gone. Now it is the area office, the head office that does it and they are very much detached from what is happening in the areas. They seem to have a training and delivery role for initiatives which are coming from head office but there is just that layer missing, knowing who you can contact on particular issues, we've lost it in development control too. (Trent 6)

Where we used to be able to say to our regional engineer, why don't you come and have a day with us and we can go and look at one or two sites and you can perhaps give us an opinion..... that isn't there any more and technically the buck stops with us really. (Trent 1)

We don't tend to get a lot of help from Head Office.....you know they are really busy (head Office) and they don't always have time to follow through the things they say they will so we have to sort of, kind of, do it ourselves and then e mail them to show them what we are really up to. (Thames 1)

and the Environment Agency being so big, its difficult to, well make sure that the messages get from the high level teams down to the right person in the low level teams but that's sort of internal communication hiccup. (Thames 4)

LPA time constraints and volume of work

Like EA staff, local authority development control staff are constrained by time targets for their response to planning applications and felt that this militated against quality work and good communications

We are assessed, I know that part of our returns that we give in, our performance against different deadlines, so with a minor application it is eight weeks, with a major is either 13 weeks or 16 weeks I mean to deal with a really big application in 16 weeks, its laughable, and I shouldn't be so rude you know but its just mad.....you are under a great deal of pressure all the time you know, to get things moving and our delivery grant is partly based on our performance against those quantitiesso

performance against those deadlines, its so very important. The quality isn't judged at all, so, mad. (Thames 9)

Staffing levels were not mentioned by local authority interviewees but in the Thames case study there were vacancies for planning staff indicated on the local authority website at the start of the project and planning. staff turnover and vacancies were talking points at the meetings of the Lower Thames Planning Officers Group.

4.3.7 Maps, modelling, modelling and flood data

EA maps, models and flood data are at the core of flood risk communication. Yet EA staff felt that these were problematic in a number of ways. As one EA Thames manager commented.

I think the trouble with modelling is it drives everything we do, it drives advice to planners about where we should and should not build, it drives flood warnings in terms of where we should be issuing warnings, it drives the capital programmes in terms of where are the communities at risk and where we should be seeking to reduce that risk , so it is the keystone in terms of everything we do, and yet for me it is perhaps one of the weakest links. I mean I don't know whether everybody would see it that way but maybe we have had far greater experience in this area than in a lot of areas. (Thames 8)

Variable quality of the data available

EA staff were aware of the variable quality of the flood data available to them and this was in some situations an inhibiting factor in their role of advising and informing the local planning authorities. The EA had taken over responsibility for many Critical Ordinary Watercourses (COWS) from the local authorities and there were no flood zone maps for them.

for the Thames the information is very good and we have a high level of confidence in the quality of that information. But on some of the tributaries where we haven't got flow gauge and we haven't got the data that records past floods and how much flow was going down the river, its quite difficult sometimes to...it's a best estimate I think and that is how we should be viewing them. (Thames 1)

EA National Flood Maps and National Flood Risk Assessment (NaFRA) data

Within the EA, issues were raised regarding their own two main forms of flood maps: the National Flood Map and the NaFRA data, both of which were available on the EA's website. The National Flood Map data and its use on the internet and as a mechanism for communicating flood risk to external bodies and the public was questioned by some staff. This map shows the 'natural' flood plain without regard to any defences that may exist specifically for planning purposes. This was not necessarily understood by EA or LPA staff. A Thames manager noted that the Flood Map had caused difficulties particularly with one local authority. The issues were that the maps were based on very broadscale modelling and that they showed the flood zones without defences

Trying to explain to them what the flood map is and what the flood map is based on and the fact that it doesn't then include defences and it is not currently accurate in modelling the Jubilee River, you throw that into the melting pot with planners who are already ultra sensitive to planning decisions and that has lead to some challenges and some pretty robust conversations with us.(Thames 8)

Those within EA Thames mapping and data management defended the national mapping approach because it offered national consistency in process and output. Data to be included had to comply with strict rules.

I don't think I would agree with him that the mapping was worse after it went national, I think that it is better from the perspective that we can actually explain to members of the public what it's actually meant to show. I think before that when it was the IFM (indicative flood plain map) it was quite haphazard, different areas,

different regions would be basically representing different things and that doesn't help the public's understanding because they could speak to one region and hear one message and say oh this information is because of this, and then they could come to us and we could say oh no, it's not because of that it's because of this, so I think that from that perspective I think that it's a great improvement. (Thames 7)

The Trent case study, mapping and data management staff also recognised the virtues of a nationally consistent system despite their reservations.

there is a strict specification for the outlines on the internet, in that they have to be modelled without defences, so without defences, so that if it then modelled with defences, you can't put it on the internet, so occasionally that would be the case, but now all the models we have done will be modelled without defences, Without and with so we know both outlines.(Trent 3)

In Thames, the mapping and data management section were using opportunities to enhance the flood maps when more detailed but compliant modelled data became available.

I think that inevitably when you go to a nationalised product that you do lose maybe some of the detail that was there before, but then if that detail's not always 100% kind of justifiable or accurate then maybe it's not a bad thing that something's kind of forced us almost to reconsider is what data is in the mapping, and I think that since they - since the flood maps were introduced in 2004, what we've basically been doing is - is trying to look at areas where we know that the generalise model isn't as good as it could be, and then using that to help target, whether it's a generalised improvement so just purely, I mean the J Flow technology has improved since it was first used to create the map, and when we get more detailed topography, then obviously we can kind of use that even more. (Thames 7)

In the Trent case study, the value of the NaFRA data, also on the internet, as a way of communicating about flood risk in the planning context was questioned by an EA development control officer.

to be honest, I don't trust the NAFRA data at all. I think it contradicts the information that is actually shown on our website on the layer above it really in a number of issues, you can find if you click on one site which is within the 1 in 100 year it will say significant risk but you can move to another part of the same floodplain and it will say the risk is low, even tho' it is all within the blue area ... I have had it in planning appeals where people have gone, 'but I've got this from your website, and it is says my site is in the low risk', and you think 'oh, here we go again, I've got to go through and explain all this', so it is sometimes used against you. (Trent 1)

In the Trent, even mapping and data management staff had reservations about having the NaFRA data on the internet.

There is always a lot of questions about the NaFRA data, why is it, for example, low in one area and then you can move the cursor a small amount and it will suddenly be high which is very difficult to defend, because it is such a coarse data, in my opinion, and it shouldn't really be on the internet.(Trent 3)

In the Trent, mapping and data management staff while recognising the limitations of the NaFRA data were often able to improve it.

NaFRA is not so reliable but...often we will have water levels from the models we have, produced for us and we can often have, say like, for example our data, more accurate data that can give us an idea of the height of the land or maybe even will have, for example, in the Trent outline, all the thresholds of every single house have been surveyed within 10 mm from the 1 in 100 year outline, so from user water levels and thresholds, you can give them a much better idea of risk – undertaken as part of the Trent Strategy. (Trent 3).

Updating maps, different interests and perspectives on, and challenges to EA maps and modelling

While the EA is keen to, and is required by Government for various purposes, to enhance its mapping, the availability of a number of different or updated maps can be confusing to the public and is not necessarily welcomed by professional partners.

Ideally, I would like, in this ideal world to have one set of flood maps, you know, that everyone knows where they are coming from. There is this problem in variations and, we have just had this hydraulic model done, so that outline is slightly different from the another which is slightly different from the one that is on the internet, and I can understand how people can get confused, annoyed and anything else, so the number of times we change the maps and the amount of maps that are available, if we could get those and reduce the ones that are out in the open to the public, to people, that would cut down on any possible confusion, but....., we have to be improving and they keep asking us to map more, more extensions, and map this and map the other and it does change and it is this thing that those changes do bring confusion. (Trent 1).

In the Trent, EA development control reported that, because of demand relating to the insurance industry's requirements, models and maps were now having to be produced to show the 1 in 75 year outline. In the Trent case study, the insurance industry was seen as divergent and influential. However, this was not reported as an issue in the Thames.

This 75 year figure was never a figure really that we used, and suddenly in modelling now, maybe it is a figure that we are having to get where a model is done, you might have got ranges of flood levels for a 25, a 50 year and a 100 year, but now we are having to get that 75 year in because so many people are requesting 75 year return period levels that it seemed that if we say I am sorry we haven't got that then we are being obstructive, so we are having to sort of respond and do extra work to cover the information that is needed to stay behind. (Trent 1)

The EA and its professional planning partners may have slightly different agendas on mapping and modelling. The EA strive to provide the best data available at any point in time whereas planning officers may prefer stability for policy implementation purposes.

The Environment Agency now obviously has its regular programme of updates to flood maps and flood zones, and they're released on a quarterly basis I think, and I think the local authorities now know that they get something every quarter. We have had sort of mixed responses, some of them are quite keen to have relevant information, or, relevant up to date information, some of them have been a bit reluctant and said 'well we've adopted X map as our development control map, if we have a new map then we're going to have to keep going to committee every three months to update the map', and obviously if you've made a development control decision based on a certain flood level and that's superseded in three months or six months time by a new flood level that can cause you problems. I think the Environment Agency took the view that it wanted the best, or, whenever we got new information that became the best information available for that reach, and we wanted that information to be disseminated to all the relevant decision makers. (Thames 4)

An observation from EA Thames was that professional partners and the public have very different interests, perspectives on, and attitudes towards, flood maps and the output from modelling. Members of the public have a very direct personal interest in flood risk information, planners do not. For this reason, members of the public and developers were much more likely to challenge mapping and modelling than professional partners.

I think professional partners are quite happy to sort of take it and use it and actually it doesn't matter if you're a planner or in a local authority or fire rescue or - you'd just

take the information and you use it and that's the flood outline, that's what you work to. The problems come with members of the public, because it's them who's property - you see it's not - with professional partners it's not them as individuals who are being affected in terms of property prices, insurance premiums and so on and so forth, so they're once removed from it. They can afford to sort of be quite blasé about the information that's presented. For Joe Public it actually impacts on them as individuals and impacts on their own financial wellbeing, and that's where - that's where you really start to come against a hard place. So I think with professional partners no....., I think it's because, you know, they will look upon us as a professional organisation, they will assume that the information that we are providing is the best available information and they are more likely to take that as read than challenge it.....and actually why should they challenge it, it's been issued by us and we're the experts in the field....but I think it is rare for local authorities to challenge us, it's usually developers and individuals (Thames 8).

Members of the public may not only have a direct personal interest in flood risk information but may also have local information and personal experience as an example from N&SDC illustrates.

in the consultation process, people look at the outline as they are here and during the flood and (say) this wasn't flooded and this was flooded, and that will, the meeting I was in, that happened and we went out to the village and surveyed it and more accurately.....and it turned out that there was an area of high ground there that had not been caught by the, I think it was the Lydar data, wasn't represented on the Lydar data, so that was taken out of the flood outline.(Trent 3).

For this reason, an EA Thames manager argued that initial site visits should be a requirement to provide modellers with a basic understanding of site conditions. Just as some EA planning liaison and development control staff regretted their lack of opportunities to go on site, this EA manager felt that modellers could become out of touch with the realities on site if visits were not made.

what it is I think is a very convincing case that hydraulic modellers should walk every watercourse that they're going to model, and they should take their own photographs and their own notes before they even set foot in the office and sit at a computer screen and start entering the data, I'm convinced of it, I'm absolutely, you know, otherwise it just becomes a theoretical exercise, and you're not able to challenge or consider the information that's presented to you (Thames 8)

Uncertainty in flood risk mapping and modelling

Those interviewed expressed differing views on whether and how the uncertainty inherent in models should be communicated in the context of planning and development control. Experience in the Lower Thames had led some staff there to have very severe reservations about the output from modelling generally and to take the view that information on the tolerances on models should be made available.

I mean we've spent about two million pounds on the Lower Thames model, probably, over a - the best part of nine years, and the issue of that... because of the 2003 event and then we've had to revisit and recalibrate and so on and so forth. There are still some errors in that model that have only just been identified, and I think - I think the trouble is that any hydraulic model, and therefore any outputs and any mapping, are only as good as the modeller that you've employed in actually doing the model, and that or - well it's a combination of being as good as the modeller and the client in terms of its output

I think it's (modelling) a black art that very few people understand, but which actually gets translated into fact. I mean what is never quoted is the tolerances on these models, and that really galls me,

I think we need to be much more explicit as an organisation about the information and how it's produced and what it's based on. I think we need to make people far more aware that this is - this does have some quite significant tolerances that need to be applied to it, and that the information should be treated with caution. (Thames 8)

Another of those interviewed in the Thames case study took the view that, although it was difficult and time consuming to explain, it was vital to communicate this uncertainty to the public as well as to those professionally engaged in flood risk management and considered that if this was not done it would undermine credibility in the long run.

You have to communicate the uncertainty in ... in terms of confidence you can attach to a particular figure ... the Agency, to make the documents look as if they have any credibility at all does not, as a matter of routine, include uncertainty brackets. Because they are so large they feel that communities would have no confidence in them whatever. My own experience is if you can get people to sit in on all of this it is doable.....But it is absolutely central, in my view, that people engage in this debate (on modelling and uncertainty) (Thames 10).

Within Thames mapping and data management, there was more tentative support for communicating uncertainty.

I think it depends on kind of what it's going to be used for, I think if you think about development purposes then obviously I mean models when they're done don't come with an accuracy that's linked to the calibration and the verification. We've started to ask for that as a team a lot more.

I think having an uncertainty associated with levels is actually - is quite a positive - is quite a positive thing because it is a model, and I think too often people see a model and say oh well that must be the level, that's set in stone, (Thames 7)

In the Trent case study, an EA mapping and data management officer took the view that it might be useful internally.

there is no policy about that that is, it is not something that we are involved with.

There are reports produced which will go into the uncertainty surrounding the outlines, but, no it is not something we communicate, or have to or really need to I guess as well. It would be useful for us I think and Development Control, because having fuzzy boundaries would complicate things with the general public and the external, but for us it would be quite useful.(Trent 3)

However, interestingly from those more directly involved in communicating about flood risk in relation to development plans and development control, while recognising that uncertainty could be an issue, there was less enthusiasm for communicating it and other ways of dealing with uncertainty were suggested.

people like lines, it helps in some ways as long as maybe expectations are such, when a line goes down the middle of a road and the houses on one side are on the flood plain and the houses on the other side aren't, you know that is kind of a worrying scenario, but I don't think a grey area, a wide strip down the middle would make things any clearer or simpler, it's not as detailed.....yes, because it may well be something simply if it is a house, even if it is on the wet side of the line, we would say raise your floor levels up 600mm, if it is on the dry side of the line, on the other side of the road, we would probably say the same thing. (Trent 1)

Well its an issue (uncertainty) but taking the precautionary principle, if we think there is going to be an uncertainty, we will go for the higher flood risk and use that as the basis for flood water levels and extents (Thames 3).

Development control staff also pointed out that where there was uncertainty or where the EA's mapping data were contested in relation to planning applications, it was open to

developers or members of the public to prove the EA's modelling to be wrong through undertaking their own modelling or through topographical surveys. It appeared to be not uncommon in the Thames case study area, for developers to challenge the EA's modelling and to undertake their own for their FRA. A planning liaison officer reported on one of several examples of disputes over models cited.

they (consultants for developer) started the modelling project and then we(EA) modelled it and then our model has sort of unofficially been proved wrong by their model so that was a bit of a battle, but that's sort of two ways where it's been modelled by two different people and we've had different outcomes, and because it's quite flat the extent was quite different, so it's showing some development inside and some more outside of the extent.... That has been resolved because we had the Environment Agency model checked by the EA modellers themselves, and we also sent the external model to a third party (another consultancy), and it came up as it was right, it (external model) was correct, but then you can only take a model so far,, and our model was done on kind of broad scale, whereas this one (external model) was just a section of the river which proved more accurate than ours.(Thames 3)

The Wapshott Road Inquiry also illustrates the complex processes of establishing flood risk through modelling in relation to a major planning application. The processes over a period of about two years involved four models: two developed by the EA and its consultants and two produced by the developers' consultants, at least three meetings between the EA and the applicants' consultants, a Model Comparison Report and a Hydraulic Model Review and finally, a Statement of Common Ground which set out the areas of agreement on the modelled flood risk between the parties, the EA and the applicants' consultants. While there had been many areas of uncertainty in the modelling, these processes virtually eliminated debate on technical flooding issues regarding extent, depth and velocity of flooding from the inquiry. What remained to be contested in the Inquiry were issues regarding the consequences and implications of the flooding for flood risk management and the interpretation of national policy (Appendix 2).

For one RBC planner, climate change raised much more serious uncertainty issues than any uncertainty attaching to current modelling. For this one interviewee, this was the most serious concern in the field of risk communication.

I think the main thing that is really, its, it's the long term environmental issues that the planners, not just town planners but all planners need to be thinking about, but chances are that we won't really be thinking about them until we really start hitting the problem say in 25, 50, 100 years time and then it will be.... major. (Thames 5)

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5. MAIN FINDINGS: FLOOD WARNINGS

The following chapter continues to address the case study areas of Thames and Trent but now in relation to flood risk communication in flood warnings.

As found for planning in the previous chapter national policy attempts to impose a nationally consistent approach to flood risk warning again through the application of standards but also this time through the centralisation of activities (McCarthy, 2007). The research analysis compared the two 'flood footprint' areas to identify any differences and established similarities in communication roles, agendas and requirements of the professional organisations involved. Again it is revealed that great similarities exist between the Thames and Trent case study areas, as might be hoped for from a policy perspective. However, there are variations in how some communication needs are met informed by historic communication mechanisms and approaches in response to localised events. But the drive towards a uniformity of approach is apparent in the communication mechanisms adopted.

As previously illustrated for planning equally in flood warning risk communication two different temporal scales can be identified. Across both the Thames and the Trent case study areas flood warning and flood incident management is driven by two quite different time frames and contexts. These in turn inform risk communication needs, the role of the actors involved, the communication structures and tools employed. The temporal division can be described as communications related to:

1. Planning and preparing for flood events
2. Warning and responding in relation to the incidents themselves

Planning and preparing for flood events is mainly a routine round of communications activities providing the 'day job' for staff. It was reported that such communication activities attempt to maintain a level of commitment, freshness of planning and building of linkages and relationships between and within the professional organisations involved. For fluvial flood risk this is often planned for and conducted over an annual cycle set against the seasonal likelihood of events. Whilst warning and responding in relation to fluvial flood events might be governed by seasonal climatic conditions it is the magnitude of such events that is not so predictable. It can be months and years before significant events occur, that is events with high resultant consequences. But there can also be shorter periods between repeat, minor or 'near miss' events that require reaction by the professionals. When there is a likelihood of flooding the professional response provides a highly structured intense period of localised event specific communication within a short time scale of days and hours. The key actors and organisations involved in both the preparation and the response to an event tend to be the same.

5.1 Professional organisations and groups involved: constraints and agendas

5.1.1 Planning and preparing for flood events

Risk communication between professionals takes place through year round activities to raise awareness of flood risk and to plan and prepare for flooding. Influencing a national approach to planning and preparation recent legislation came into force which dictates a national organisational structure for general hazard management.

The Civil Contingencies Act 2004 (CCA 2004) was derived from a review of emergency planning arrangements catalysed by a number of crises including the flooding of autumn 2000 and the outbreak of Foot and Mouth Disease in 2001. The CCA 2004 has placed new duties, activities and arrangements on the agencies concerned with emergency planning and

it was reported gave a new impetus to the preparedness activities. Resultant from the CCA 2004 both the counties of Surrey and Nottinghamshire have a Local Resilience Forum which involves key possible responders to a range of hazards for that county. The CCA 2004 defines the Local Resilience Forum and the types of organisations that could be involved in the management of a hazard. The type of organisations defined as making up the membership is the same in both counties. By way of example the membership for Nottinghamshire is given in Table 8:

Table 8: Organisations types in the Nottinghamshire Local Resilience Forum.

Category 1 Responders	Category 2 Responders	Other Responders
Ashfield District Council Ashfield & Mansfield District Primary Care Trust Bassetlaw District Council Bassetlaw Primary Care Trust British Transport Police Broxtowe Borough Council Broxtowe & Hucknall Primary Care Trust Doncaster & Bassetlaw Hospitals NHS Foundation Trust East Midlands Ambulance Service Environment Agency Gedling Borough Council Gedling Primary Care Trust Health Protection Agency Mansfield District Council Newark & Sherwood District Council Newark & Sherwood Primary Care Trust Nottingham City Council Nottingham City Hospitals NHS Trust Nottingham City Primary Care Trust Nottinghamshire County Council Nottinghamshire Fire & Rescue Service Nottinghamshire Healthcare NHS Trust Nottinghamshire Police Queens Medical Centre NHS Trust Rushcliffe Borough Council. Rushcliffe Primary Care Trust Sherwood Forest Hospitals NHS Trust	Anglian Water Services Ltd British Telecom British Waterways Central Networks Health & Safety Executive Network Rail Severn Trent Water Transco Trent Strategic Health Authority	Age Concern Armed Forces Benefits Agency British Red Cross CRUSE Bereavement Care Girl Guide Association Government Office East Midlands HM Coroner National Association Citizens Advice Bureau Religious Organisations Royal Society for Prevention of Cruelty to Animals (RSPCA) Salvation Army Samaritans Scout Association St John Ambulance Highways Agency and contractors Victim Support WRVS And others ...

As illustrated in the table membership of the Local Resilience Forum is prioritised into three groups which define different levels of responsibilities. Category 1 responders have to be involved in the Forum and have to attend forum meetings. Category 2 responders do not have to attend meetings but can if they wish. However, if the Category 1 responders consider it necessary they can request a Category 2 responder to attend meetings. The 'others' category highlights organisations that may be relevant or useful for certain hazards but do not have to attend meetings. So although listed as a member of the Local Resilience Forum participation is not necessarily guaranteed but dependent upon the category definition of the organisation. This will be reported later as a possible constraint on communication. The job titles and roles of the individuals representing their organisations are also set by the Forum and so similar across Trent and Thames. An example of a few of the job titles taken from the Surrey Local Resilience Forum is as follows:

Surrey Chief Constable
Chief Exec of Surrey County Council
Chief Fire Officer for Surrey
Chief Exec of Surrey Ambulance Service
A representative Chief Exec. of the Primary Health Care Trusts
A representative Chief Exec. of the Boroughs and Districts
Senior representative of the Hospital Trusts

Of note is the seniority of the organisational representatives involved. The Local Resilience Forum prepares for and co-ordinates the response of its members to major incidents. An initial assessment of the hazards pertaining to an area was undertaken by a sub-group which prepared a communication tool in the form of the Community Risk Register which will be described later in this chapter. It was reported that specifically with regard to flood risk management the organisations listed as part of the Local Resilience Forum will have varying degrees of involvement dependent upon their responsibilities and expertise. Activities are actioned through Working Groups. For Surrey it was reported that there is an intermediary group between the Working Groups and the Surrey Local Resilience Forum called the Inter-Services Liaison Group which attempts to coordinate the multitude of activities and organisations. It could be said that all the organisations listed in Table 8 will have or could have some role to play in the communication aspects of preparation for flooding but the key organisations that arose in the research were:

The Environment Agency.

The EA is a body whose flood risk management activities are funded by the Department for Environment, Food and Rural Affairs (Defra). They have regional and local presence in England and Wales and attempt to have a consistent agenda of promoting preparation for flooding. EA flood forecasters and flood incident management team members are involved year round in maintaining and enhancing their readiness and systems for forecasting and disseminating warnings. On a day to day basis, it was reported that the EA flood forecasting's role and agenda is to maintain and enhance their flood detection and forecasting capability. In terms of structure, by way of an example but also similar in approach in Nottingham, the EA area of Thames Region has a team staffed by a complement of about thirteen covering the whole of the populous, a varied fifty five catchments and 215,000 properties at 1% risk of flooding (Environment Agency 2007). The South East Area is concerned with the reach of the Thames in this research is only one of three areas within Thames Region. In the South East Area and other EA Areas, there is a Flood Incident Management Team which was reported to be made up of seven people led by a team leader. The team members tend to have special responsibilities in terms of preparation and planning for a flood incident.

Both Regional Flood Forecasting and Flood Incident Management teams are also involved in awareness raising activities and other preparedness activities. It was reported that the teams

lease with and take advice from the EA Corporate and also External Affairs departments. This not only involves communication with the at-risk public but also includes building and maintaining relationships with the EA's professional partner organisations. The key professional partner organisations highlighted in interviews in relation to this activity are now described.

County Council Emergency Planning Units

Councils both at county and local levels consist of publicly elected and appointed officials who endeavour to meet the social requirements of their area and the political and national legislative agendas. The local councils have greater latitude to pursue their own initiatives outside the constraints of national policy and guidance although they still need to adhere to Local Resilience Forum preparatory activities. Lead strategic emergency planning is provided at a County level by the Emergency Planning Units. For part of the Lower Thames area it is the responsibility of Surrey County Council's Emergency Planning Unit and for the Trent it is the Nottingham County Council Emergency Planning Unit. The Units are concerned with the managing, the preparation and response to major emergencies or disasters including major flooding. They work closely with the boroughs (e.g. 11 boroughs in Surrey) and districts, the emergency services and the other agencies listed in Table 8.

District and Borough Councils

Although emergency planning and response is a county responsibility, at a local level, both local councils have set up responding groups within their organisations. The relevant local councils for this research are Newark and Sherwood District Council (N&SDC) for Trent and Runnymede Borough Council (RBC) for Thames. For N&SDC the group or mechanism for communication is called the Risk and Resilience Unit. For RBC they have created the Safer Runnymede Centre.

Other contributing groups

Other community and voluntary bodies were reported to be involved in raising awareness of flood risk and planning for flood events with communication links with the EA region and area offices and the relevant local councils. These were brought together by mechanisms such as Local Strategic Partnerships, Flood Risk Action Groups (FRAGS) and The Thames Flood Forum. The contribution of such risk communication mechanisms will be explored in more detail in this chapter.

5.1.2 Warning and responding in relation to the incidents themselves

The role of directly warning the public about an impending flood event was once undertaken by the police forces but in England and Wales since September 1996 the EA has been given the lead responsibility for flood warning dissemination. Preceding an event the EA is a key communication organisation in flood incident management. Once there is a flood incident then the initiative shifts to the emergency services and the Local Authority and still further towards the local authorities in relation to the recovery phase. Efforts to include adaptation initiatives continue to be explored at the time of this research. Research at a national level as part of this project (McCarthy 2007) highlighted how the implementation of the National Flood Forecasting System (NFFS) and Floodline Warnings Direct (FWD) was an EA initiative to improve warning delivery, greater consistency and national control over performance. At the time of this fieldwork the new systems were still being rolled out.

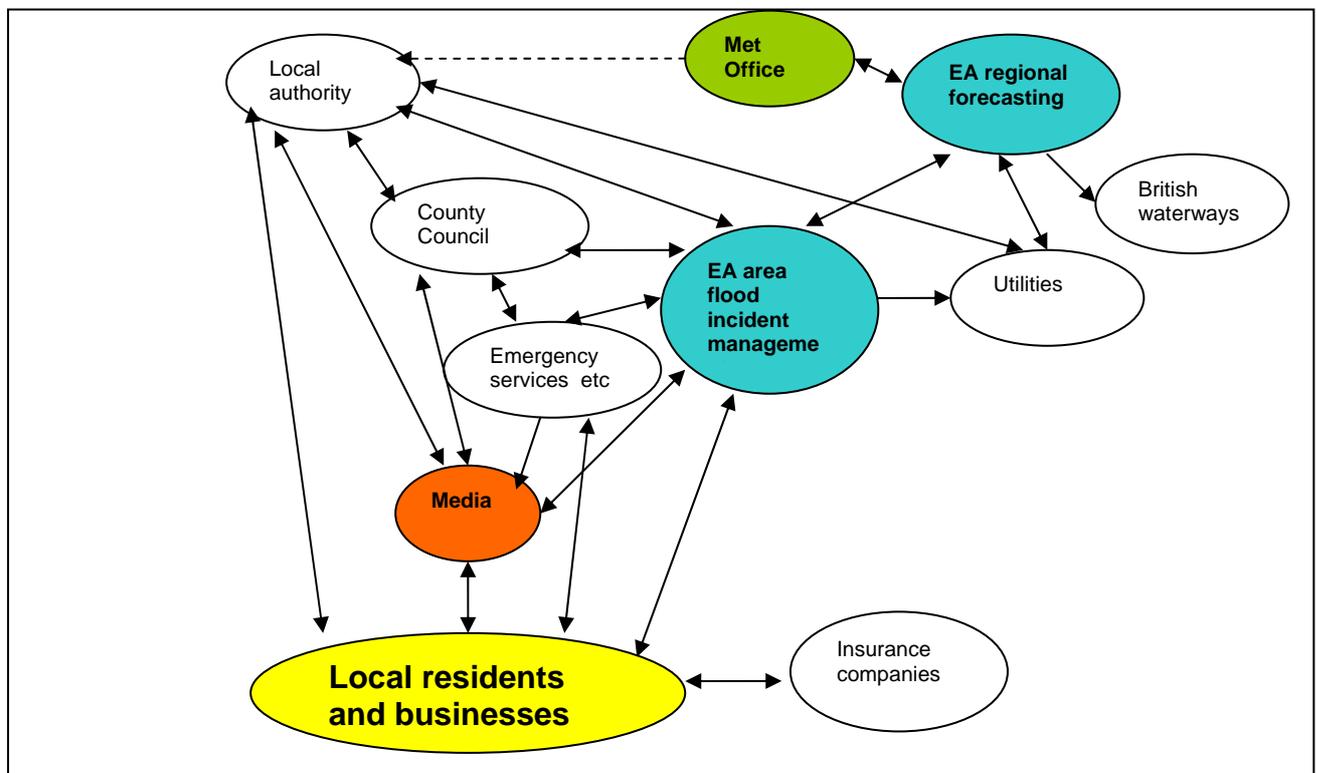
Characteristic of flood event management, risk communications are issued over a short time period (hours or days) set against the consequences of a potential event the decision making is made under the pressure and can be stressful. It is revealed in the research that there is a more formalised and slimmer communication organisational structure in comparison with the warnings planning and preparation activities. That is prescribed

communication channels, decision relationships and message content is characteristic of the current fluvial flood warning system. This is compared with the slower burn, the greater breadth of organisations involved and flexibility in communication activities in preparation for flooding. However, the research reveals that more tightly defined relationships and decisions are being implemented at a national scale through the Local Resilience Forum. The primary forecasting and warning communications route are from:

- The Met Office to the EA Regional Forecasters
- The Regional Forecasters to the EA Area offices
- The Area office (Flood Warning Duty Officers) to their Professional Partners and the public via Floodline Warnings Direct.

However, the research revealed, as illustrated in Figure 9, outside this primary formal communication route special relationships can exist between these key organisations and the end users of the communication.

Figure 9: Professional risk communication linkages in warning and response



Characteristics of the key organisations involved in this communication net are:

Met Office

From national level interviews (McCarthy, 2007) it was found that the Met Office aspires to being a world class meteorological organisation and keeping its methods and services at the forefront of developments. This involves the development of new products and taking the initiative in meeting the new information needs of their customers. The Met Office delivers flood warning information to the Regional Flood Forecasters but also as in the case of RBC they are sent direct to their Community Safety Manager. This is because of the manager's responsibility for certain highways activities and requirement for extreme weather warnings and other general forecasts i.e. surface water conditions or to get gritting teams out if snow is predicted. It was reported that N&SDC once had a direct contact with the Met Office but now relied on their County Council and EA as primary sources of warnings.

EA Regional Flood Forecasting

Regional Flood Forecasting's role and agenda when flooding threatens is to deliver timely and accurate forecasts to the area Flood Incident Management teams. The criteria for flood forecasting performance is avoiding 'false alarms' and issuing a 'correct warning' when the alarm level for a particular water course has been reached. Much of the forecasters risk communication is internal within the Environment Agency. Regional flood forecasting communicates with:

- Area flood warning duty officers
- Area operations regarding telemetry
- EA waterways staff regarding opening and closing of locks and weirs
- Other EA regional forecasters e.g. regarding radar and rainfall events

The main organisation with which they have external communications is the Met office. If pumping and abstractions can affect fluvial water levels as in the case on the Thames then the utility company Thames Water and Didcot power station can be communicated with. British Waterways can be a contact if non-fluvial navigations are influential. External communications with professional partners are mostly dealt with at area level by the Flood Incident Management teams.

EA Area Flood Incident Management Team

In a flood incident, the Area Flood Incident Management Team role and agenda is to issue timely warnings to professional partners and the public. Warning communications are made via a gold, silver or bronze command structures if it has been activated but also directly via the Floodline Warnings Direct system with:

- Emergency services – police, fire, ambulance
- Local and county authorities
- Local and national media – BBC and independent radio and TV networks, teletext
- Public concerns in the flood risk area schools, hospitals, residential homes
- Concerns with infrastructure in the flood risk area: utility companies e.g. water companies, rail infrastructure and train operators
- Local residents and businesses, flood wardens, caravan sites, boat owners, visitors

The Media

The media will be involved in gathering stories from all the professionals and from local residents and businesses and will be a source of information to all. At a local level in relation to warning and responding to incidents contact with the media was reported to be in varying degrees for the individuals interviewed. Whilst at a national level the EA have agreements in the provision of warnings to news networks senior managers are given responsibility (via corporate affairs / external relations) for acting as a spokesperson during a flood event. Emergency management officers within local councils in both flood footprint areas were mentioned having contact with local media at the time of an event to communicate local specific information mainly for public reception and to local businesses.

5.2 Needs, strategies, and communication tools

5.2.1 Planning and preparing for flood events

As already outlined a major recent communication structure or driver of risk communication between organisations relevant to flood risk management has been the Civil Contingencies Act 2004. The Act established a requirement to not only tackle the event but also prepare for the next event. This was set against a national drive away from flood defence to flood risk management and preparation including resistance and resilience activities. In order to

achieve this there is a need for cooperation and to bring together organisations and groups with different responsibilities and abilities. However, preparation is not only attended to with regard to warning and flood incident management activities but also cuts across other areas such as spatial and development planning. In order to achieve the aims of the Act various mechanisms and tools have been put in place. The following Table 9 outlines the key approaches revealed in this research and the two case study areas.

Table 9: Summary table of key risk communication approaches: Warning Planning and Preparation

STRUCTURES	MECHANISMS	TOOLS
Legislative: Civil Contingencies Act 2004	Local Resilience Forum - Inter-Services Liaison Group (Surrey) - Working Groups Warnings Levels of service methodology - Telemetry and - forecast model maintenance and improvement. Risk and Resilience Unit (Trent) Safer Runnymede Centre (Thames) Flood Risk Action Groups (FRAGS) The Thames Flood Forum Local Strategic Partnerships Training Exercises Formal meetings Informal day to day contact	Community Risk Register - Decision scales and matrices Surrey Alert website Nottinghamshire Prepared Website Environment Agency website Warnings Levels of service methodology - Decision scales and matrices Environment Agency flood probability maps NFDDS database. EA and Council Website and hard copy booklets, leaflets and dedicated web sections. Telephone, mobile, fax, (radio), internet systems Environment Agency Flood Plans FRAG advice booklet (Th)

The **Local Resilience Forum** meet on a regular basis to create, review and refresh hazard management plans that include flooding. While the Local Resilience Forum is a relatively recent group it was reported that there were already similar groupings present in the counties before the Act. As an example in Surrey a similar group was established in 1992 as the Surrey Emergency Services Major Incident Committee or known as SESMIC. At that time the Environment Agency was not a member of SESMIC but now as a Category 1 responder under the Civil Contingencies Act, it is now has a voice on the Surrey Local Resilience Forum. With implementation of the Civil Contingencies Act the name was changed along with the group's activities, duties and membership but essentially some

relationships and communication channels were already established. There were also County Council level plans developed that were reported to still be in circulation and inform more recent plans e.g. there is a Severe Weather Emergency Response Plan dealing with severe weather and flooding.

One of the initial requirements of the Act by central government's agenda was for the Local Resilience Forums to establish a **Community Risk Register** for their area thus providing a national picture of hazard risk levels when areas are combined. The aim of the registers is to provide publically available information about generic hazards that exist within an area and the control measures in place to mitigate them. They embody a conception of risk that embraces probability and consequences assigned to each local hazard. Within the risk register there are also a number of sequentially applied communication tools in the form of scales and matrices to direct and standardise decision making. For the probability component a five point scale descriptor is used and shown in Table 10.

Table 10: Community Risk Register probability categorisation scale for a hazard.

Likelihood scoring scale			
Level	Descriptor	Likelihood over 5 Years	Likelihood over 5 Years
1	Negligible	> 0.005%	> 1 in 20,000 chance
2	Rare	> 0.05%	> 1 in 2,000 chance
3	Unlikely	> 0.5%	> 1 in 200 chance
4	Possible	> 5%	> 1 in 20 chance
5	Probable	> 50%	> 1 in 2 chance

Related to each scale descriptor the probability described as 'likelihood' is set within a five year time period and provided in two forms as either a percentage or as odds. This use of language and alternative translations is an attempt to convey meaning to a potentially diverse readership both across and within professional organisations but also the public. The consequences component or described as the 'impact' of a hazard are assessed in terms of the economic, social, health and environmental impacts of the hazard as defined in Table 11.

Table 11: Community Risk Register categories of impact.

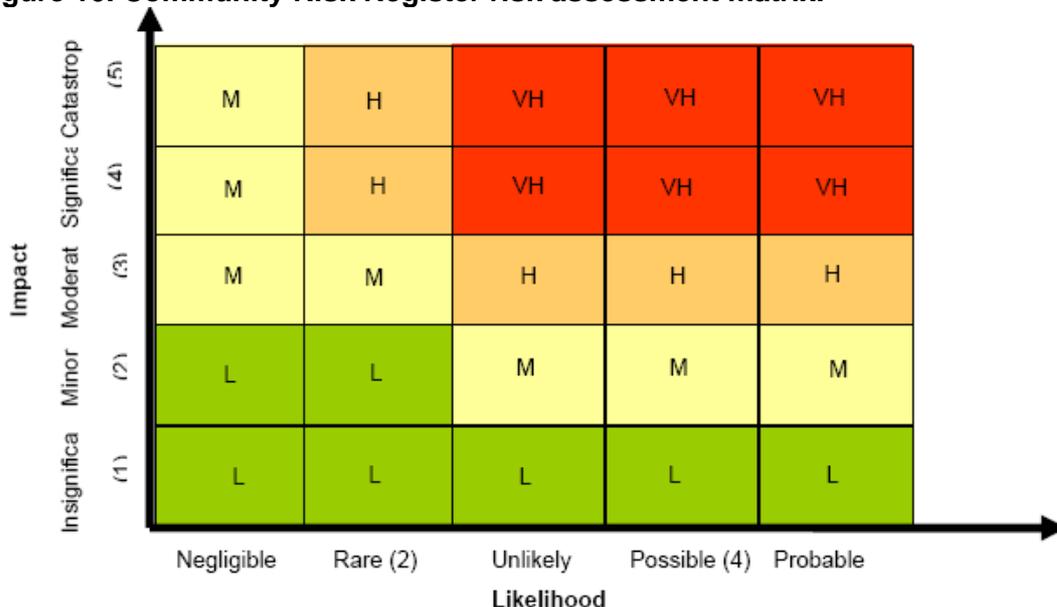
Explanation of categories of impact	
Category	Explanation
Health	Health Encompassing direct health impacts (numbers of people affected, fatalities, injuries, human illness or injury, health damage) and indirect health impacts that arise because of strain on the health service.
Social	Encompassing the social consequences of an event, including availability of social welfare provision; disruption of facilities for transport; damage to property; disruption of a supply of money, food, water, energy or fuel; disruption of an electronic or other system of communication; homelessness, evacuation and avoidance behaviour; and public disorder due to anger, fear, and/or lack of trust in the authorities.
Economic	Encompassing the net economic cost, including both direct (eg loss of goods, buildings, infrastructure) and indirect (e.g. loss of business, increased demand for public services) costs.
Environment	Encompassing contamination or pollution of land, water or air with harmful biological / chemical / radioactive matter or oil, flooding, or disruption or destruction of plant or animal life.

Each of the above categories is assessed for each hazard and an overall impact level is assigned on the following five point scale:

- Catastrophic
- Significant
- Moderate
- Minor
- Insignificant

In order to obtain a rating of risk for each hazard both five point scales from the assessment of likelihood and impact are combined into a twenty five cell matrix (Figure 10).

Figure 10. Community Risk Register risk assessment matrix.



According to the position of the hazard on the grid, the risk is rated on a four point scale as very high (VH), high (H), medium (M) and low (L). On the matrix the scale categories are presented as colour coded cells related to the level of the risk, green to red. Generic hazards such as flooding can have hazard sub-categories that further subdivide into for example fluvial and flash flooding. Table 12 is an example taken from the Surrey Community Risk Register with the resultant risk ratings for the generic hazards and the flooding sub categories identified. The numbers indicate the separate hazard issues or sites identified for each hazard in the area.

Table 12: Surrey Community Risk Register

Hazard sub-category	Risk category				
	Very high	High	Medium	Low	Total
Animal health: notifiable diseases		1		1	2
Civil disturbance: general public, prison		1		1	2
Environmental pollution: pests, releases from pipelines, transport, site		2	1	1	4
Fire/explosion: gas terminal, tunnel, vessel, site, heath		1	7		8
International incident		1	1		2
Public health: pandemic, food poisoning, contamination: water, land, air	1 (flu)	3	1	2	7
Public safety: siege, hostage, evacuation, influx			1	1	2
Supply disruption/failure: water, elec., gas, communications, food		3	4		7
Structural emergency: collapse building, dam failure, quake			4		4
Severe weather: drought, extreme heat , flooding, wind, low temp, snow		6	2		8
Transport		1	3	1	5
Total	1	19	24	7	51
Localised flooding of rivers and streams (possible/moderate impact)		1			1
Widespread flooding of rivers and streams (unlikely/moderate impact)		1			1
Localised flash flooding (unlikely/minor impact)			1		1

Source: www.surreyalert.info/surreyalertpublic/slrf.html

The assessment illustrates that there can be a number of issues or sites where a hazard can exist in an area and in turn they can have different risk level ratings. In order to inform planning the individual hazard sub-categories such as flooding is associated with a lead responsible organisation and the report holds contact details for that organisation. There is recognition within the register that the risk levels are dynamic and reassessment of a particular hazard is indicated with a review date. The following example Table 13 is taken from the Nottinghamshire Community Risk Register for a single sub-category of major local fluvial flooding.

Table 13: Example of part of the Nottinghamshire Community Risk Register

	B	C	D	E	F	G	H	K	N	Q
	Risk Ref No	Hazard or Threat Category	Hazard or Threat Sub-category	Outcome description	Likelihood	Impact	Risk Rating	Controls Currently in Place	Lead Responsibility	Review Date
4	HL19		Major local fluvial flooding	A sustained period of heavy rainfall extending over two weeks, perhaps combined with snow melt, resulting in steadily rising levels over a region. Localised flooding of more than 100 and less than 1000 properties. There would be some impact on minor roads and some A roads and trunk roads impassable for a time. Some main rail lines would be closed (where bridges are deemed unsafe for example). Many minor rail lines and stations would be closed. Most waterways would be closed to traffic because of strong currents and high water levels.	Possible 4	Moderate 3.25	High	Flood defences – North Muskham Defences have been built on the east of the Trent at North Muskham. Flood defences - Girtton Flood defences: Agricultural land is protected to between 1 in 3 to 1 in 10 year return periods. Villages either side of the Trent are defended with the exception of Girtton and other localised areas. Nottingham City Council "Emergency Call Out Plan" Nottinghamshire Strategy Document for integrated Emergency Management Nottinghamshire Management Protocol for Floods response Nottingham City Council "Managing an Emergency" Environment Agency: Local Flood Warning Plan for the City of Nottingham and Nottinghamshire County Council Area Environment Agency: Flood Defence and Land Drainage Operational and Emergency Contact Arrangements (for each Local Authority) Environment Agency: Work Instruction for the Incident Management Manual Environment Agency: Work Instruction for	Environment Agency	November 2007
52										

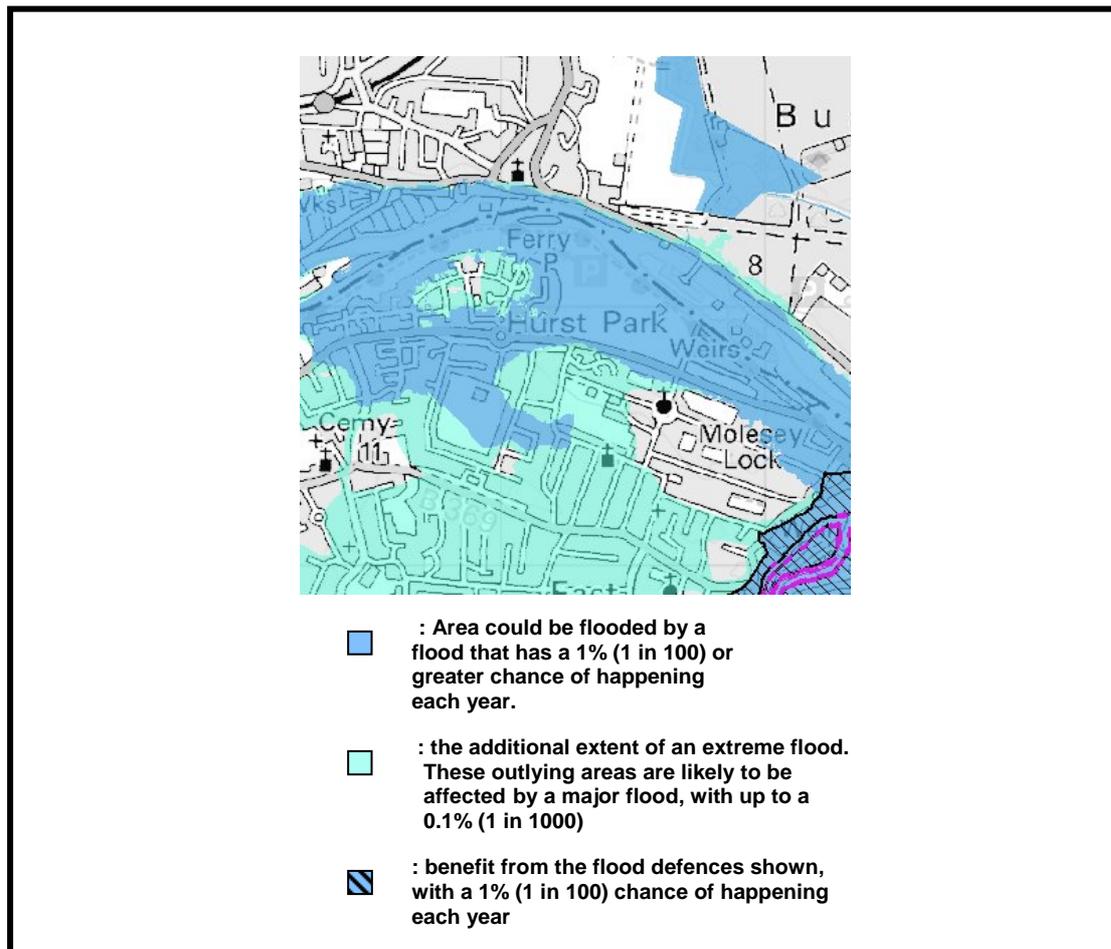
In both flood footprint areas both the registers and LRF meetings every two months were considered to be a useful mechanism for bringing together groups and raising awareness of flood risk among professionals.

A useful forum to really drive home about flooding particularly in London where they have got so much to deal with. I don't think they have ever really realised that flooding is as big a risk as it is and so it has been a really useful forum to really get that out on the table and say this is how many properties have got a risk (Thames 13).

The EA and Council staff respondents also agreed when prompted that the risk registers had highlighted some of the key flood risks and issues and made people think more about them than before. For one respondent commented 'a few eyes have opened' and noted that at least one Chief Executive had questioned whether flood risk should have come out as high in the ratings. The Register for any region nationally is openly available for any professional organisation and public alike. Within both of the research flood footprints the registers are available on the internet.

In both Trent and Thames flood footprints the County Councils have open access websites which provide information on the Local Resilience Forum information and more generally flooding. For the Trent the site is called the **Nottinghamshire Prepared website** and for the Thames the **Surrey Alert website**. The latter is perhaps more focused on flooding and has additional communication tools in the form of sections on severe weather and flooding, evacuation, advice leaflets, business continuity and an emergency toolkit. The RBC's website holds a copy of their Civil Contingencies Plan 2006. It was reported as intended for internal information and guidance primarily to all officers in the Council who may have responsibilities in an emergency situation. However, the plan is accessible external to the organisation. It has an Appendix E to the Civil Contingencies Operations and Logistics Plan which deals specifically albeit fairly briefly with flooding. The Surrey Alert website has links to the **EA website** and their electronic and hard copy versions **booklet and leaflet advice** e.g. on flood warnings and what to do to prepare for flooding and to clean up afterwards. However, the sole focus is not flooding there are also sections on food contamination, fuel crisis, pandemic flu, radiation emergencies, utilities, volunteering in emergencies. In relation to preparation and planning the EA website provides postcode and location searchable flood probability maps which are mainly directed at the public but can be accessed by professional organisations (Figure 11).

Figure 11: Example of Environment Agency website flood risk map.



The map provides colour coded zones associated with the probability of flooding occurring and is presented both as a percentage and odds. The maps also show where flood defences are in place and associated areas that are at risk but benefit from those defences. With further interrogation NaFRA (National Flood Risk Assessment) data can be revealed which will give a high, medium and low flood likelihood evaluation.

It is very coarse data, it is very rough data and it shouldn't be looked at as property specific. It's 100 by 100m squares. (Trent 3)

Such 'roughness' is reflected in the 1 in 50000 scale for viewing the maps which reduces the ability to resolve the image down to property level. The council respondents commented that they often have to attend to the website source of information through queries from their constituents and sometimes in relation to concerns regarding gaining insurance cover. Such queries are more often made to the EA and directed to the Area Flood mapping and modelling who have preformatted responses dependent upon the answer to the query. The maps and updates are issued on the website when they become available to local authorities where they are used to inform development planning decisions (Section 4.2).

For N&SDC the mechanism for communication is called the **Risk and Resilience Unit**. Staffed by a small team it was reported to have a wide range of concerns and brings together individuals within the District Council who have responsibilities for:

- Risk management
- Health and safety
- Community safety

CCTV
Emergency planning
Climate change, adaptation and energy management.

The Unit acts as a point of contact not only for the public but also the EA and the many parish councils. Trent is a rural area with some 80 parish councils and it was reported that in September 2007 a parish council **risk and resilience conference** was held. It was used to communicate to the parish councils that while funds were not available for additional flood defences some limited funds were available. Most of the councils requested assistance with flood resilience measures.

For RBC they have created the **Safer Runnymede Centre**. This is also a small team consisting of a community safety manager plus three staff members and the operators. It was reported that the Centre deals with all community safety matters in Runnymede. This also includes the town CCTV system but also the speed control strategy and monitoring the community care alarm system. They are responsible for community safety issues and planning and preparedness for all types of emergencies. For both local council groups flood risk management is a part but only a small part of their agenda. However, it was pointed out by respondents in both councils that flood planning cuts across all of the concerns of these groups even planning and use of CCTV in flood event management.

Mainly driven as a result of the Civil Contingencies Act a communication mechanism employed to bring together relevant organisations to both prepare for and test their incident management working relationships are **training exercises**. In both flood footprint areas exercises have been undertaken specifically in relation to flooding:

We have had the odd one here and there (exercise about flooding), but there seems to be a lot more and I think that is a direct result of the community risk register which has pushed it up the agenda. (Thames 13)

Equally it was reported that there were more requests by professional organisations for participation in the exercises. It was reported that these are usually tabletop exercises with, in the case of flooding, scenarios written by the EA. It was commented that exercises help both to turn into action LRF initiatives and in conjunction with LRF meetings help to maintain organisational motivation during non event periods. More complex exercises, it was reported, test real time hard communication systems such as radio, mobile, fax, internet and conventional landlines. Looking just in London it was reported that there have been eight professional partner exercises in the two years up to May 2006. In addition to training exercises within the key organisations staff are also sent on training courses either held within or outside the organisations either to gain or tune their skills.

Particular to flooding decisions made in exercises and planning can be informed by **Environment Agency Flood Plans**. These plans follow a national format and are produced for the County Councils. They are updated annually and are focused on Boroughs and Districts separately. The plan describes the flood warning codes, lists the Flood Warning Areas and includes diagrams showing how flood warnings are issued and a map showing the areas at risk for each of the Flood Warning Areas. The Flood Plans are presented by the Environment Agency to the council emergency planners in annual **formal meetings** or following a flood to review the plan. It was reported that there was also **informal day to day contact** between the EA and the emergency planners in County, Boroughs and District councils regarding specific queries in relation to risk management. The formality of some meetings was commented on as sometimes a constraint on interaction and workshops might be more beneficial.

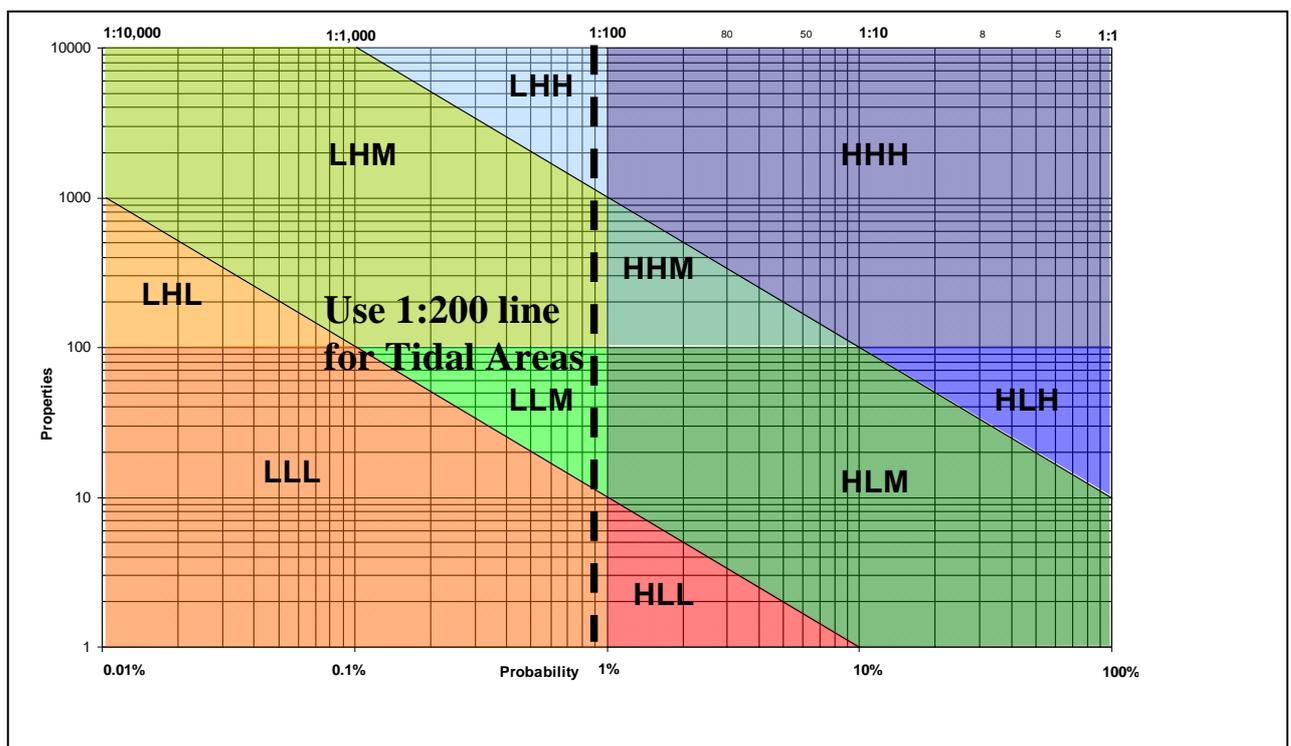
Such preparatory exercises and training help to maintain the capability of organisations while awaiting a flood event. Within the EA the **Regional Flood Forecasting teams** also attempt

to prepare and improve their systems before a flood event occurs. In order to meet their preparatory agenda to maintain and enhance their flood detection and forecasting capability the **Warnings Levels of Service Methodology** is employed. This is a mechanism also utilised by the **flood incident management teams** to inform preparatory decisions regarding the levels of service the Agency provides across:

- Detection and forecasting
- Warning dissemination
- Public communication

As an inter-agency communication mechanism it was reported the aim of the methodology is to establish nationally consistent standards across the EA functions in the three categories listed above. Launched in 2005, it is applied to both existing and new flood warning areas. Within the approach are a series of scales and matrices that are designed, as in the case of the community risk register, to aid decision making but in this case for the establishment of a warning delivery standard for an area (Figure 12).

Figure 12: Example of a Flood Risk Delivery Decision Matrix



Once again the concept of risk in terms of the likelihood and the consequences underpins the assessment decision tool with the decision matrix described by the flood probability, presented as a percentage and a return period, and impact in terms of the number of properties affected. Dependent upon the position on the matrix different coloured zones define via a three point scale the standard or combination of services that should be expected in the flood warning area e.g: from a full flood warning system to perhaps only awareness and education programmes. For more detailed description of use refer to Andryszewski et al (2005). Information pertaining to the assessment is provided by **Area Flood mapping and modelling**. This is a separate local EA team that manages GIS

mapping databases combined with models in the **NFDDS database** to inform such decisions. The NFDDS is a web-based data storage medium managing GIS flood zone maps, risk assessments, survey data and any report data associated with a particular area. Data can be downloaded onto the office personal computer to view and amend.

For preparation of the physical flood warning system in both flood footprint areas it was reported that the maintenance duties are undertaken. It was reported as involving a daily routine of checking the functioning of the telemetry system outstations for faults. This is an attempt to reduce uncertainty or malfunction of the system as the majority of telemetry data feeds directly into the models that inform flood warning release decisions. EA Area teams responsible for the outstations will also check them and fix them if they go wrong. General systems checks, for example, to see whether the alarm handling function is working properly are also done on a daily basis to establish the readiness of the forecasting system.

Enhancement of the system is also undertaken and involves upgrading the telemetry system. As part of the EA asset replacement programme it was reported that they have been moving away from radio stations. This is because the radio transmitters take in data from ten or twenty outstations. This was reported as a concern as a malfunction on the radio stations would have serious consequences for forecasting. So the radio transmitters are being replaced by individual landline units. The Regional Flood Forecasting team evaluate and rationalise the network of outstations and their location to see whether the stations are needed. The team also assess the whole range of flood forecasting techniques and ways to improve them. At the time of interviewing it was reported that the old cascade forecasting system was in the process of being replaced by the National Flood Forecasting System (NFFS) (described in McCarthy 2007) which when fully operational was hoped would greatly enhance the forecasting data EA Area received.

Another opportunity or mechanism reported by respondents for bringing organisations together to communicate with regard to the preparation for flooding are the **Local Strategic Partnerships**. Government has directed all local authorities to produce a community strategy in which it sets out a long term vision for the locality (National Strategy Action Plan). These plans are achieved through Local Strategic Partnerships and their task groups. With an aim to develop a strategy the groups are made up of interested local parties from public, private, business sectors and community organisations. There is an environment task group that is relevant to flood risk. The EA has considered the value of their participation in these partnerships as a means of furthering its interests and in particular, the raising of awareness of flood risk at local level. However, it was reported that locally these were not viewed as a priority mechanism for Flood Risk Management communication delivery due to the dominance and wide ranging membership of the already formed Local Resilience Forum. Involvement was also viewed by the EA as potentially very demanding on already stretched resources. In the South East Area it was reported that there are thirty six Local Strategic Partnerships alone. Such constraints were also felt to operate for the local authorities as well so the EA was reported to attend those that are a priority and where the local authority is interested.

A communications mechanism unique to the Lower Thames area is the River Thames and Chertsey Bourne Flood Forum or otherwise known as the **Thames Flood Forum**. This body, a special bespoke communications mechanism supported by the EA, replaced the Flood Risk Action Groups (FRAGs) in 2005.

Historically in 2003 the EA and the Local Authorities set up **Flood Risk Action Groups (FRAGS)** in response to public demands for a public inquiry and as a means of independent scrutiny of local flood events. Both the previous FRAGs and the now Thames Flood Forum are chaired by a person not local to the area, as a neutral and independent party. Three FRAGs were set up:

FRAG Hurley to Wraysbury (Thames) (22 members)
FRAG Wraysbury to Teddington (Reaches 3 and 4) (16 members)
FRAG Chertsey Bourne (12 members)

They were thus focused on the past flood event but did serve to raise awareness of flooding issues and as a communications mechanism between professionals i.e the EA, and local councillors and officers and local communities. In addition, the FRAGs also set up Community Support or Liaison Groups made up of representatives of riverside communities with an information gathering and disseminating role. The group also established four sub-groups to investigate particular topics on:

The mechanisms of flooding: causes and impacts work lead by Clive Onions
Insurance lead by John Pollen and Mike Smith, Wraysbury Parish Councillor
Development in the flood plain with local authority planners and Environment Agency staff: Justine Glynn
Emergency response lead by Surrey and Buckinghamshire County Councils.

Most relevant to preparedness was the last sub-group on emergency response which produced a **FRAG advice booklet** titled 'Flooding: Are you prepared for it?' It was prepared by representatives of eight councils, three community groups, Thames Water and the EA. Its preparation in 2004 undoubtedly involved a major exercise in professional communication on flood risk and formed the basis of interaction in the current Flood Forum. The final report of the group in March 2004 was titled 'Mechanisms of Flooding'.

The new Thames Flood Forum brings together representatives from the EA, councillors and officers from the local authorities, community groups such as the Chertsey Society, Thames Awash, Community Support Group South and the River Thames Society and Thames Water. It has an educational role to play in enhancing mutual understanding among the organisations involved and aims to act as a channel of communication at central government, catchment and local levels. The overall objective of the forum is to help to reduce flood risk to those living and working in the flood plain of the River Thames between Hurley and Teddington and the Chertsey Bourne. Meetings are held roughly quarterly and these follow a programme on special topics relating flood risk to increase understanding and to allow for an exchange of views. For example a presentation providing the local authority perspective on flood preparedness and response with contributions from Surrey County Council and RBC was made at a February meeting in 2007. Additionally the ABI and National Flood Forum have made contributory presentations to the group. The EA also uses this mechanism as an engagement exercise to keep local groups informed on their progress, or lack of progress, on local flood issues and to address members concerns.

For dissemination activities to the public, which is outside the scope of this report, there are additional groupings that are interagency involving councillors and officers and community groups as well as the EA that utilise Community Groups as communications mechanisms. Other public focused mechanisms and tools include Floodfairs, periodic newsletters, flood wardens, local flood signage, EA stands, community flood sheds and volunteer group networks.

5.2.2 Warning and responding in relation to the incidents themselves

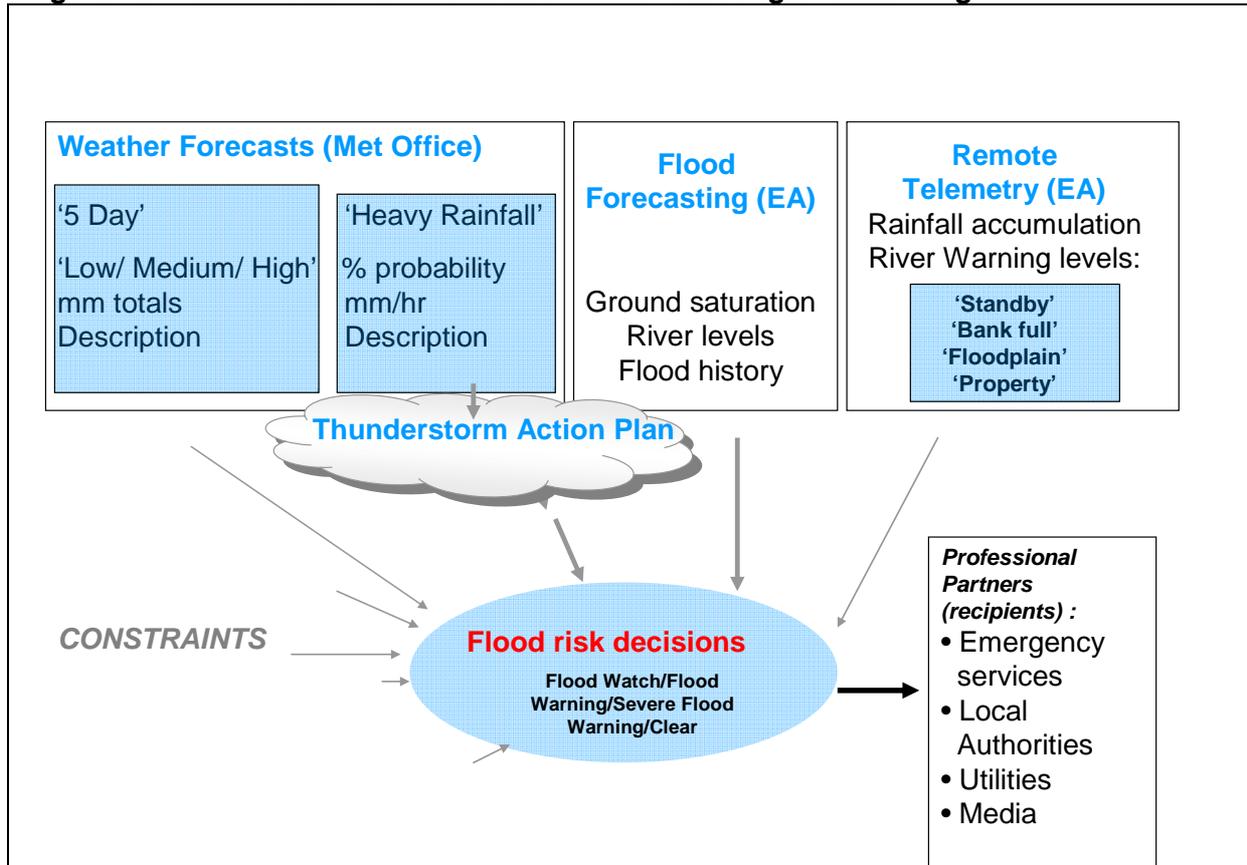
Response to the incidents themselves involves the same organisations but different groups within those organisations utilise different mechanisms and tools to deliver warnings. This research is concerned with inter professional systems and does not include informal systems employed by the public. Although a single formal warning system is the goal of warnings in England and Wales decisions for organisations such as the local authorities can be informed by a number of professional sources. Table 14 lists the key structures, mechanisms and tools reported in this research.

Table 14: Summary table of key risk communication approaches: Warning and responding

STRUCTURES	MECHANISMS	TOOLS
<p>Environment Agency lead warning agent: Setting of standards and centralisation of control</p> <p>Enabled by the Flood Warning Investment Strategy</p>	<p>Met Office forecasting</p> <p>Regional Flood Forecasting Team</p> <p>Flood Incident Management Team</p> <p>The Safer Runnymede Centre Trent Risk and Resilience Unit</p> <p>Availability of more experienced staff</p> <p>Temporary command and control structure</p>	<p>Daily Forecast, 3 Day Forecast, 5 Day Forecast 7 day outlook Heavy Rainfall Forecast Storm Tide Warning Service</p> <p>Early warning notification</p> <p>Remote telemetry</p> <p>Crib sheet</p> <p>Model forecasts</p> <p>Floodline Warnings Direct</p> <p>National Flood Forecasting System</p> <p>Local Authority control room</p> <p>Gold / Silver / Bronze Commands</p> <p>CCTV</p> <p>Telephone/email/pager</p> <p>Fax</p> <p>EA website</p> <p>Surrey Alert website</p> <p>Floodline</p>

The formal flood warning delivery process was reported as a sequence of information triggers that combine to inform decisions to either or not release a warning at a particular level to recipients who need to take some form of action. Figure 13 illustrates the sources of information that influence flood risk decision and EA flood warning release.

Figure 13: Local Flood Risk Translation in Forecasting and Warning



It was reported that some communications have already been mediated by decisions such as the Met Office weather forecasts that in turn have message content that is designed specifically to help the decision maker reach a decision. Although a clear sequence of triggers can be followed between the professional groups it should be remembered that the information is constantly being updated and combinations of information that can inform decisions are changing and reaching the decision maker, the Duty Officer, at different times. Equally constraints are acting both in terms of mediating the communication routes both to and from the decision maker but also contextualise the decision that needs to be taken, to issue a warning or not. These issues will be addressed in this and the following sections.

Met Office forecasts to Regional Flood forecasting

The communication channels are e mail and telephone discussions and so are both one and two way communications respectively. Forecasts are provided by the Met Office as preformatted communication tools based on **Daily, Three Day and Five Day forecasts** referring to the forward prediction period provided. There is also a **Seven Day** outlook and **Heavy Rainfall** warning. In terms of message content it was reported that the Day Forecasts contain a high/medium/low assessment of probability, expected mm rainfall and a description. The Heavy Rainfall forecast contain a percentage probability, expected mm per hour rainfall and a description. The latter feeds into a '**thunderstorm action plan**' that informs decision making by providing action scenarios for the information received. Where relevant there is a **Storm Tide forecast** which can be specified to only be received when a specific telemetry meter trigger level is reached. It was reported that when required the Regional Forecasters not only consult the Met Office but also telephone other Regional Forecasters to consult on weather radar and rainfall outputs. This is particularly on boarder line results where discussion about possible future climatic behaviour is required.

In both Trent and Thames the Regional Flood Forecasting team maintain a forecasting model fed by real time telemetry gauge data. Where the model does not cover a particular area it was reported that the telemetry data is assessed directly by the EA Area Office which have to make decisions without the luxury of a model prediction. The majority of the telemetry stations have trigger levels for high water or for the rain gauges the trigger levels are set below the decision trigger levels to build in some response time just before action is required. In hot spots the trigger levels are set on the intensity of rainfall. When a trigger level is reached the gauge station automatically dials out to the forecast model and sets off an alarm, termed 'alarm out', and sets in motion a model run for the attention of the team. In Trent it was reported that the forecast model is also set up to undertake polls of the telemetry stations roughly twice a day at say 7am and 7pm.

The Flood Warning Duty Officer. Regional Flood Forecasting on an alarmed model run alert the Area Office by telephone, email and pager. There can be a discussion between the Forecaster and the Duty Officer to expand on and clarify the message.

to clarify whether or not good quality data, poor quality data, should we issue a warning, should we not issue a warning.(Trent 8).

The decision to issue a warning is down to the Duty Officer, reported as a 'a one-man decision'. However, it was reported that an inexperienced Duty Officer can seek clarity from another experienced officer but the decision is still down to the person on duty experienced or not. For the Nottingham Area Office while there wasn't an operational decision flow chart that is available in some EA areas they had what was described as a '**crib sheet**' which has the gauging stations, their threshold levels and when they would action a warning and the forecast both from a model output and climatic. It was commented that the 'crib sheet' also contains what would be expected to happen over a period of time. Measurement at a gauging station would be interrogated if it felt out of pattern with other station measurements.

we notice some contradiction at times we might get a level of 5.2 and the next minute a level of 3.8. which can cause some confusion.(Trent 9)

Information on the history and any particular maintenance issues which might affect readings are also included on the crib sheet. So taking into account all this information plus, it was reported, local knowledge, ground saturation and rate of rise a decision is made. If a 'rising limb' flattens out then a warning is not issued but if that rate maintains then a warning issue is likely. A gauging station can indicate 'out of bank' but action can vary by location if a few or many houses are threatened or there is a history of flooding. Out of bank in one location might very quickly result in a more severe flood warning level being reached due to topography if that bank is elevated above property levels.

The lead time between trigger levels was commented as crucial. While on the Lower Thames the lead time can be a couple of days in Nottingham at Gunthorpe it was reported as approximately 16 hours.

That's all right for us but for some of the tributaries its 30 minutes which still can be of use. That depends on flows and the constriction in Nottingham city which opens up into the largest indicative floodplain in the UK. (Trent 9).

Once the decision to issue a warning has been realised these are sent directly to the professional partners. It was reported for Surrey that the EA also provide specialised warnings. Where it is assessed to be useful professional partners can receive an **early warning notification** by email. This is again triggered by telemetry levels. It was commented that the service could not be provided to London because there the main problem is summer thunderstorms rather than winter rain. It was reported as currently impossible to predict the summer thunderstorm rain accurately so it was not possible to give an effective warning service.

Faxes, it was reported, remain the standard way of communicating flood warnings to professional partners. The EA do make back up telephone calls to check that the fax has arrived. Faxes (and e mails will be) set to a national format and template for national consistency but there are fields in the format that the Area Office can enter their information. Both **The Safer Runnymede Centre** and the **Trent Risk and Resilience Unit** receive both faxes and emails. Email provision as a service of Floodline Warnings Direct was still being rolled out at the time of this research and the effectiveness of the new system could not be commented on.

Both the **EA Website** and their dedicated **Floodline** telephone information line provide real time warnings information for both professionals and the public. The website provides all the warnings in force in an area and is updated every fifteen minutes.

Surrey Alert website is a means of communicating with the public and professionals. It is described on its website as an innovative way of sharing and providing information to Surrey. This includes both the public as well as the Council's professional partners. Flood warnings are put on this website by the Safer Runnymede Centre. The Centre was reported to operate 24 hours a day and always available to put the information on the website. The website can show a map of the rivers in Surrey with the Warnings that are in force on them. It was considered by the RBC respondents to be a more convenient way for Surrey and its residents to look at the information on flood warnings than receiving it by warning area. The Borough Council community safety officer was proud that the Surrey alert site was up and running throughout the 2003 event whereas he reported that the Agency site kept crashing due to the level of use. This was considered an advantage of a local system.

Press releases and information such as school or road closures also go on the Surrey Alert site to provide instant communication (to those with web access). Surrey Alert also operates **a closed system** during an event only accessible by the Council's professional partners. Those with access include: Surrey County Council, Emergency services, and the Boroughs. It was reported that there are discussions about having BAA at Heathrow and Gatwick airports, the EA and the Utilities on the system. In an event it provides an additional communication mechanism between the professionals in the listed organisations. They can provide information, log what they are doing or request help.

it means that all the professionals in all the different places are aware of what is happening. It is also more efficient in that to tell 10 people you have to make 10 phone calls (Thames 15)

Safer Runnymede Centre. It was reported that the Centre is staffed 24 hours a day and 7 days a week due to a responsibility to monitor the community alarm system and the CCTV system. The Centre is housed in what is described as a purpose built centre within the Civic Offices. The main concern of the Centre day to day is with crime and its reduction and with reducing the fear of crime. The Centre also monitors cameras in Spelthorne for Staines and Ashford town centres. Initiatives also undertaken by the Centre are the introduction of community constables in local neighbourhoods, a programme to reduce vehicle speed in the borough and to tackle issues such as anti-social behaviour, vehicle crime alcohol and drug abuse and domestic and racial violence. The Safer Runnymede Control Centre would be the communications centre in the event of an emergency and it receives flood warning messages which it relays to the relevant managers within the Borough.

The Community Safety Officer interviewed considered that the Local Authority was able to respond much more quickly in a flood event because of the Centre operating all the time. He judged that having the centre up and running gave a two hour start over those who had to open and staff a control room when an event threatened. Nottingham also have a 24 hour CCTV control centre as part of their risk and resilience unit but also a room purpose built for

command and control. However, this control room is only operational at the time of an event. During non event times it was reported the room is used for training purposes.

CCTV is a new technology that informs social control issues but was commented on as used in flood management in both flood footprint areas as a means of immediate observation of the state of the rivers. However, it was reported that sometimes the CCTV observational state and the time lag associated with EA telemetry data could sometimes conflict.

In the event of what is considered a major flood event where wider resources for event management are required a **temporary command and control structure** can be brought into operation. The lead organisations are the County Council and police. A tiered hierarchical command structure is made up of Gold, Silver and Bronze levels of command. The aim is to provide a communication command structure that enables information and decisions to be clearly understood by everyone involved in the response. The responsibilities of each level are as follows:

Gold Command (Strategic) ensures that the tactics deployed are proportionate to the risks identified, that tactics meet the objectives of the strategy and are legally compliant. In any incident there should only be one Gold command which can allocate the location and number of silver and bronze commands. For national incidents control can be overseen by COBRA at national Government level.

Silver Command (Tactical) develop and coordinate the tactical plan in order to achieve the strategic intention.

Bronze Command (Operational) implement the tactical plan by use of appropriate tactics within the geographical or functional area of responsibility.

The command structure levels in flood incident response can have multiagency representation with a prearranged lead agency usually the police or county council. The EA takes an advisory and operational role. It was commented that a key concern for professional partners and emergency services during previous events was if the flood peak had been reached, when the flood water would recede and would it return. Once an event is deemed to have moved into a recovery phase responsibilities are transferred to the local council and the command structure dissolved.

5.3 Reported constraints

The following section reports on the key constraints reported in relation to planning and preparing for events and the management of those flood events. Some constraints span both preparation and event management.

5.3.1 Planning and preparing for flood events

Civil Contingencies Act (CCA) Local Resilience Forum

While it was considered the CCA had brought organisations together respondents of both local Councils did not consider that the CCA had enhanced Borough knowledge and understanding of flood risk. In Thames it was reported there was substantial local knowledge of flooding in the Borough even before the 2003 floods. The ability of the Local Resilience Forum to deliver on its goals was considered in both flood footprint areas to be limited by who attends the forum. The utility companies although Category 2 responders were considered integral to a preparatory response in both flood footprint areas.

It has focused minds on category 1 but we still have issues with category 2.

The main culprits in my mind in this area are Seven Trent. Category 2 are still some way behind the good cooperation understanding achieved with category 1.(Trent 9)

The reason for such Category 2 reticence for involvement was thought to be their organisational resource and capacity issues which meant priority was not given to the Forum.

CCA Planning structure

Even for those who attend the Forum concern was voiced about the level of commitment required. That there are so many groups and working groups and meetings are very demanding on time and resources. The level of output from such meetings was also questioned. It was questioned by a respondent in Trent if following the Nottingham June 2007 floods enough tangible change had been achieved so that with another event the expectations of residents will not be met.

CCA as a demand on resources

Both council respondents had the attitude that they still have to respond to events even without legislation so the CCA on its own has not added to their workload.

Communicating with professional partners was constrained by staff resources,

it is an area that we could do more in really, and it is something that we have just started to look at with X coming into the team. These three are fairly new, start for them so it is something that we have not been able to do really, until recently is put the resources out to actually try and, my plan is to go out to them and say, you know, exactly what sort of things do you need from us, we have got this, is this useful. A lot of it is a result of Waverley coming directly to us following their exercise thing. We need to write our own plan now, can we talk to you, what sort of information have you got in it. To do things like that and try and try to do a lot more in partnership with them. (Thames 13)

Whilst not driving a demand on resources the CCA activities are enhanced by dedicated resources.

CCA seniority of participants

An EA respondent commented that the seniority of membership of Local Resilience Forums could sometimes constrain pragmatic delivery considerations of outputs. However, it was thought that the working groups under the main forum, if they continue, will be the main place where you can really get the message across as they are all people at the same lower level. Also there were wider comments that the main Forum could benefit with more operational staff membership input at that level.

Training

The level of training of individuals to enable them to fulfil their roles was considered a key constraint however, both councils and the EA thought training needs are being met at that level.

Personal skills

Whilst training was considered important also having individuals with the right attitudinal characteristics in place was a possible key constraint on effective communication. One Council respondent commented:

We also feel we need trained staff that can demonstrate empathy. The last thing you want is a contractors' part time employee with no experience dealing with traumatised people. We use agencies but we keep them away from the front line. (Trent 9)

In Trent it was commented on by council representative that their staff are sometimes confronted with anger and unreasonable demands from the public which can constrain activities and communication.

Relationships

For most respondents the value of relationships was valued element of communication in enhancing their ability to deliver. For a Trent council respondent the importance of inter organisational relationships was key.

I am still a great advocate of plans but to fair the events of last June and July I looked at the plan for possibly ten minutes, the most important thing to me was the relationship with the professional partners. (Trent 9)

Outsourcing response

There was a preference where possible for organisations to use their own staff. For both councils keeping staff that are involved in response in house was viewed as an advantage. The reason was not only control over the quality of staff but also flexibility in response. Commercial outsourced organisations, it was commented, might set restrictions on staff response or heavy financial penalties for short notice or response at unsociable hours.

Resilience to negative communication

It was reported that EA professionals in Nottingham had to endure a lot of negative feelings and comment at the Parish Councils meetings following the 2000 flooding. It was questioned if it was realistic that the professionals were resilient enough for this to be maintained over time a long period of time.

Unified Voice

A key thing is that we have a continual and consistent message. (Trent 9)

This was considered important when put to all the organisations interviewed. In Trent there was local Council concern that while the council and the EA were speaking with one voice their other professional partners were not (such as fire and rescue, the police and the county council). This was not voiced as a key concern in Thames.

Maintaining interest

Developing new news to maintain interest during the dry periods was considered a challenge for both the EA and the Councils:

I must admit, I am ashamed to say really and it is against my beliefs and wants, that this is the first time that we have actually cancelled having a flood warning plan meeting, because I just felt there was just nothing you could tell them. ... everybody would have thought it was a total waste of time.(Trent 8)

This constraint has traditionally been associated with communications to the public but it is interesting to find similar concerns are an issue for organisations communicating with their professional partners.

Forecasting staff retention, turnover and promotion

Maintaining EA forecasting staff with experience and the relevant skills is a concern but more in the Thames than for the Trent flood footprint.

*I think the constant turnover of staff is an issue to some extent, the experience within the team you know, you've always, people come and go and that is a fact of life...
... I think we have a reasonably high turnover, but I wouldn't say its necessarily any worse than other parts of the Agency or, I don't know, but you know, you are talking about you know, people coming out of University, it maybe their first job, do a couple of years you know, they want to move on, they want to move onto something better and you know, within the team there is not a lot of opportunities to move up the ladder to get a better job because we are quite a, its quite a flat structure almost, but there is good opportunities elsewhere, whether its internally or externally, so you know, people will move on and that is inevitable. The other problem we have and you know this is going way off forecasting, but of course is the*

South East factor in terms of salaries and stuff. People find it hard to buy and just to.....settle, yes so people move on, but that does mean that we have a churn of staff, a training issue, an experience issue, you know we have got 1 or 2 stay and therefore you know, you do have that sort of, those pillars as it were, but you know, there is always a sort of cycling of new people and training, so that's, and that is always a factor, at the end of the day you can't get away from that. (Thames 14)

Recruiting staff is not as great problem as retaining that experience and knowledge. The more expensive social context of the south is cited as one possible motivation for staff to leave and seek higher salaries that come with promotion. However, some do stay and are termed 'pillars'.

5.3.2 Warning and responding in relation to the incidents themselves

There were few comments directed specifically at activities during the warning and responding phase in itself. Comments were directed at constraints that could affect the decisions that are made at the time.

Sustaining a response

One constraint directed specifically at activity that was commented on was highlighted by a council respondent in the Trent. It was reported that their organisation has approximately 800 employees (including outsourcing etc) but to sustain a response over more than a week to a significant event was considered *questionable*. This comment was made even though the respondent knew their council had managed a week and handled over 4500 calls through to their control room largely from the public.

Staff turnover and reorganisation

Staff turnover has already been commented on in relation to retention of experience and knowledge. It was also commented on in relation to reorganisation that had recently taken place in the EA and its impact on effective emergency decision making and planning.

emergency planning professionals who had got qualifications and had a lot of pride in what they did, they were all told they had got to apply for their own job and by the way they are not (going to be in the future) Emergency Planning Officers, they are going to be Project and Policy Officers. They I think quite reasonably thought, I have got a career in emergency planning, I don't want to be a Policy Officer, and how is this going to help me advance to somewhere else. The result was 9 out of 10 left in the space of 2 months (Thames 15)

It was also commented that staff turnover and retention had also affected the work of the mapping and data management team but optimistically it was also felt that budget cuts might have a benefit in leading to more co-ordinated working and re-focusing of the work.

Resources

Resources were considered in both flood footprint areas as a constraint on the maintenance and enhancement of data collection (telemetry etc) for forecasting and to enable a proactive stance in communicating with professional partners about flood risk.

Enhancement in the form of new data sites can sometimes result in loss of data that could inform communication and decisions.

I think we get a little bit frustrated by the data side of things and how difficult it is to get really good data reliable, consistent, because as soon as a site has gone, or has to be changed or moved or something like that, you know, any historical record is lost effectively, because you are starting afresh, so maintaining sites and stuff like that is

quite important to us and we do struggle with our resources to deliver that I think (Thames 14)

Resources were viewed as a key component for enabling action to mitigate such constraints.

Benefits of, and the difficulties of transition to, new systems:

Over the period of the interviews, EA staff were in the process of establishing two new national systems, the National Flood Forecasting System (NFSS) and the Floodline Warnings Direct (FWD) warning system (McCarthy 2007). Although EA staff hoped for considerable benefits from the new systems NFSS and FWD, in the short term the process of getting the new systems up and running put an extra strain on the EA staff. Some staff were redeployed to work directly on implementing the new systems. There were some concerns that errors could have introduced during transition to the new systems particularly NFSS. One EA interviewee felt that the benefits of FWD needed to be testing and most noted that there were teething problems for FWD with initially limited registration to the system.

Limitations of the technology in warning delivery

For both flood footprint areas the warning areas were considered by EA respondents to be too large. For example the Thames flood warning areas were changed in October 2003 in response to complaints generated by the 2003 events that the areas were too large. But it was commented that now even with more areas they were still quite big and this is still a challenge.

at the moment our flood warning areas are quite broad, so we divided the rivers up from catchments into 3 or 4 say, flood warning areas in the catchment. We are now moving as a national sort of directive, is to work towards community based warnings, (Thames 14)

It was reported that currently warnings tell only of the extent of likely flooding not the very specific location, flow and depth. In both flood footprint areas it was commented the EA is moving towards community-based warnings based on specific smaller community areas where there is property. A move from Flood Warning catchment areas to community warning areas requires a review of the telemetry, radar and other forecasting data collection to see whether it is appropriate to communities who wish to be warned or have their needs better matched. The next level of sophistication or detail would be to look at the risk within the communities and tailor the warnings to go first to those at most risk e.g. 1 in 20 year return period then 1 in 50 year return period and so on. In EA mapping and data management, the opinion was expressed that mapping could help FIM by looking at a range of flood event extents and the depth of flooding therein.

As reported at a national level (McCarthy 2007) as a concern of respondents was also reflected at a local level with comments that heavy rainfall forecasting in particular for London and urban areas was considered lacking. Also current Met Office severe weather warnings were felt to be often vague and very broad. This again highlighted the concern that flood forecasting and warning for other forms of flooding other than fluvial were not currently being taken into account.

The importance of models and their limitations

In both flood footprint areas the view was expressed that that modelling was driving everything the EA did.

advice to planners about where they should and should not build, it drives flood warnings in terms of where we should be issuing warnings, it drives the capital programme in terms of where are the communities at risk and where should we be

seeking to reduce the risk, so it is the keystone in terms of everything we do and yet for me it is perhaps one of the weakest links. (Thames 8).

One of the respondents in Thames thought it was disastrous that they were not yet (in April 2006) working to the most recent flood map. This was considered a constraint for effective communication by flood incident management. The most recent maps were Flood Zone Maps which gave the extreme flood outline i.e the 1 in 1,000 year return period outline. However, the Indicative Flood Plain (IFP) maps were still being used and based on modelling, historic observations and any other data to give the 1 in 100 outline. In March 2006 in Thames Flood Incident management undertook a direct mailing, the address point information was based on the IFP maps not the flood zone maps and there were discrepancies between them. It was reported that there were people receiving letters about signing up who would click on the map on the internet and find that they were not even in the extreme flood outline, *'which made us look a bit foolish'* (Thames 8). Equally there were people, who would have wanted a warning who found they were not represented in the flood plain. This illustrated that at a local level there could easily be inconsistency with what the rest of the organisation was doing.

In the Thames modelling had to be revisited and recalibrated after the 2003 floods. This was a key worry for some of those interviewed

I worry considerably about mapping and modelling and the outputs we get from it (Thames 8)

It was reported that those professionals involved had expended a great deal of time and money on the Thames modelling but still there were flaws and errors uncovered once the output was examined in detail.

Flood Zone Maps, the early days

Events and issues had conspired to heighten the constraints surrounding maps in Thames compared with Trent. Differing views were expressed in Thames by EA respondents with regard to Flood Zone Maps. Whilst one respondent saw real virtues in a consistent national approach with consistent criteria for the production of maps another felt strongly about the maps as a challenge to the status of the EA and in flood risk communication. There was criticism that the flood zone maps produced nationally were based on rather crude (J flow) modelling.

They were coming up with absolute rubbish in terms of the Lower Thames. I mean absolute nonsense... .. these maps were actually going to show flooding from the Jubilee River flooding areas it had never flooded, having built a £110 million scheme, issue a set of maps that showed flooding from the Jubilee River... ..I mean that is how bad it was. (Thames 8)

Also when the maps were first issued it was reported they assumed there were no defences in place, no railway embankments, no road embankments so swathes of areas now shown in the flood plain were not included on the IFM.

really sort of testing people's faith in the Agency's ability to get anything right... ..I know we're now working on and we're gradually getting on the areas benefiting from defences but we have actually gone two years with none of this information in place. (Thames 8)

This illustrates the tension in communication between releasing information quickly to be of use set against completeness in detail and accuracy. It was also reported that there was a national and local issue over the production of the Flood Zone Maps. It was thought that they had been produced nationally without consultation with areas because of the focus on producing maps that are nationally consistent but that did not mean they were accurate.

Another criticism of the Flood Zone Maps was that they were based on the National Flood and Coastal Defence Database (NFCDD) which was in 'a pretty poor state'.

nobody in their right mind would have put their hand on their heart and said that much of the information contained within that database was accurate. (Thames 8)

As a result the solution presented by this respondent was to actually be explicit about the uncertainties surrounding the models which he terms 'tolerances'.

I mean what is never quoted is the tolerances on these models. I think we need to be much more explicit as an organisation about the information and how it is produced and what it is based on. I think we need to make people far more aware that this is, this does have some quite significant tolerances. (Thames 8)

From the EA perspective it is interesting to note that the issue of the accuracy of the maps was not considered to cause problems with the professional partners. It was felt they were happy to take the information at face value but it was reported that it was members of the public who challenged the maps. The reason for this was considered that the outcome of the maps affected the public as individuals and their financial well being in terms of the value of their property being wrongly blighted or their insurance premium affected.

'Hydraulic troubleshooters'

The quality of the modelling was considered a constraint on the quality of risk data available to be communicated. The quality of modelling was considered a challenge for the EA because their lack of any hydraulic modellers in the department partly because they do not have the resources to retain them. This was also a concern of Council respondents. It was commented on in both areas that the EA needs people who understand the models and the issues that surround them.

We almost need sort of hydraulic troubleshooters, who can pick up a model, understand what the issues are, work with a consultant to get it fixed and then sort of power shoot into the next thing, and we just do not have that capability, we are completely reliant on consultants. (Thames 8)

These individuals would be viewed as the champions in the sphere of modelling within the organisation. On occasion it was commented that such an individual had once been present and valued but had either retired or moved to a more lucrative organisation. The issue of lack of resources for modelling, reliance on, and the need to monitor consultants was a concern within EAs mapping and data management team and the Councils. A view was expressed that there was scope for more co-ordination of modelling work within the EA and for more in-house modelling work.

Modelling and uncertainty in flood warning

Those interviewed were well aware of the reliance placed on, value of (eg. Wapshott Appendix 2) and complexity of modelling in flood forecasting and warning and in varying degrees of detail the uncertainties involved. Where there were some differences in views it was on the extent and situations in which information about uncertainty should be shared with professional partners and the public.

It was reported that forecasters were discussing with the Met Office moving from deterministic to probabilistic forecasting but were unsure whether this would be useful to the area flood warning teams. At the moment the areas and public get a yes/no service. It was thought putting a confidence on that prediction might be possible and it might be left up to the public how they responded to the probabilities.

One EA respondent thought that **ensembles** should be shared with areas and provide them with the basis for making a flood warning decision. It was felt EA area could in some circumstances take this information to professional partners as a way of communicating

about risk. This respondent also thought that Gold Control in a widespread or severe flood would find this type of information useful but he was not so sure about communicating it to local Authorities in more routine events.

Those responsible for flood warning and preparedness interviewed saw some uses for the new means of showing uncertainty in modelling e.g. ensembles. However, this was chiefly as a means of increasing understanding of the uncertainties in modelling among professional partners in advance of an event, in the planning stage. One EA respondent did not think that it would be helpful to share the information in an event.

it is our responsibility to provide them with the information. (Thames 13)

Some within the EA thought that attaching probabilities / confidence levels to modelling was to be strongly recommended although it would also present some challenges. Others felt there was a need to be open about accuracy and tolerances in modelling and within mapping and modelling, communicating uncertainty was thought to be a positive thing. From the Council attaching probabilities was thought to be a possibility. For others what was appropriate for professional partners should also be communicated to the public as one consultant commented.

if you are not frank about uncertainty you will be found out. (Thames 10)

5.4 References

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6. SUMMARY AND CONCLUSIONS

This section draws together and summarise evidence on variations over temporal scales and between flood footprint areas.

6.1 Differences between flood footprint areas

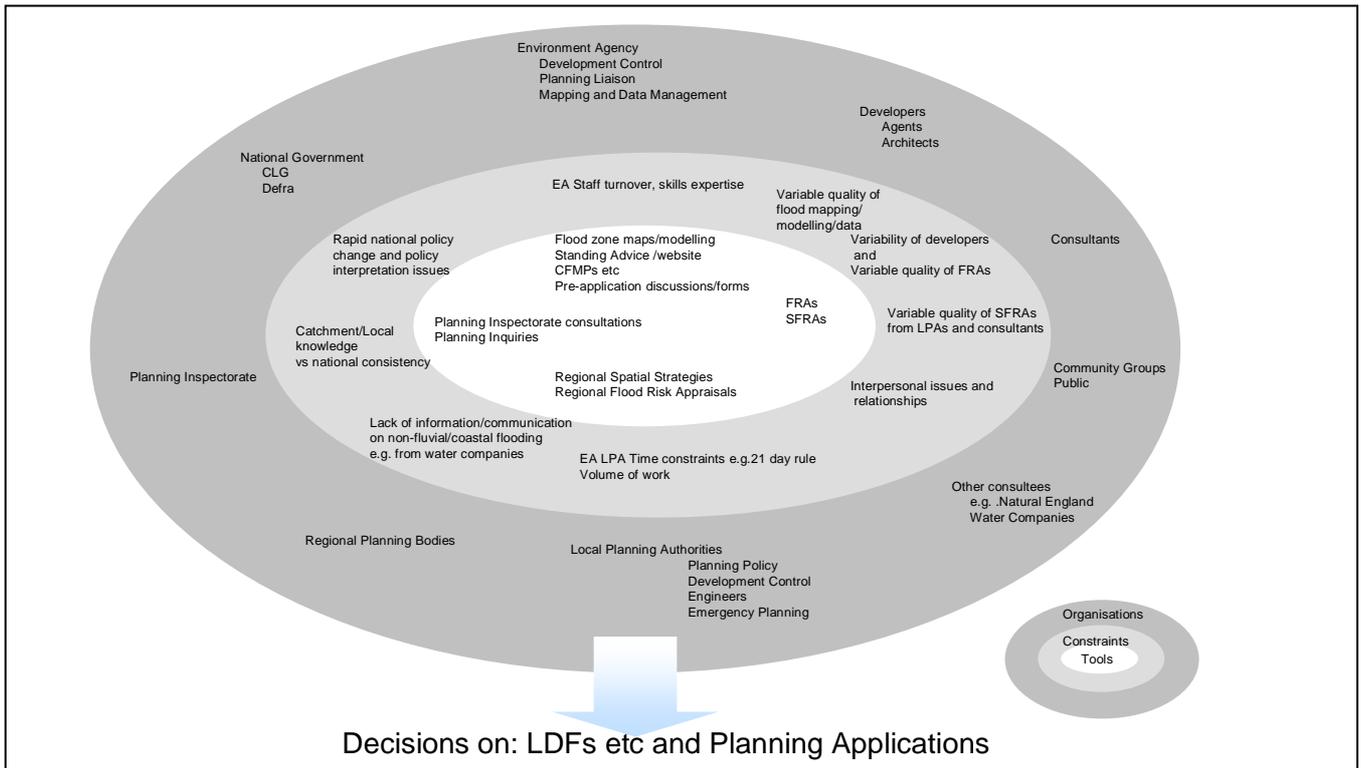
Given the significance of national policy for flood risk communication in relation to spatial planning and the EA's drive for national consistency in policy and practice, it was not surprising that few differences were found in the professional groups and agencies involved in flood risk communication in relation to spatial planning or focus on warning activities. Furthermore, there were relatively few variations in the structures, strategies, and communications' tools' used in the different areas. A limited number of specific local organisations and individuals in each of the areas did make for some variations in risk communication according to flood footprint. Such variations appeared to be dependent upon historic mechanisms and initiatives that were in place before nationally consistent approaches and mechanisms were introduced.

In relation to the professional constraints and attitudes to communicating risk and uncertainty revealed through the case studies, some differences were apparent. However, it must be noted that some limited variation may be due to the limitations of the research methodology in terms of the interests of those interviewed and amount of time allocated to an interview. However, the interview research has been supplemented with documentary and other research sources which will limit a research effect.

Generally, those in Thames reported more issues and constraints in risk communication in the context of spatial planning than emerged in the Trent. So constraints summarised in Figure 14 were mainly reported for the Thames. Whilst for warning there was far less variation reported. For planning development possibly greater development pressures in the Thames may have put risk communication there under more stress with a need to meet those challenges. Certainly, reports of difficulties in risk communication related to planning development activities were more common in the Thames than in the Trent. Such reports arose from the fact that communication was taking place at a time when all parties were engaged in implementing new planning policy. But both areas were equally challenged by the implementation of new warning tools in the form of FWD and NFFS.

In both Thames and Trent, the new role for, and dependence on, consultants for SFRA and FRA in risk communication was recognised. However, only in Thames was the lack of professionalism and poor quality of work of some consultants on FRAs seen as a particular issue in flood risk communication by the EA. Timing was reported as a constraint in relation to planning applications in both Thames and Trent. In both areas, the EA encouraged pre-application discussions with developers so that flood risk issues could be considered while proposals were still under development. However, in both areas, the EA reported that this early communication often did not happen due to the developer's or LPAs failure to contact the EA. Interviews with EA officers in the Trent, suggested a slightly different and more flexible approach to LPAs, developers and FRAs by the EA. It may be that greater stability over time and place in the developers that the EA dealt with as compared with Thames made this different approach possible and desirable. In Thames, both the LPA and the EA were critical of the contribution of Thames Water to risk communications while in the Trent, no problems were mentioned in relation to the water company there.

**Figure 14: Summary of local risk communication contextual issues
Planning Development**



Issues internal to the EA relating to understanding of, and expertise in, mapping modelling were mentioned as potential or actual constraints on risk communication in both areas. In fact for both planning development and warnings models were now viewed as a key tool driving activities forward. Models describing topographical risk were common to both planning and warning activities. While Trent had recently acquired the necessary mapping and modelling expertise, this remained a very real problem within Thames attributed to the limitations in the modelling work available, and poor salaries and promotion prospects within the EA. The time constraints under which both EA and LPA planning staff worked militated, in the view of EA and LPA staff, against the achievement of good quality outputs on flood risk issues because the time to work out solutions was lacking. Some of those interviewed in both areas, considered that high EA staff turnover made it difficult to develop the understanding and good working relationships that would facilitate risk communication. In the Trent but not in the Thames, EA officers, while recognising the need for a consistent national approach, regretted the loss of the opportunity to make site visits and of the local knowledge that this can bring. There was even a fear that this lack of local site knowledge might at some point lead to a loss of EA credibility with the LPAs that had much greater local knowledge. Lack of credibility contributing to trust would potentially have a major impact on the effectiveness of any communication.

In planning but also informing warning decisions the EA's two forms of flood maps and modelling, were considered problematic in various ways in both Thames and Trent. Having different forms of maps and modelling and updated maps available was confusing for the public and sometimes caused difficulties in communications with professional partners. An observation made in the Thames case study was that professional partners and developers and members of the public had very different interests in and perspectives on the output of mapping and modelling. This highlights understanding the requirements of the end user a necessary component of communication. Planners on the whole accepted the EA's information as the best available estimates while developers and the public were more likely

to challenge EA maps and modelling because their financial interests were directly involved. On the issue of communicating the uncertainty in mapping and modelling, there was some support for doing so from EA managers and mapping and data management officers in both Thames and Trent. However, those closer to risk communication in relation to spatial planning, planning liaison and development control officers in the EA and planners within the local authority saw few benefits in this for their risk communication related to their roles. In Thames, a number of cases in which there were disputes over modelling were cited. Expert champions or 'troubleshooters' were viewed as a possible way forward to resolve interpretation and oversee standards of output concerns. However, these conflicts were usually resolved via negotiation. For one Thames planner the crucial uncertainty was the issue of climate change and how that was dealt with in spatial planning.

For warnings spatial differences were limited to the local organisations involved, the very specific requirements for monitoring the catchments and progress in implementing national guidance. For example the specificity of flood warnings was limited by the size of flood warning areas. This was reported to be in the process of being resolved with the redefinition of smaller community based rather than catchment based areas.

6.2 Variations over different temporal scales

Spatial planning and the flood risk communications associated with it take place over two different temporal scales and involve different activities. Planning policy involving the production of development plans and SFRA's takes place over a time scale of years; development control involving decision making on planning applications for development on specific sites normally takes place over weeks or months. Although for the latter there may be protracted discussions before an application is submitted and sometimes a history of repeated planning applications for a site extending over years.

Within the LPA's different teams of staff deal with planning policy and development control. However, this is not the case in the EA, where the same staff are tasked with inputting to both. Many other agencies, e.g. national government, the Planning Inspectorate, consultants and community organisations are also involved in both activities over the different time scales. However, developers, although they may respond to consultations on development plans are mainly active in planning applications and development control issues.

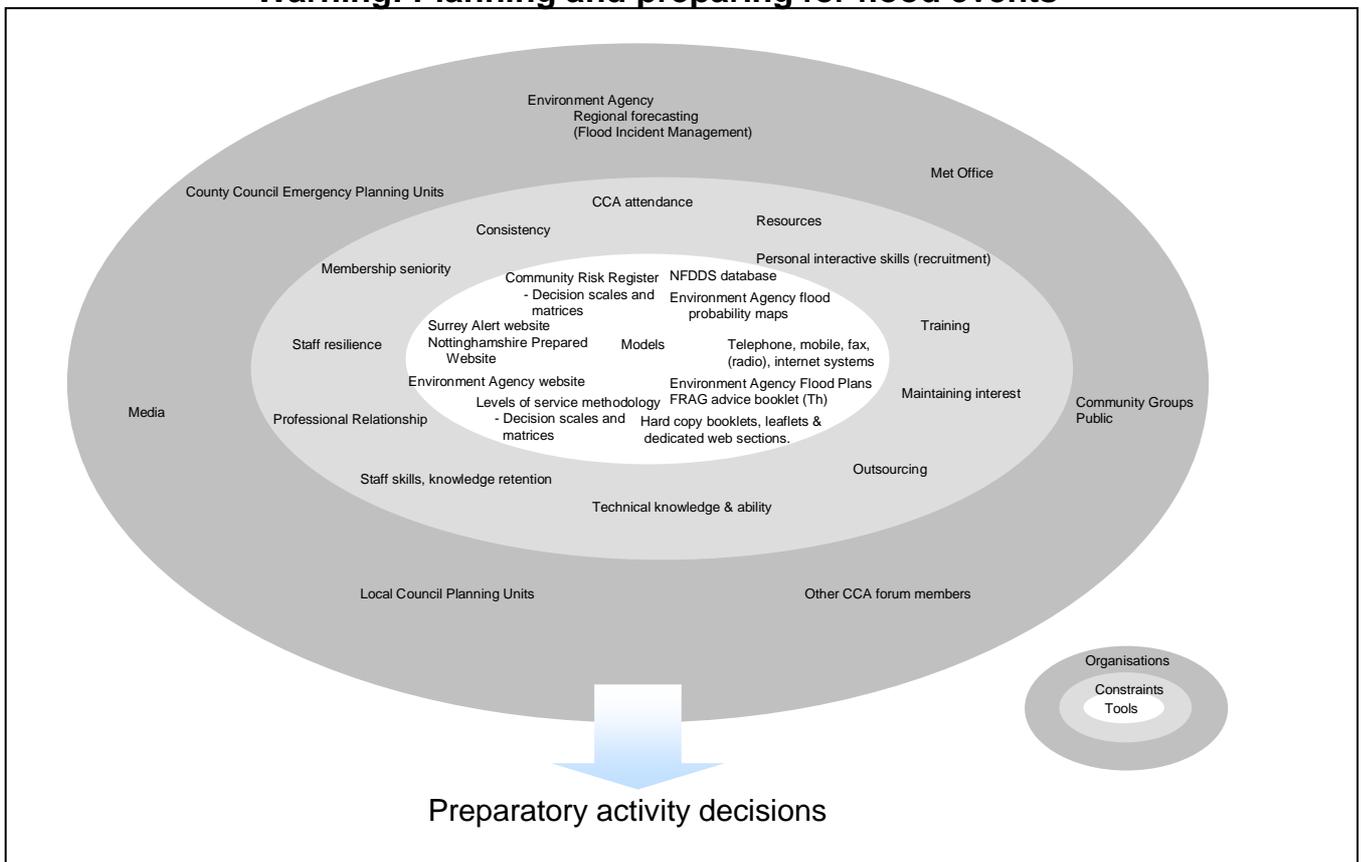
Similarly, many of the key risk communications tools, strategies and structures are relevant to activities over both time scales e.g. national policy and guidance and the EA's and others' mapping and modelling. These are represented in Figure 14. There are, however, a few mechanisms and structures that mainly contribute to risk communication in relation to development plans e.g. the EA's CFMPs and the LAs' Local Strategic Partnerships and Sustainable Communities Strategies. Furthermore, a larger number of specific tools have been developed by the EA to help their officers to respond to planning applications in a timely and effective manner and to inform developers and LPAs of EA's requirements e.g. pre application forms and discussions, EA Standing Advice on Development and Flood Risk for LPAs and developers and the advice on the EA's website which is intended to communicate with a wide range of parties: developers, their agents and members of the public.

Both those involved in planning policy and in development control activities over the two time scales reported uncertainty in interpreting and implementing new national planning policy requirements as constraints on risk communication. However, these constraints were experienced differently for the activities over the two time scales. Overall, many constraints such as issues regarding flood data, maps and modelling were relevant to risk communication in relation to both spatial planning activities and time scales. However, there were some constraints that impacted particularly on development plans or development

control. For those involved in development control, a lack of coherence in development plans and their policies due to the time lag in producing LDDs and SFRAs. Also it was reported that planning application decisions were being made in relation to out of date development plans whose policies did not reflect the current flood risk management approach presented particular difficulties. In relation to planning applications, developers' failure to engage in the required or desired risk communication activities e.g. failure to take part in pre application discussions and to submit FRAs or FRAs of the required quality were serious issues in risk communications cited by the EA and LPAs. These problems have been highlighted over the years in reports on High Level Target 5 (Environment Agency 2007). EA internal constraints in the form of a lack of understanding of modelling and of the expertise to monitor consultants' model output for FRAs or SFRAs were a particular concern and also impacted on warning preparation. For the EA internally, time pressures on EA staff and high staff turnover affected risk communication over both planning time scales but were perhaps more acutely felt in relation to development control. National consistency in EA policy and its implementation versus local knowledge and flexibility were issues in risk communication over both time scales but again may have been particularly significant in relation to planning applications where every site was different.

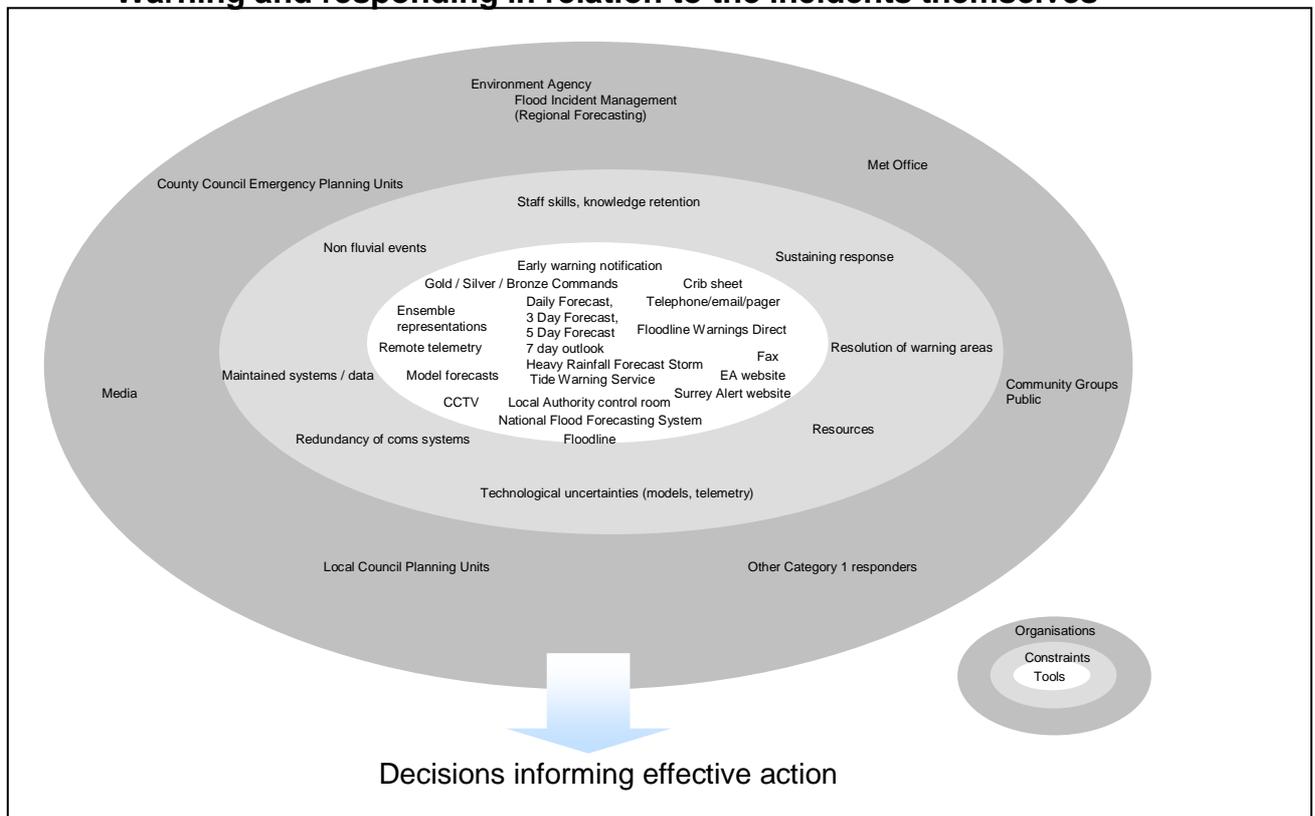
In flood warning there is a more distinct separation in the types of tools and mechanisms employed in communication activities whilst the organisations and predominantly the staff are the same across activities defined by the temporal scale. Broadly warning can be divided into activities in preparation for an event (Figure 15) and also activities immediately informing and in the management of the event (Figure 16).

**Figure 15: Summary of local risk communication contextual issues
Warning: Planning and preparing for flood events**



The Civil Contingencies Act 2004 is a key communication mechanism that has been introduced that facilitates preparatory communications between organisation and develops tools in the form of assessments and plans to aid decision making at the time of an event. However, it is a multi hazards forum and flooding is but one of many hazard issues. Attendance of fora meetings was reported as a possible constraint in terms of seniority of members and category 2 member lack of involvement undermining effectiveness. Resources to enable participation were felt to contribute. Whilst the preparatory phase has the luxury of extended time to act a constraint was reported as maintaining interest and involvement even at this professional level. The research revealed that the degree and breadth of application of approaches undertaken by organisations is not only dependent upon recent legislative relationships such as the Civil Contingencies Act but also the historic arrangements and initiatives in an area. The Thames FRAGs and the now TFF was considered a very successful mechanism for communication in preparation for an event. Specific to flooding it was born out of historic concerns and mechanisms but locally was allowed to survive with support from the EA. Even with imposed national consistency such flexibility at a local level appears to be an important aspect of effective communication.

**Figure 16: Summary of local risk communication contextual issues
Warning and responding in relation to the incidents themselves**



Well defined communication channels characterise the warning and response phase. Met Office forecasts combined with regional flood forecasting being the main source of information to potentially trigger activity. But even between professional organisations it is not the case that a single clear route of communication exists but different routes into specialised mechanisms in both the EA and councils exists. Again with the EA a risk based decision approach with appropriate tools set the standard for the monitoring and response within areas. This allows for prioritisation within the context of limited resources and constructs a range of local need. Maps, data bases and specific communication mechanisms such as council emergency units and web sites equally inform event management and preparation. The prevalence of new tools in the form of CCTV for realtime

but centralised observation was apparent. However, here temporal differences in CCTV observation and information from other sources were reported could cause confusion.

Sustaining a response with the staff available and the quality of that staff in terms of appropriate interactional abilities was a key concern for councils. In fact relationships were reported as a possible constraint and facilitator of communication. The development of professional relationships it was considered were strengthened in preparation to enable effective communication and decision making during an event.

In both these fluvial flood footprints there was in the main a sufficient forecast period before an event for action to be taken. This may be a major communication constraint in other localities and for non fluvial flooding.

7. APPENDICES

APPENDIX 1

Interview Guide

Introduction - Structure, use and confidentiality of interview.
- Exploratory nature

Background

What is your overall role (risk com aside) – fit within development / planning liaison
(land drainage consents)
(SMP's / catchment flood management plans)
- warning / forecasting
- level within insurance / loss adjusters.

How and why you are now in this role

How does it fit within the organisations structure – area/ regional/ national

Understanding of risk

How risk is understood generally and specifically by you and in your role (adequate?)

Relationship with uncertainty – is it viewed the same.

What is risk communication generally and specifically in your role and the organisation.

Links of this understanding with your role specifically and everyday activity – (how is it grounded within their activities?)

(How does this activity compete with time or other activities in role?)

Is (by you) and how risk communication initiated / responded to?

Risk communication process

Who are the communicators to you and who do you communicate on to:

What are the formal structures? – organisational charts etc?

How is it communicated to you / group / organisation

In what form – statistics, words, levels, maps, lines, processes, cost/benefit, feasibility

real time models
predictive models
indicative flood maps
warning levels
feasibility studies
policy documents

By whom

When – event focused / frequency

Where – is it always office based?

Other forms – do they get better attention / action.

How is it acted on by you / group / organisation

In what form

By whom

When

Where

Other forms

How / if is it re-communicated by you / group / organisation

In what form

By whom

When

Where

Other forms

Is this how it is supposed to happen or are there other ways it *actually* happens?

Better practice

Are you satisfied with what others provide to you?

What would you prefer?

What does the other want from you – are they satisfied / what would they prefer? (content / speed / consistency)

Do you experience questioning / conflict to what you supply? What / how?

Do you and how interrogate what is supplied to you? Guidance documents.

How do you support your communication to others? Standardised? Written vs verbal?

What do you understand by effective communication?

Is this at odds with the formal understanding? (High level targets vs locally)

Is there some form of assessment of success and / or effectiveness formal and informal?
(degrees of – policy point levels)

What are the barriers to the current system operating effectively? Policy changes in pipeline.

What other issues do you have to take into consideration in your communications (political)?

What issues maintain current perceptions and processes within the organisation and for you?

Overall how well do you think it works? (PPG25 & ministerial referral)

What changes have you noticed in time in role if any?

Are they for the good?

What could be done better.

Who /what drives communication?

What informs better practice?

Depth of understanding and possible abdication of knowledge about details – trust.

Transparency of information. political / procedural context, context of role & responsibilities.

They have agendas (whether implicit or explicit)

- do they know about what they wish to communicate (at any one time)?
- do they have understood consensus on this?
- do they need to?

What worldview inputs are there – is it totally contained within the organisational process – external influences?

Views and motivation / ability may vary among actors with the same roles within an organisational group.

Summary and questions and any additional information

Appendix 2

Development and flood risk communication at a time of policy transition: the case of the Wapshott Road planning application and inquiry

Sylvia Tunstall, Simon McCarthy and Hazel Faulkner

1. Introduction

This appendix covers a case within the Lower Thames case study, the case of the planning application relating to land at Wapshott Road, Bowes Road and Cornwall Way, Egham, in the Borough of Runnymede, Surrey (hereafter referred to as Wapshott Road). This case provides an example of a particular mechanism through which risk communication between professionals, involved in planning and development control, takes place: a planning inquiry on a called-in planning application. It also illustrates the wide range of communications tools used by professionals in the period prior to the inquiry.

It is based on four interviews with key participants in the planning inquiry and draws on a large number of the documents produced as evidence in the public inquiry.

Proposals for redevelopment of housing on this site were under consideration as early as 2000 and options for the site were raised for comment with the Environment Agency by the planning authority in July 2003. After protracted negotiations between the developer, the planning authority and various consultants, when the planning authority was minded to give its consent to the development, the Environment Agency requested that the Secretary of State call in the application and the Secretary of State agreed to do so in August 2005. A public inquiry was held in the summer months of 2006 and the Secretary of State's acceptance of the Inspector's Report of September 2006 closed the matter in November 2006. The case illustrates the following aspects of flood risk communication:

- Decision making on development and flood risk at a time of national policy change and transition from flood defence to flood risk management.
- The extent to which professionals' agendas at local level are set by national policy and embodied in national, regional and local policy documents and plans.
- Extent to which there is scope for agreement, conflict, interpretation and negotiation between professionals at local level on flood risk issues.
- The risk communication tools used and the processes used when negotiations fail and local professionals cannot agree.
- The discourses used by different parties: in terms of detailed textual analysis and interpretation of phrases in Planning Guidance (PPG25 and Draft PPS25) and plan policies;
- Uncertainty and issues of modelling flood risk.
- The conceptualising of risk as probability and consequences and the importance attached to both components under the new flood risk management approach.
- The drawing together of considerations of warnings and emergency planning and of development control within the context of planning applications.
- Sustainability issues and the weight attached to sustainability objectives in decisions on development and flood risk.

2. Context: national housing policy, Runnymede Borough Council and the Wapshott Road application

The Wapshott Road planning application has to be seen in the context of national housing policy as it affected Runnymede Borough Council (RBC). The Housing Services of RBC were reviewed for the Audit Commission by its Inspection Service in 2002 (Audit Commission 2002). Its report assessed the Council as having 'a good' two star service (4 point scale 0-3 stars) that had promising prospects for improvement (second on a four point scale). At the time of the Audit Commission's Report, the Borough had 30,900 households, with 79% owning or buying their property. The RBC itself had a small stock of council housing (3,268 units in April 2001). Housing policies in the Borough at the time of the Audit Commission's report were driven by Regional Planning Guidance (RPG9) (DETR 2001) which set out a requirement for 2,360 net additional dwellings each year in Surrey to 2016 and also provided guidance on affordable housing. However, the County's structure plan under revision at the time of the Audit Commission report with the new structure plan set a figure of 3,450 new additional dwellings per year for the County (Surrey County Council 2001). At local level the Council's housing policies were, according to the Audit Commission report, driven by its Housing Strategy (RBC July 2001) and its Local Plan then under review and due to be influenced by the Council's new Community Strategy.

Affordable housing was according to the Audit Commission Report and remained a significant issue for RBC. Affordable housing was also highlighted as an issue in the regional planning documents and the local plan and in the Borough's Housing Needs Assessment (2005). Thus these planning and housing policy documents provided a very clear agenda for local action by housing officers and planners. Furthermore, the Audit Commission in its review noted that not all the Council's own stock of existing housing met the Government's decent homes standard (DETR 2000: DTLR 2002) and highlighted the Wapshott/Bowes Road Estates as areas where substantial investment was needed. It noted that the Council was proposing to address these problems in its own stock by working in partnership with, a Registered Social Landlord (Apex Housing Group later A2 housing), which appointed architects and design consultants to carry out feasibility work. The singling out of the Wapshott/Bowes Road Estate by the Audit Commission in 2002 may have acted to spur the Borough to support plans for the estate. Furthermore, the Government's Public Service Agreement targets (CD213) states in PSA7 that by 2010 all social housing should be brought into 'decent condition'. RBC argued that the Council was on target to meet this target for all the properties in its ownership, except those on the Wapshott Road Estate (RBC 2006).

The Wapshott Estate was built in the 1950's as council housing, system-built in reinforced concrete, the Cornish System that has given rise to a number of defects. The dwellings, as a result have poor levels of energy efficiency and a poor standard of maintenance. Prior to the public inquiry, RBC had commissioned a housing stock survey and an energy efficiency survey for the Wapshott Road flats (RBC 2006a ,b). The Estate as a whole consisted of a total of 222 properties, however the application site covered only part of the Estate. By the time of the public inquiry in 2006, half of the 106 bungalows and houses had been sold off to tenants but of the 116 flats, 111 were still owned by the Council (Gibbs 2006).

Thus, in terms of housing, RBC planning and housing officers were under pressure to meet national and local policy agenda's on the provision of housing including affordable housing and on bringing existing housing stock up to 'decent' standards at a time when finances for refurbishment were very circumscribed. Under government housing policy, for major funding for redevelopment or refurbishment to be available from government sources, the housing stock had to be transferred to, and the application taken forward by a Registered Social Landlord (RSL), a housing association (Apex Housing initially and subsequently A2 Housing Group) in association with RBC

3. Environment Agency responses to development options and proposals.

The development proposals for Wapshott Road were the subject of extensive consultation between the EA and the developer's agents. The EA set out its objections very clearly from the start. As early as July 2003, a plans and option appraisal document was sent to the EA for its consideration.

Two options were presented:

Option 1: for the refurbishment of the existing housing and flats.

Option 2: for rebuilding some or all the existing dwellings and increasing the number.

The EA's response in a letter of 30 July 2003 makes clear that:

Option 1: the EA would have no objection to this as it would involve no additional residents at risk of flooding, no increase in the footprint of buildings within the floodplain and thence no reduction in flood storage there, and no increase in the impeding of flows.

Option 2: The EA would object to this proposal as it would increase the number of residents at risk from flooding, increase the footprint of dwellings in the floodplain thus reducing flood storage and might impede flows.

For option 2 to be acceptable a flood risk assessment (FRA), in line with the requirements of PPG25, the Planning Guidance applicable at the time, would be required. This would have to show among other things:

An assessment of the probability of the extent and depth of flooding, the extent of historic and modelled events at the same scale as the plan, the sources of flooding, existing flood defences and local structures, the speed and routes of flood flows on site, speed, onset, duration and impact of flooding, existing and proposed drainage, the volume of floodwater displaced and its impact, impact on channel morphology and sustainability, the impact of climate change and the residual risks of new defences.

Already at this stage, the EA noted that it would object to Option 2 unless the FRA could demonstrate all of the following:

- That the new building do not lie within the 1 in 100 floodplain or can be raised above it;
- That residents will be afforded a safe, permanent route of access and escape, that will remain *dry* during the 1 in 100 year flood event, to land lying entirely outside the flood plain;
- Any loss of floodplain storage will be compensated for on-site on a level for level basis, noting that the provision of under floor voids does not mitigate flood loss arising from an increase in groundcover, as experience has shown that it often become blocked over time;
- The development will not cause increased impedence to flood flows.

The EA letter also noted that more up-to-date flood level information was available than that quoted in an EA letter of 7 October 2002 and that the flood water level varied across the site.

Following on from this, Option 2 was further developed by RBC and the proposed Registered Social Landlord (RSL) for the site. An initial planning application for the site was registered by Apex housing on 22 September 2004. This involved the construction of 181 dwellings on 10 different areas on the site and the demolition of 98 existing houses and flats and 35 garages. A consultant, Capita Symonds, was commissioned by the developers in 2003 to advise on flood risk issues relating to the development proposals. It produced an initial assessment of flood risk (Symonds Group 2003) and subsequently undertook a formal Flood Risk Assessment as required by the EA and summarised in a Flood Risk Assessment Report, (Capita Symonds August 2004). The consultants advised the developer against

attempting to develop on the part of the site closest to the Thames because the flood risk there was too high.

The EA responded to the development proposals and FRA on 9 May 2005 (EA, letter of May 9 2005). The EA reiterated its objection in the light of the FRA for the following reasons:

- A large proportion of the proposed redevelopment lay within the 1 in 100 year flood plain.
- Dry access: The modelling showed that the redeveloped areas would not have dry access to an area wholly outside the 1 in 100 year flood plain. The dry access mentioned in the FRA is to the school surrounded by the high risk, 1 in 100 year flood plain and not outside it.
- Floodplain storage: there were discrepancies in the FRA as to the estimated flood storage loss and the FRA did not demonstrate level for level compensation for storage lost.
- Flood flows: local flood flows were discussed within the FRA

Thus the EA explained its reasons for objecting as follows:

‘The proposed development lies within an area liable to flood as shown on EA maps. The proposed development will be at direct risk of flooding, may increase the risk to people and property on site and in the surrounding area, and will increase the number of people at risk by introducing additional households into the floodplain.’

A revised planning application was registered by Apex Housing Group in the week ending 11 May 2005. This involved the construction of 173 dwellings and an office on 10 areas within the site and the demolition of 108 dwellings. The EA received a further letter on 25 May 2005 from RBC in which they requested advice on mitigation measures in order to minimize the impacts. The EA in a letter of response of 16 June, reiterating its reasons given above for maintaining an objection in principle to the proposal which they understood RBC might be minded to approve against their advice, set out its mitigation advice on three main issues:

- Safe access to and egress from the development
As a safe (dry) escape from the redevelopment lands to areas wholly outside the flood plain cannot be achieved, a flood management and evacuation plan should be drawn up with the involvement of the relevant emergency services. This would not, however, overcome the EA’s objection.
- Impact on flood storage
Finished floor levels should be raised to 15.74AOD
A void as open as possible should be provided under the finished floor for storage with provision for maintenance access but there should be no raising of existing ground levels on the site in order to maintain storage.
- Surface Water Run-off
Surface water run off at the site should not exceed the existing situation. Any additional discharge to a soakaway should be constructed so as to prevent the pollution of groundwater.

The planning application was to be presented to the Planning Committee of RBC for consideration on 22 June 2005. However, the EA took the unusual step of writing to the Government Office for the South East (GOSE) on 21 June 2005 requesting that the ODPM call-in the application. Concerns raised by the EA in the letter were:

- The potential benefits of rebuilding the existing development with resilient design etc and thus reducing the risk were negated by introducing 65 extra new dwellings to be built in the flood risk area. The EA stated its objection in principle to any proposal that will increase the number of people and or properties at risk of flooding.
- The FRA confirmed that the site did not have safe access and egress to areas wholly outside the floodplain

- The proposal was contrary to PPG25 and noted that EA views on flooding are material considerations.
- The planning application conflicted with Policy SE3 in the Surrey Structure Plan 2004 'Flooding and Land Drainage'. It also conflicted with RBC's Local Plan Policy SV2 'Flooding'.

The reply from GOSE in a letter of 2 August 2005, stated that Government Ministers were very selective in calling in planning applications because they considered it right that, in the vast majority of cases, decisions on development control should be taken by the local planning authorities. Applications are normally only called in if issues of more than local importance are involved or if a proposal is contrary to Government Policy in a significant way. In this case, the Secretary of State considered that the application had important implications for Government Policy on new development and flood risk and therefore he decided to call-in the application. The EA had asserted that the proposal was contrary to PPG25 and the Government considered that this issue needed detailed examination, setting the scene for a public inquiry.

4. Modelling the flood risk and uncertainty

The Wapshott Road planning application illustrates the complex processes required to establish the flood risk under the new planning and flood risk management approach: much more was needed than simply to show that the development site was in a high flood risk zone (Appendix Table 1). The Wapshott Road site lies within the Lower Thames area where modelling had been undertaken as early as in the 1990s. In 2002, the EA developed a one dimensional (1D) ISIS river model (referred to as Model 1) for the Thames from Hurley to Teddington covering the Wapshott Road site, as part of the Lower Thames Risk Mapping Study area. A detailed flood risk assessment on the Wapshott Road site was delayed until the results of this EA's modeling became available in August 2004. Capita Symonds was commissioned by the applicant and the local authority to undertake a detailed Flood Risk Assessment (FRA) for the proposed redevelopment of the Wapshott Road site to provide detailed information on flood depths, flows and velocities at the site as required under planning guidance. Using some of the data and results from the EA's Model 1 i.e the channel survey and hydrology, two TUFLOW models (Models 2 and 3) were developed by Capita Symonds (Table 1). The first on a 20m grid allowed the movement of flows around a larger area around the Wapshott Road site to be assessed and evaluated. The second model involved much more detailed modeling using a 4m grid to assess the flows within the application site. The components, features and results of this modeling were presented in the Flood Risk Assessment Report (Capita Symonds 2004)

The EA in 2005 commissioned further modeling as the Lower Thames Flood Mapping (LTFM) study to converted their Reach 3 ISIS model (Model 1) into their own TUFLOW model for that reach of the Thames. This model (Model 4) was constructed on a 50m grid as appropriate for the large area modeled.

Thus by the time of the public inquiry, there were four models available:

- (Model 1) 1D ISIS model (Environment Agency, August 2004)
- (Model 2) 20m grid 2D FRA TUFLOW model (Capita Symonds, 2004)
- (Model 3) 4m grid 2D FRA TUFLOW model (Capita Symonds, 2004)
- (Model 4) 50m grid 2D TUFLOW model (Environment Agency, June 2005)

THE FRA report on the site and the models within it were reviewed for the EA by Halcrow Ltd and they appeared to be satisfied with the TUFLOW approach adopted. In addition, the EA requested that Wapshott Road Estate site FRA TUFLOW models (Models 2 and 3)

should be compared with the LTFRM TUFLOW (Model 4) to determine whether there were differences between the modeled water levels, flood flows and flood risk at the redevelopment site. A comparison report was produced (Capita Symonds 2005).

The report noted that the EA's LTFRM model and the two FRA models were both TUFLOW models built using the data included in the existing Thames Flood Study ISIS model and hydrological inputs. The comparison concluded that the main differences between the models resulted from the different grid cell sizes used, the definitions of Manning's n and the routing of the hydrographs through ISIS and TUFLOW model. There was little difference in the results on key issues. The water levels were very similar for both models. However, the flow paths and velocities were significantly different. This difference, the report notes, would be expected since the FRA models contain more detail as is appropriate for a site specific FRA. The FRA models use slightly higher flow estimates although the difference is considered in the report to be negligible. The LTFM model predictions for water level were used to determine threshold levels and this was a conservative approach because the levels in this model were slightly higher than those in the FRA models (Capita Symonds 2005).

Subsequently, the EA commissioned Jacobs, who had undertaken the modeling for the EA to provide a limited review of the models, report on the findings (Jacobs 2006) and attend a meeting with Capita Symonds to agree areas of common ground.

Thus the process of assessing the flood risk for the Wapshott Road Planning Inquiry had involved four models, three model reviews and three consultants. In addition, Capita Symonds had met with the EA on three occasions: in February 2003, September 2005 and February 2006 to discuss flood risk at the application site.

Clearly the modeling was a matter for debate and close scrutiny in the period before the public inquiry. However, by the time of the inquiry, the parties to the dispute had agreed on many issues and a 'Statement of Common Ground' was produced and presented as evidence at the public inquiry (EA and Capita Symonds 2006). This records that an independent review found Model 3 as the most detailed model to be suitable for estimating flood depths and velocities and it was agreed that this model's results should be used when quoting flood water levels, depths, velocities and flows within the vicinity of the Wapshott Road site for the 1 in 100 return period. The debate therefore focused on the implications of the agreed modeling data for the safety and well being of residents.

5. Issues to be addressed in the Public Inquiry.

The Government's letter of 2 August 2005 calling-in the planning application listed certain matters on which the Minister wished to be informed by the inquiry: calling-in issues. Some of these were concerned with the extent to which the application complied with national policy and guidance on planning, housing and sustainability and the development plan; one covered flooding issues. This illustrates the way in which debate on development and flood risk issues is focused on, and constrained by, a wide range of national policies and by development plans and the interpretation of their provisions in site specific cases. It indicates that flooding was only one of a number of issues to be addressed in the inquiry.

Calling-in issue 1: Compliance with the Development Plan

The extent to which the proposed development was in accordance with the development plan for the area, having regard in particular to the relevant policies in the Runnymede Borough Local Plan Second Alteration (adopted 2001), the Surrey Structure Plan 2004 (adopted 2004) and the Regional Planning Guidance for the South East (RPG9).

Calling-in issue 2: Compliance with PPG3

The extent to which the proposal would comply with Planning Policy Guidance Note 3: Housing, with particular regard to the following points:

- a. Whether the proposed development would make the most efficient use of land;
- b. Whether there is a housing need for the development proposal at this particular location and at this time;

Wapshott Road Estate, Egham Hythe

- c. Whether the proposal would secure an appropriate mix of housing and affordability, that contributes towards the objectives of creating mixed and inclusive communities, in the light of any assessment of local housing needs;
- d. The accessibility of jobs, shops and other services from the site by modes of transport other than the private car, and the potential for improving such accessibility;
- e. Whether the proposed development would make the best use of land, taking into account its density, layout, design and the level of car parking provision, having regard to the advice in paragraphs 54-62 of PPG3.

Calling-in issue 3: Sustainability, and access

The extent to which the proposals would comply with Planning Policy Guidance Note 3: 'Housing', March 2000 and PPG13: 'Transport' on sustainable development, particularly with regard to the location of the site and its accessibility by means other than the private car.

Calling-in issue 4: Flooding

The extent to which the proposed development would accord with published policies in Planning Policy Guidance Note 25: 'Development and Flood Risk' with particular regard to the following points:

- a. Whether the proposed development would increase the number of people and/or properties at risk of flooding in the surrounding area;
- b. The likely impact of the proposed development on the capacity of the floodplain to store water;
- c. Whether the flood management and evacuation measures proposed by the development would be sufficient and such that they would maximise the safety of residents and ensure their safe evacuation in the event of a major flood;
- d. Whether the design of the replacement buildings, in particular the provision of voids underneath, would help reduce the risk of flooding for the occupants; and
- e. Whether there would be management plans in place sufficient to ensure that these voids would be kept permanently clear.

Calling-in issue 5: Conditions and s106 Agreement

Whether any planning permission granted should be subject to certain conditions and if so, the form that they should take

Calling-in issue 6: Any other matter

Any other matter that is considered material to the determination of this application.

Procedure at the Public Inquiry

A pre Inquiry meeting was held at RBC's offices to discuss the arrangements for the Inquiry. It was agreed that the Wapshott Road development proposal would be considered in conjunction with another appealed RBC development in a joint inquiry.

RBC and A2 Housing Group, the applicants were represented by a barrister, Michael Druce who marshalled an impressive group of witnesses:

P.H. Jenkins, Head of Planning at RBC – planning and related matters

D. Blowers, Director of Housing and Community Services at RBC – housing and local flood management considerations;
J. Gallifent, Director of Development A2 Housing – scheme appraisal and related development considerations
A.G.J. Dale, Regional Director of Capita Symonds Ltd *– flooding and flood risk considerations
D.G. Dodd, Community Safety Manager at RBC* – emergency plan (Surrey and Borough wide) and related considerations
J. Godden, Principal Engineer at RBC* – land drainage and sewerage considerations.

The EA was the only objector to the proposal and the EA was represented by a barrister who called just one witness:

J. Glynn, Technical Specialist, Development Control, EA Thames Region, South East Area* – flooding policy and flooding technical issues.

* those interviewed for the Thames case study

6. Sustainability issues in the public inquiry

The Inspector noted in his report that the flooding issue was the only one on which there was any discussion in the inquiry (Gibbs, 2006). The Environment Agency confined its evidence and its closing submission to the issue of flood risk and its impact on the proposed development i.e. its area of competence. However, this did not mean that the evidence provided by RBC and A2 spokespersons on other call-in issues were not of importance. Following the holding of the Pre-Inquiry meeting on February 8 2006 which mainly served to agree the procedure for the Inquiry, the Inspector clarified the main consideration to be examined at the Inquiry as being ‘whether the benefits of redeveloping Wapshott Road Estate, in the manner proposed, would outweigh the harm that might be caused through increased flood risk’. Furthermore, as the Inspector noted in his Report (Gibbs 2006) the called-in application provided an opportunity to examine the application of the advice in PPG25 para.35 (DTLR 2001) on previously developed land. This paragraph states that ‘a balanced flexible approach is required which addresses the risk of flooding whilst recognising the benefits of recycling previously developed land and the damage to urban regeneration caused by under-investment and urban blight’. The Inspector noted that within the ‘balanced flexible approach’ one has to take account of ‘other sustainable planning objectives’. Thus, the fact that the RBC and A2 Housing were able to make a compelling case regarding these other sustainability objectives was important. Indeed, their barrister argued that these objective amounted to a ‘social imperative’ (Druce 2006).

The main Proof of Evidence presented by RBC (Jenkins 2006) reviewed National Planning Policy and Guidance, Regional Planning Guidance for the South East (RPG9) (2001) and other documents such as the Regional Housing Strategy(2005) relevant to the planning application. It went into considerable detail in addressing the extent to which the proposed development was in accordance with the local plan including Regional Planning Guidance and County and Borough Plans and Policies: one of the issues which the Inquiry was to address (Call-In Issue 1). This proof and other evidence presented for RBC and the closing submission by the barrister on behalf of RBC and A2 Housing (Druce 2006) argued that the proposal addressed certain key objectives in the national and local agendas on housing, planning and sustainability

Decent Homes

The barrister for RBC and A2 Housing Group noted that the Government’s document ‘Sustainable Communities: Homes for All (ODPM 2005) set out the following vision for communities:

'A flourishing, fair society based on opportunity and choice for everyone depends on creating sustainable communities – places that offer a decent home that they can afford in the community in which they want to live and work, now and for the future.'

And asserted that the Wapshott Road Estate was an existing community where people wanted to live (and consultation responses from residents and their community leaders bear this out to a degree) but where people needed decent homes.

Furthermore, national housing priorities for decent homes (DETR 2000; DTLG 2002; ODPM 2004) which are expressed in the ODPM's Public Service Agreement (PSA) targets were cited in support of the application in particular PSA7:

'By 2010 bring all social housing into a decent condition with most of this improvement taking place in deprived areas and for vulnerable households in the private sector, including families with children, increase the proportion who live in decent condition.'

RBC was on target to meet this target except in the case of the Wapshott Road Estate. RBC was able to muster a strong portfolio of evidence on the poor condition of the housing there (Jenkins 2006; Michael Druce July 2006).

An area of multiple deprivation

RBC in their Proofs of Evidence (Jenkins 2006; Blowers 2006) were able to show that the Wapshott Estate was located within a wider area Egham Hythe which had been identified as an area of multiple deprivation in a study by the Social Disadvantage Research Centre 2004 and which was in the lowest quartile nationally in relation to the domain of Living Environment Deprivation which measures the quality of housing, air quality and traffic accidents.

RBC in its main Proof of Evidence (Jenkins 2006) drew attention to a number of PSA performance targets that were of particular relevance to the planning application which were concerned with deprived areas : PSA1 Tackle Social Exclusion and Deliver Neighbourhood Renewal, and PSA8 on improving the built and other environments in deprived areas and generally. PPS1: Delivering Sustainable Development and its advice on social cohesion and inclusion and regeneration were cited in support of the application.

Previously developed land

RBC (Jenkins 2006) was able to argue that the proposed development was compliant with national, regional and local policies on housing including PSA5 which requires local authorities to 'achieve a better balance between housing availability and the demand for housing, including affordable housing in all English Regions while protecting valuable countryside and the greenbelt..'. The Wapshott Road Estate proposal involved the demolition of 108 dwellings and the erection of 173 replacement dwellings on an existing site on previously developed land. Thus, it was in accordance with PPG3: Housing (DTLR 2000) and the Draft PPS3: Housing which include the national target for 60% of additional housing to be provided on brownfield sites by 2008 as well as local plans policies.

Efficient use of land and housing density

The proposed development, RBC noted, would increase the housing densities on the site and thus was in accordance with national housing policy as presented in the Draft PPS3 on Housing, and sustainable development policy in PPS1 and PSA5 (Jenkins 2006). This, as well as local plan documents stressed the need for efficient use of land which could be achieved through increased densities. RBC noted that the efficient use of land was particularly important in its area because 78% of its land is in the Green Belt and development is constricted by other designations such as heathland within the Thames Basin SPA and fluvial flood risk which affected 28% of the Borough and 33% of its urban land.

Affordable housing

RBC in its main Proof of Evidence (Jenkins 2006) acknowledged that the proposals would result in a net gain of only one affordable property on the site with the demolition of 102 council owned properties and their replacement with 103 affordable dwellings. 64 additional units would be sold on the open market to cross subsidise the redevelopment on the site. The applicants presented evidence (Blowers 2006; Gallifent 2006) that the improvement of the affordable housing to a decent standard on the site could not be achieved without this subsidy since the Council did not have the funds to renovate or rebuild its housing and also argued that it would not be possible to provide the market housing elsewhere to cross-subsidise the redevelopment of the affordable housing on the Wapshott Estate.

Housing mix and tenure

RBC (Jenkins 2006; Blowers 2006) sought to demonstrate that the proposals for the Wapshott Estate site would provide a mixed and balanced development in terms of tenure and housing types that national and local plan policies encouraged. Certainly, the proposals represented a move away from a large single tenure estate although substantial number of houses originally part of the Council owned estate had already been transferred into private ownership through the right to buy.

The barrister representing RBC and A2 Housing Group in his closing submission on their behalf, emphasised two points:

Given the unchallenged evidence both as to the very poor standard of accommodation in which the residents of the Estate live and the conditions of multiple deprivation exhibited by the area in which the Estate lies.....A compelling social imperative drives the application proposals, and the Environment Agency must demonstrate a truly exceptional case for planning permission to be refused. (Druce, 2006)

7. Flood risk issues in the public inquiry

The Environment Agency's case related solely to the issue of flood risk and its impact on the proposed development and surrounding areas. However the barrister making the closing submission on behalf of the EA (Beard 2006) had to accept that the flood risk had to be balanced against other material considerations and that the EA sought to make the case for ensuring that adequate weight was attached to flood risk as one material consideration in the decision process. The EA's case against the development was as set out in their consultation response letters (section 2 above) and elaborated in their written submission (Glynn 2006) and presentation and in the closing submission by their barrister (Beard 2006).

There was agreement between the parties on many flooding issues: that the site was in a high risk area as defined by PPG25 (i.e Flood Zone 3a: developed areas), that the best way to reduce the consequences of flooding was to avoid building in floodplains, that the application site was presently undefended and that there were no proposals to provide structural flood defences. The main characteristics of a likely major flood event in terms of the speed of onset, the depth and velocity of flooding at the site were also agreed (EA and Capita Symonds 2006; Dale 2006). The disagreement lay in the interpretation of the consequences and whether these could be managed rather than in the nature of the likely event, although the EA raised the issue of the uncertainty inherent in modelling which could not replicate a real event.

7.1 The level of risk, its management and mitigation, evacuation and safe access and egress

The EA's barrister (Beard 2006) asserted that there could be no dispute over one of the calling-in issues: that the proposed development would increase the number of people and

properties at risk within the vicinity of the appeal site as 65 new dwellings were proposed for an area agreed to be at high risk. This was their primary ground for objection. The EA contested the view put forward by the consultants responsible for the FRA, Capita Symonds, that the hazard level would be low at the site. The EA also objected to their citing EA/Defra documents entitled 'Flood Risk to People' in support of their argument because this draft report on a research project did not constitute EA policy or guidance and was not comprehensive in its treatment of the topic (Beard 2006). The barrister for the applicants defended the use of this research on grounds that it at least provided some basis for considering the risk (Druce 2006).

In relation to previously developed land, PPG25 specifies that the risks of flooding on such sites 'might be mitigated by confirmed good levels of protection, including protected access' and the EA interpreted this to mean 'a safe, dry access, which is safe for all people at all times' (Beard 2006 p.6). The EA maintained that the Wapshott Estate application would not provide this and was also not compliant with the Exception Test requirement in the Consultation Draft of PPS25 for residual risks to be managed. The EA maintained that the evidence demonstrated that a safe, dry access and egress from the appeal site to *wholly outside* the flood plain would not be possible during a high risk event. This, for the EA, introduced an unacceptable risk, which the EA maintained could not be managed adequately despite the considerable efforts and resources that the LPA intended to deploy to protect future occupiers of the dwellings.

The barrister for the applicants disputed the EA's interpretation of safe access and argued that if PPG 25 had intended to require dry access it would have stated this. He also countered the EA's arguments on the level of risk at the site quoting evidence from Capita Symonds (Dale 2006). The consultants in their presentation showed a flood animation to demonstrate the rate of flood onset and flow over the Wapshott site. This demonstrated that the rate of rise of the flood waters and the speed of inundation would be slow giving residents at the Wapshott site nearly two weeks notice of the possibility of flooding before the peak could be expected there. The magnitude of the flood flow velocities would be low, and the depths would be low, facts agreed by the EA. The maximum depth of flooding on the evacuation route would be 0.75 metres.

Furthermore, the barrister for the applicants (Druce2006) stressed that RBC were not dependent upon the EA's flood warnings having a high level emergency planning and response capability. RBC had devised their own site specific Flood Management Procedures and a Flood Management Plan for the Wapshott Road Estate (RBC 2006 c, d, e). These were presented as evidence of the Boroughs capacity to manage flood risk at the site. Furthermore, RBC, it was noted, was highly unusual in having emergency planning infrastructure that utilised a Borough wide surveillance system staffed on a 24 hour basis year round, the Safer Runnymede Centre. This facility was visited by the Inspector. RBCs Community Safety Manager presented evidence (Dodds 2006) on the Borough's emergency preparedness and plans and on its performance in a recent flood event in 2003 to highlight the Borough's flood risk management capability. Similar arguments were deployed by the applicant's barrister to argue that the application was compliant with PPS25 and the Exception Test. The EA's barrister noted that the RBA and A2 Housing Group had produced new evidence on flood risk management and evacuation that had not been available when the application was considered by the EA or the LPA before call-in: the applicants had greatly changed and strengthened their case in this respect. The EA while recognising that RBC's emergency plans were very good, argued that there could be no guarantee that the resources would be available to maintain these plans throughout the life of the development (i.e. over 60 years) and that in a flood event the Council's resources might become over stretched (Beard 2006).

The EA's barrister in his closing submission (Beard 2006) argued that the EA accepted that it was not possible to avoid building in the flood plain in all cases but in this case it considered that the flood mitigation measures proposed were not adequate having regard to the risks associated with increasing the number of people living in the flood plain. Accordingly the EA contended that the proposed development was not in accordance with current planning policy and guidance including the guidance within PPG25. The barrister for the LPA and the A2 Housing Group based his counter argument on a detailed analysis and interpretation of PPG25.

The key counter argument made by the applicant's barrister was that there would be an overall *reduction* in the level of risk because of the design features and emergency planning measures: thus existing residents would be at much reduced risk and the risk of new residents would also be sufficiently mitigated and finally that there were compelling sustainability objectives that had to be balanced against the flood risk considerations.

The Inspector agreed that there would be 60% more dwellings on the site and thence the resident population would be increased. He noted this as an important point to take into account in the 'balanced and flexible approach' require for previously developed land within PPG25 (Gibbs 2006, Para.6.25).

The Inspector in his conclusions (Gibbs 2006) commented on 'the state of the art modelling exercise to illustrate the course of events that would typify a 1 in 100 flood event affecting the application site and its surroundings. The results were shown graphically on a CD included as part of the evidence presented by the applicants. He commented on this simulation exercise as indicating 'a slow and steady unconstrained spread of floodwaters...' This visual tool appears to have made a considerable impression on the Inspector who noted that FRAs were a relatively new and evolving area of work and that the case provided an opportunity to explore its application within the framework set by PPG25 and draft PPS23 (Gibbs 2006, Para. 6.7).

On the issue of safe access and egress from the site in time of flood, the Inspector thought that the EA's interpretation of 'protected access' as a dry escape route was not unreasonable and recognised that it had been used by other Inspectors in appeal situations as an indication of the adequacy of escape routes. However, he did not consider it to be the only possible interpretation. (Gibbs 2006, Para. 6.22). He noted that the maximum depth along the evacuation route would be 0.7 metres and indicated that wading through such depths would present a challenge to some people. However, he also noted the long warning lead time and the gradual rise of the flood waters that would allow residents time to evacuate at an early stage. He concluded that the absence of a guaranteed dry escape route at all times during a flood event was a cause for concern particularly given the depths of flood water that might be encountered on the escape route. However, he also had to take into account the legal agreement that there should be a formal flood management and evacuation plan kept in place at all times and the professionalism of the RBC's approach to emergency planning. Therefore he concluded that the absence of a dry escape route was not sufficient reason to conclude that the residents would be put at excessive risk if the development proposals were to proceed. (Gibbs 2006, Para. 6.23).

Finally, the Inspector referring to the EA document 'A Strategy for Flood Risk Management' (Environment Agency 2003) noted that flood risk there is a combination of two components: the probability and the consequences that an event would cause if it occurred, a point also made by the barrister for the applicants in his presentation. In this case the Inspector concluded:

'On the basis of the evidence presented, I support the conclusion that although the number of people living in the area liable to flood would be increased, the consequences for them of a flood would have been substantially reduced. In

comparison with the current situation, the magnitude of the overall risk would have been reduced.'

by flood resilient design and warning and emergency response procedures (Gibbs 2006, Para. 6.36). The Inspector, therefore, concluded that the requirements of the Exception Test in Draft PPS25 for risks to people to be acceptable and managed and for the development to make a positive contribution to reducing or managing flood risk had been met in the proposal.

7.2 PPG 25: the application of the sequential test

The EA's argument put by their barrister in his closing submission concerned the applicants' interpretation of PPG25 and their failure, as the EA saw it, properly to apply the sequential test and its risk based search sequence as specified in the planning guidance. The EA cited the Tonbridge case (R (Environment Agency v Tonbridge and Malling Borough Council 2005) in support of this argument. In that case, an appeal against refusal of planning permission was rejected on the grounds that the sequential test had not been properly applied and the availability of sites at lower risk from flooding had not been considered. The EA argued that the same was true of the Wapshott Estate application. The Consultation Draft of PPS25 also required the sequential test to be carried out in all cases.

In their proofs of evidence, the LPA and A2 Housing (Jenkins 2006; Blowers 2006; Gallifent 2006) and their barrister argued that they had explored the possibility of raising the finance to fund the redevelopment of the existing Wapshott road properties by other means than further development of the Wapshott road site (thus fulfilling the requirements of PPG25 to examine alternative lower risk sites). However, none of the options explored and presented in the Proof of Evidence from Runnymede's Director of Housing and Community Services (Blowers 2006) had proved financially feasible. They also argued that even if it had been financially possible to raise funds just to redevelop the existing dwellings to a decent standard, this would not have been consistent with the sustainability objective of maximising the use of brownfield sites in urban locations. Refurbishing the existing affordable homes on the site, the applicants argued, would have left them at flood risk whereas the redeveloped affordable homes would be at reduced risk and have a longer life. Because the problem of unfit homes at Wapshott Road could not be solved by relocating the housing to another site in a lower risk category, the applicants considered that the carrying out of the sequential test and consideration of alternative sites were irrelevant in this case.

The applicants' barrister in his closing submission (Druce 2006) noted that the issue of the sequential test and alternative sites had not been raised in the initial consultation letters from the EA and observed that the allegations that the risk based approach and the sequential test outlined in PPG25 had not been adequately applied was made for the first time at the enquiry and he suggested that this was made as 'an afterthought' (p.7). He thought it very surprising that the EA should have failed to raise this issue of the sequential test earlier given that they had given the application serious consideration.

Further the applicants' barrister argued that PPG 25 requires the decision maker to 'demonstrate that there are not reasonable options available in a lower risk category, *consistent with other sustainable development objectives*' and thus that the priority afforded to alternative lower risk sites must be balanced against other sustainable development objectives. The barrister also noted that Para.31 of PPG25 stated that

'Where extensive areas of land fall into high risk zones, further development may be needed to avoid social and economic stagnation or blight, or to allow existing development to be adequately protected'

The barrister also argued that another sustainability consideration to be noted was the 'great' emphasis placed by the Government on the need for urban regeneration and the redevelopment of previously developed land to minimise the need for development of

Greenfield sites' (DTLR 2001 Para. 35) and PPG25 in Para. 35 identified the correct approach to be adopted in relation to previously developed land as follows:

'A balanced and flexible approach is required which addresses the risks of flooding whilst recognising the benefits of recycling previously developed land and the damage to urban regeneration caused by under-investment and urban blight'.

Because of these points in PPG25, the barrister argued that there was no breach of the sequential test requirement and no conflict with PPG25. Furthermore the application was driven by a site specific requirement: to bring the homes in the Wapshott Estate up to a decent standard. A site search is not required because 'other sustainability objectives' provide compelling justification for developing on the site (to bring the properties up to decent homes standard). The barrister also dismissed the citing of the Tonbridge and Malling Case by the EA in defence of its rejection of the application. The barrister argued that in the Tonbridge case there were not the compelling 'other sustainability objectives' in favour of the development of the site that there were in the Wapshott Estate case. Similar arguments were deployed to make the case that the application was consistent with PPS25 and its Exception Test.

The Inspector in presenting his reasoning and conclusions accepted that the development proposed was within a high risk area and stated that the inquiry provided an opportunity for a practical exercise in applying the advice in para.35 of PPG25 which is concerned with 'previously developed land'. Like the applicant's barrister, the Inspector noted the requirement for 'a balanced and flexible approach' in such cases and the need to take other sustainability objectives into account as part of that approach. The Inspector cited as such factors the use of recycled land, the repair of the damage due to under investment and urban blight at the site and commented that the replacement of seriously defective housing with decent homes, retaining an established community on site and creating a mixed community by introducing owner-occupation into an area of predominantly socially rented housing weighed heavily in favour of the proposal.

In addition, the Inspector argued that since the applicants were faced with a decision as to how to secure development on this particular site, it was not at all surprising that the sequential approach to site selection was not followed. He concluded that the sequential test had indeed not been applied but he did not regard this as a matter of such consequence that, in this instance it should be regarded as an overriding or indeed a particularly weighty consideration within the application of a 'flexible and balances' for previously developed land as advocated in Para.35 of PPG25.

7.3 PPG 25: Flood defences

The EA also argued that although PPG25 did not preclude development in high risk areas, it states that 'these areas may be suitable for residential, commercial and industrial development provided the appropriate minimum standard of flood defence (including suitable warnings and evacuation procedures) can be maintained for the lifetime of the development' (DTLR 2001). This point in PPG25 was also conceded by the applicants' barrister in his closing submission. PPG 25 clearly states the high risk areas should be protected against a flood with the probability of 1% (DTLR 2001). 'Flood defence', the EA maintained meant physical barriers and certainly not flood warnings and evacuation plans. The Wapshott Estate, it noted, was not defended and there were no plans to provide physical defences.

On this issue, the Inspector was not convinced that PPG25 's Table 1 should be read as implying a preference for development of areas that are defended from flooding by physical barriers as against areas where it is recognised as being not appropriate to seek to contain potential sources of floodwater behind a raised barrier. He commented:

'As reflected in Making Space for Water, the trend in relation to the engineering of flood defences is to adopt 'soft' measures where possible and to work with the forces of nature, rather than seeking to contain flood waters behind heightened barriers. I regard the preference to 'areas already defended' as more likely to reflect a reluctance to encourage the building of new flood defences rather than as an indication that areas that are not so protected should necessarily and for that reason itself be avoided (Gibbs, 2006, p.30).

This is an interesting and challengeable use of 'Making Space for Water' and interpretation of PPG25. A more usual interpretation of this section of Table 1 is that high risk areas are only suitable for residential development if they are protected to the minimum standard and the standard that is regarded as minimum is noted in para.31 of PPG25:

'Flood defences for most new housing development should be designed and constructed to protect against a flood with an annual probability of 1% for river flooding and 0.5% for coastal flooding for a period of 50 years taking into account the allowances for climate change...'

However, the Inspector considered that this point made by the EA carried little or no weight. Furthermore he argued that the slow and steady unconstrained flow of flood waters typical of this type of lowland river would constitute a less serious hazard than would overtopping or failure of defences. Therefore he argued that the fact that this was an undefended section of the River Thames should not of itself be regarded as making it less suitable for development than if it were physically defended by a flood barrier. (Gibbs, 2006, Para. 6.12).

7.4 Flood storage, flood flows and flood resilient design

The EA disputed the RBC and A2 Housing Group's attempts to estimate the existing flood storage capacity of the flood plain and to demonstrate that there would be no loss of flood storage on the site through the provision of voids under the development. In any case, the EA could not accept such voids as proper compensation for loss of flood plain storage because experience had shown that they became infilled and blocked over time. The EA had argued that the application was inconsistent with the Surrey Structure Plan's policy SE3 because the scheme, they argued would worsen flood risk elsewhere, due to loss of flood plain storage. The issue of loss of storage was also a ground on which the EA argued that the application was inconsistent with their own Local Plan Policy (SV2) which states that there would be no loss of flood plain storage. The applicants' barrister contended that the EA's arguments on flood storage were flawed and had been rebutted by the evidence of Capita Symonds (Dale 2006). This issue, therefore, turned on a matter of fact and modelling (the potential loss of storage) and the possibility of maintaining storage through planning conditions. The Local Plan policy, the EA had pointed out, also states that development should not be allowed if it would impede the flow of flood water. The barrister for the applicants argued that this would not happen because the water, it was accepted by all parties, would rise very slowly and would therefore not be impeded.

The EA's argument about the voids under the new building were weakened because the applicant's barrister could draw on a consultation response from the EA (letter of July 30 2003) that stated its objection to the application would be sustained unless the FRA could demonstrate that 'the new buildings do not lie within the 1 in 100 year flood plain or can be raised above it'. Thus in 2003, the EA appeared to accept raising above the flood plain as a design response that would allow development in the flood plain to take place.

The Inspector rejected the EA's objections to the provision of voids under the buildings as a means of maintaining flood storage, although he expressed some sympathy with the EA's concerns that the voids might be blocked (Gibbs 2006, Para. 6.13) However, he thought that there was sufficient assurance that the voids would remain fit for purpose and provide

the required flood storage because of proposed legal agreements and conditions to deal with this matter in the long term. Furthermore, he put forward a second counter argument on the basis of evidence from both the EA and the applicants': that the amount of Thames floodwater that theoretically might be displaced by buildings even without the provision of voids on the application site was minimal (Gibbs 2006, Para. 6.14.)

8. The Inspector's summary and conclusions

The Inspector argued that the 'balanced and flexible approach, in PPG25 required the various arguments in favour of the scheme to be set against those against the scheme, including flood risk issues.

He noted the concerns on the flood risk issue expressed by the EA as of some significance:

- There would be more people and property in a high risk area;
- There would be no dry escape route when local flooding was at its height;
- The sequential test had not been applied;
- There was some conflict with RBC's local plan policy on flooding (SV2 in the Local Plan RBC, 2001). However, it was noted that the local plan predated PPG25.

However there were other points on flood risk to set against these:

- A flood on the site would be characterised by: advance warning, a slow rate of rise, extensive dispersion and an absence of a surge that would lessen the hazard associated with the flood;
- The scheme offered a highly resilient design and a management and evacuation plan to deal with residual risks;
- The risks have been assessed and responded to in the proposed development and even with more people and property on the site, the overall risk would be less than with the existing situation;
- When assessed against the criteria contained in the Exception Test in the Draft PPS25, the criteria were satisfied.

Against the points on flood risk had to be set the sustainability objectives that the proposal would address:

- Recycling of previously developed land;
- Repair of damage caused by under investment and urban blight;
- Replacing seriously defective housing with 'decent homes';
- Retaining a community within an established neighbourhood
- Providing an admixture of housing types in an area of predominantly social housing.

On this basis, the Inspector judged that the balance of the planning arguments was heavily in favour of permitting the development with conditions and recommended that planning permission be granted.

9. Conclusion

The sustainability objectives weighed very heavily in this case. However, it is also apparent that the applicants fully embraced a flood risk management approach. They presented a case that focused strongly on the consequences of flooding at the Wapshott site and addressed the issue as to how these could be managed. In contrast, the EA's case at least initially rested heavily on an objection in principle to introducing more people into a flood risk area. It could be argued that the EA, at the time, had not entirely appreciated and adjusted to the flood risk management approach and therefore failed to build a case that sufficiently addressed the flood risk and its management at the site. Certainly the applicants' consultants and certain RBC staff felt that this was the case.

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