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**FLOOD RISK IMPLICAIONS OF PLANNING STRATEGY IN SEVERN  
CATCHMENT – HOW SUSTAINABLE IS IT?**

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Arjun Thirunavukarasu

## **Abstract**

The planning system has a huge bearing on the future development of flood risk. As such, flood risk implications should be considered when planning strategy is produced. This is particularly relevant to the UK, where flooding is expected to increase due to climate change (OST, 2003). This paper examines how effectively that flood risk is accounted at regional planning levels. Regional planning allocates mandatory local level economic and housing allocations. Hence the consideration of flood risk at this level is important as it broadly defines how flood risk will change at local levels. Considering that local level consideration is broadly predictable through development control, regional level planning strategies can help predict future flood risk.

This paper examines policy and implementation of flood risk accounting at regional level in two of the most flood risk prone regions in the Severn catchment: the West Midlands and the South West. By assessing the methodologies used we can assess whether flood risk has been considered adequately. It also predicts future planning outcomes of strategy. The assessment of these outcomes within a broad sustainability paradigm will allow us to make judgements about whether flood risk has been considered adequately. The analysis of methods and outcomes will give us insights of future flood risk effects that can be expected in the Severn catchment, and insights into the sustainability of methods used by planners. This paper finds that flood risk is not considered adequately at regional levels. This is due to the pursuance of economic goals, and the discretion incorporated into the flood risk accounting methodologies. This will have significant flood risk implications in the Severn catchment.

**Keywords:** *English planning system, flood risk accounting, Severn catchment, West midlands region, South West region.*

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## List of Acronyms

CFMP – Catchment Flood Management Plans  
 DPD – Development Plan Documents  
 FRM – Flood Risk Management  
 LA – Local Authority  
 LDD – Local Development Documents  
 LDF – Local Development Framework  
 LPA - Local Planning Authority  
 OST – Office of Science and Technology  
 ODPM – Office of the Deputy Prime Minister  
 PPG – Planning Policy Guidance  
 PPS – Planning Policy Statement  
 RA – Regional Assembly  
 RFRA – Regional Flood Risk Appraisal  
 RPB – Regional Planning Body  
 RSS - Regional Spatial Strategy  
 RTPI – Royal Town Planning Institute  
 SSA – Strategic Sustainability Appraisal  
 SW – South West  
 SWRA – South West Regional Assembly  
 WM – West Midlands  
 WMRA – West Midlands Regional Assembly

## **1.0 Introduction**

The UK is expected to experience significant increases in flooding in the future (OST, 2003). The planning system has a huge role in the development of future flood risk as it determines where development will be placed. This is because urban development increases flood risk (Environment Agency, 2002). The Severn catchment is one of the most flood prone catchments in the UK. As such, planning in the Severn catchment can contribute to increase in future flood risk experienced in the catchment.

This paper assesses how effectively flood risk is taken into account in planning in the Severn catchment. In order to do this, it will look at how effectively flood risk has been taken into account in two regions where most flood risk is experienced: the West Midlands and South West regions. It will also find the implications of flood risk strategy and assess them according to sustainability indicators. By assessing planning process and outcomes, this paper makes conclusions about how effectively flood risk has been considered, and the future implications for the Severn catchment.

### **1.1 Aim and Objectives**

This paper has the following objectives:

1. Find how effectively policy advocates the consideration of flood risk at regional planning strategy level
2. Find how this is implemented in the Severn catchment
3. Evaluate implications of regional strategy are at local level
4. Make sustainability conclusions about planning procedure and implications

### **1.2 Conceptual Framework**

This paper relies on the concept that spatial planning affects flood risk. Spatial Planning controls urban development. Urban development affects flood risk (Environment Agency, 2002). As urban planning is considered within the spatial framework in the UK, spatial planning can therefore contribute to flood risk management. UK Planning Policy 25 (ODPM, 2006a) (which deals with planning and flood risk) states that regional level planning strategy should take flood risk into account during production. This is precautionary flood risk management because it allows for flood risk to be reduced in future planning outcomes. It can contribute to flood risk management because it can reduce the need for reactive flood risk measures such as flood defences, which are expensive, thus economically unsustainable.

### 1.3 Assumptions and Limitations

The following assumptions have been made in this paper:

- Severn catchment only exists in two regional areas (West Midlands and South West).
- Flood risk can only strategically be considered at regional spatial level.
- Local level planning outcomes always result in development being moved to the least flood risk prone areas.

Although the Severn catchment exists in three regions, Wales, West Midlands and South West, it is assumed that it exists in two regions (West Midlands and South West region). Assuming that the Severn catchment exists in two regions makes analysis more manageable, particularly as the planning system in Wales is different to that of England. As the part of the Severn catchment which exists in Wales is at the uppermost section of the catchment, and is predominantly rural in character, it will not affect this paper’s analysis significantly. This paper assumes that flood risk can only strategically be considered at regional levels. Whilst policy mandates that flood risk should be considered at local strategic levels too, the effect it makes is negligible. This is because economic and housing delegations are created at regional level planning strategies (ODPM, 2004a).

### 1.4 Terms & Definitions

This paper contains the following terms which are explained in the table below:

<b>Table 1 – Terms and Definitions</b>	
<b>TERMS</b>	<b>DEFINITIONS</b>
Flood Risk Management (FRM)	FRM defines management of flood risk. It involves planning for the future so that flood risk can be reduced. FRM does not encompass ‘flood management’, which deals with flooding as it happens.
Flood Risk Management System (FRMS)	The FRMS is the system by which FRM can be practiced. This system is defined by policy, particularly Catchment Flood Management Plan (CFMP) policy.
Planning policy framework	The planning policy framework refers to the general direction inferred by all planning policy statements.
Planning strategy	The UK planning system practices ‘plan-led’ planning. This means that territories have broad spatial allocations which then influence local government

	decisions whether to approve/reject future planning applications. Planning strategy refers to the mandated future strategy which influences planning approval/rejection.
PPS25	Planning Policy Statement 25 ‘Development and Flood Risk’ is the only national planning policy which considers flood risk. It details how the planning system should deal with flood risk at all levels.
Precautionary flood risk management	This refers to the FRM which results from planning strategy considering strategy options according to the level of flood risk they entail.
Spatial planning	Spatial planning refers to planning within a spatial dimension, which allows for an integration and coordination of sectoral policies.
Urban development	Urban development is structural development which occurs in concentrated human settlements, e.g. towns and cities.
Urban planning	Urban planning is an aspect of spatial planning which is focussed on the urban environment.

## 2.0 Methodology

There were two types of data collection used from this paper; literature and telephone interviews. Research data for the planning system was largely gathered through research analysis of relevant literature. This included UK national policies and accompanying ‘Best Practice Guides’ aimed at providing more wholesome guidance for implementers. The usage of policy literature can be considered a primary source of data as all implementers are statutorily required to be in line with it. This paper also uses qualitative analysis of the policy framework, by extracting information related to the FRM. Due to the expansive volume of national policy documents and its disparate locations (mainly accessed on British Government web sites), policies were directed to me through informants used in Severn catchment analysis.

### 2.1 Data Collection in Severn Catchment

Data collection in the Severn catchment was gathered from documental evidence and liaison with informants. Documental evidence included spatial strategies for both regions within the Severn catchment. My informants were asked if they wished to not be disclosed in this paper, but all were not concerned, so my interviewees included Anne Mette-Jacobsen, Regional Planner at the South West Regional Assembly (SWRA) Stuart Macfadzean, Regional Planner for the South West Region at the EA; Rex Thomas,

Development Control officer for EA Tewkesbury, and Kate Mayes, Development Control Team Leader at EA Kelvedon. Information was gathered from telephone interviews and direct interviews. The interviews were ‘open ended’ interview, which meant it was very flexible and iteratively based creating a relaxed environment between the interviewee and interviewer (Yin, 1984). Before every interview made, they were all informed about the main framework of this paper to allow them to understand the reasoning behind the questions asked. This method was used because it allowed a deeper understanding of the planning policy framework and implementation within the Severn catchment. This also included the retrieval of information related to regional activities which were not clear from policy documents. The telephone interviews lasted for about 45 minutes and were mainly used because the interviewees were extremely busy and were not able to meet in person. The weaknesses in terms of this interviewing technique are mainly the lack of personal contact and having to take notes at the same time during the phone call. In terms of the personal interviews these problems did not occur.

### **3.0 Background**

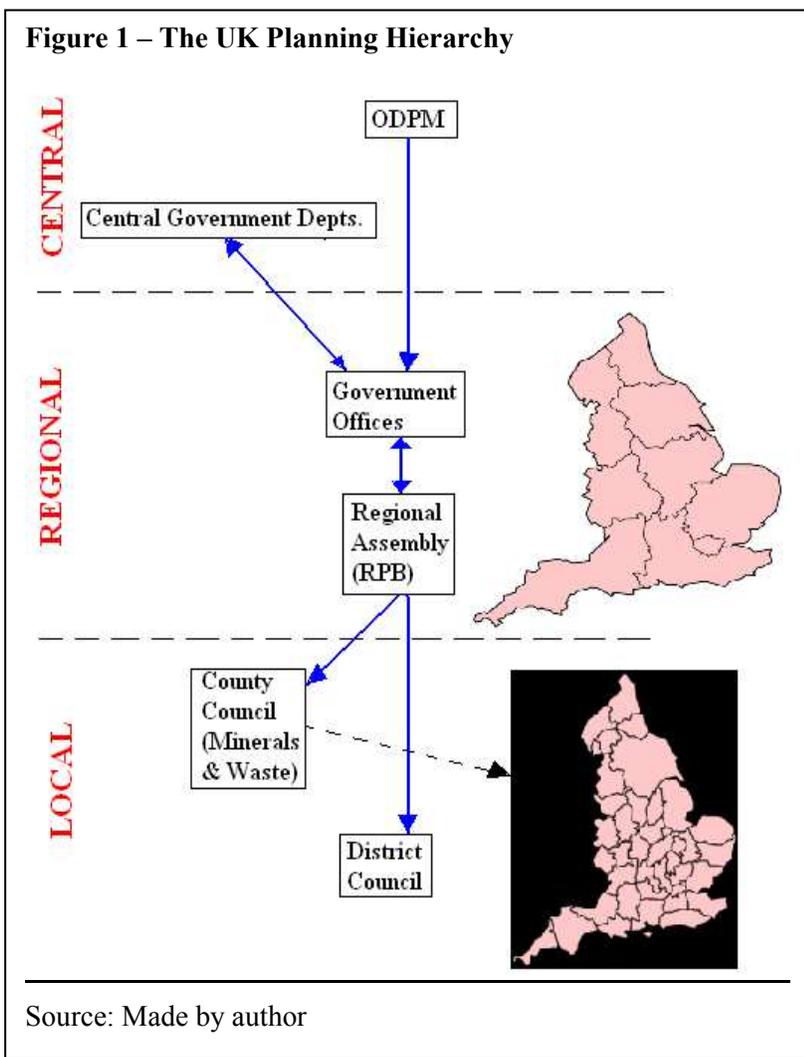
The aim behind planning is to take into account wide variety of interests and ensure that planning output is in general public interest (Cullingworth & Vince, 2006). Another issue of planning is the requirement to foresee future changes which might impact on planning systems, and their ability to function (Cullingworth & Vince, 2006). As flood risk are both in the interest of the public and can affect the planning system’s ability to function, it should be taken into account. This section of the paper will give a brief background of the planning system.

#### **3.1 UK National Planning System Background**

Planning philosophy in Britain is rooted in a strong land conservation ethic (Cullingworth & Vince, 2006). This is apparent from the long standing existence and popular support of Campaigns to Protect Rural England (CPRE), and the Green Belts movement (Cullingworth & Vince, 2006). These characteristics can be considered to be deeply entrenched in Britain’s early industrialisation. Britain does not have a written constitution. Constitutions mean that government action is subject to constitutional challenge when pursuing planning goals. Hence, the lack of a constitution allows the government much more autonomy and central power at all levels (central, regional and local). As such, planners have a remarkable level of discretion when considering what types of planning outcomes are ‘in public interest’. This allows for

planning outcomes to be ‘tailor made’ for their locality (rather than following a generalised, national set of rules) as well as changes in social trends more easily (over time).

The lack of a constitution is one of the many unique characteristics in the British Planning System which embraces flexibility through ‘discretion’ (Cullingworth & Vince, 2006: 10). As is apparent later, the planning policy framework is another aspect of the planning system which allows for flexibility. Planning systems require flexibility in order to deal with changing circumstances: both in locality and temporally.



Discretion allows planners a great deal more flexibility generally, but particularly in the interpretation of public interest (Cullingworth & Vince, 2006). Cullingworth & Vince argue that the need for flexibility is the reason why discretion is needed within the planning system (2006). It is this impossibility in devising processes which take into account such varying circumstances that require such discretion (Cullingworth & Vince, 2006).

Planning competences have been integrated into the government departments; hence the hierarchical structure follows governmental hierarchy: central government, regional government and local government (See Figure 1). The highest authority lies with the Office

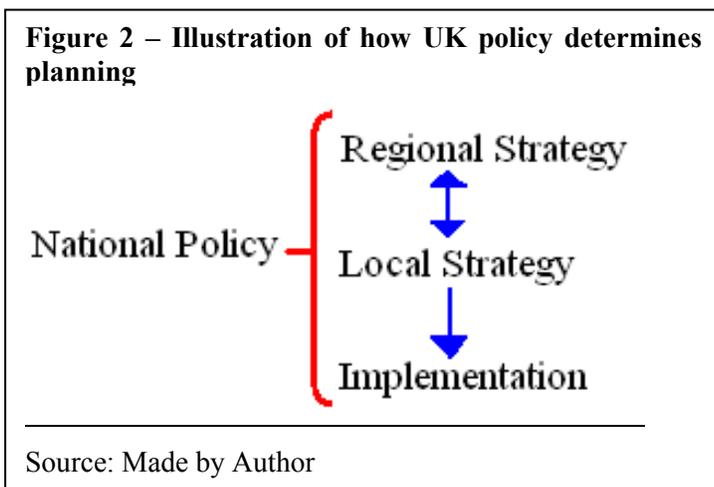
of Deputy Prime Minister (OPDM) which can be considered the ‘national department for planning’ (Cullingworth & Vince, 2006: 44). OPDM retains the ability to decide all planning decisions as they have

highest planning status. Various central departments have planning competencies with specialisations in respective sectors e.g. DEFRA has charge of rural planning (Cullingworth & Vince, 2006).

At regional level, Government Offices (GO) and Regional Assemblies (RAs) have authority over their administrative regions (See Figure 1). The RAs or Regional Planning Bodies (RPBs) are responsible for the production and updating of Regional Spatial Strategies (planning strategies for their regions) and other regionally relevant documents (Cullingworth & Vince, 2006). The relative increase in importance and power of the Regional Assemblies has been dramatic, and has been statutory by the PCPA 2004 reforms (Cullingworth & Vince, 2006). Government Offices have the role of bringing organisations together, and facilitating their work e.g. securing funding, and directing its allocation (Cullingworth & Vince, 2006). In respect to the delivery of the RSS, they are responsible for the setting of RSS delivery timetables. County Councils, who used to have charge over the delivery of ‘Structure plans’ (old versions of RSS) now help with the delivery of the RSS and power over the establishment of Minerals and Waste strategies for their regions (Cullingworth & Vince, 2006). District Councils which are the primary local planning institution are responsible for their local strategies and development control over their administrative territory (Cullingworth & Vince, 2006).

### 3.2 Planning Policy Statements

Planning Policy Statements (PPS) have two roles: to define the procedures carried out by planning organisations, and to broadly characterise the output of planning. In respect to planning outputs, Planning Policy Statements, from the national point of view allow for central government departments to come together and influence local implementation (Cullingworth & Vince, 2006) (See Figure 2). The PPS state

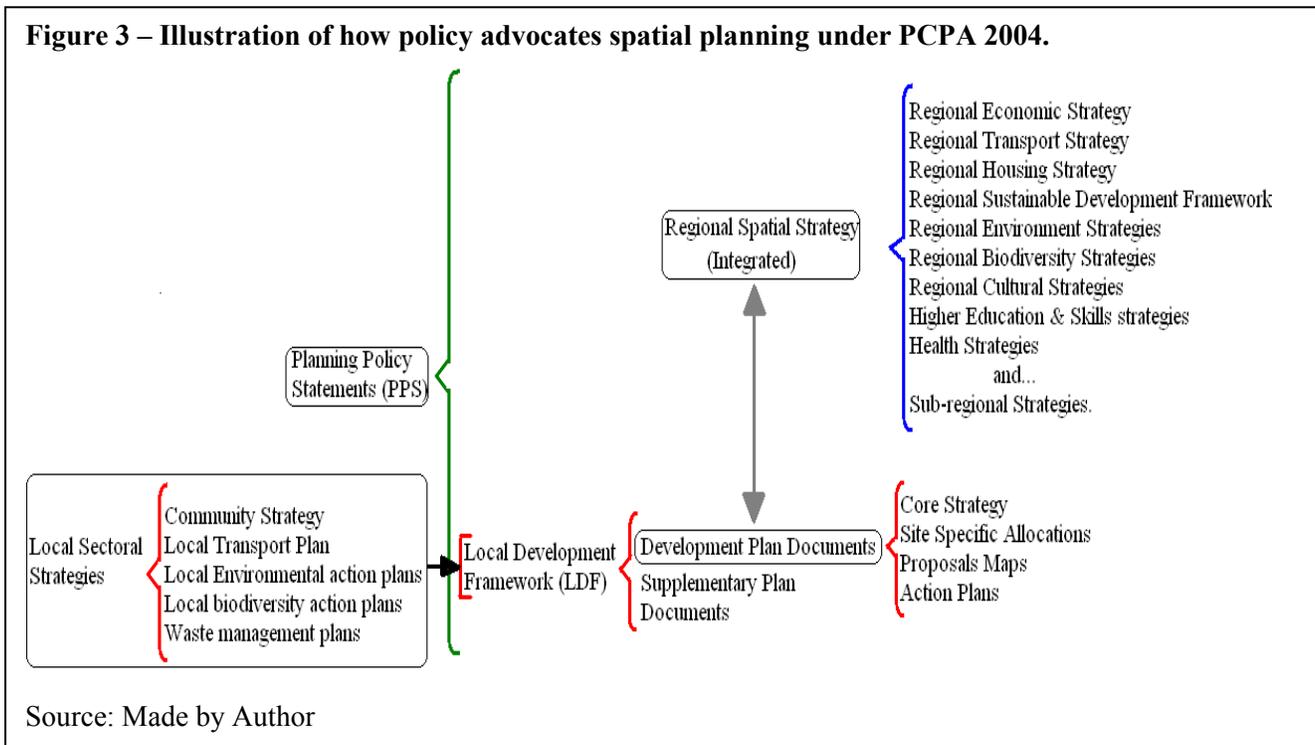


the broad national regime direction but at the point of implementation can have contradictions, either with itself or other policy series (Cullingworth & Vince, 2006). Such contradictions allow for a wide variety of interpretation at local levels. The statutory planning policy framework is ‘entirely procedural and devoid of constitutional content’ (Cullingworth & Vince, 2006:11). This is one aspect of the

planning framework which allows for flexibility, in this case, the flexibility in outcomes. Defining procedures ensures that planning organisations relate to one and other in the required manner, whilst allowing for such procedures to be considered within the framework of the local character. This ensures that planning outcomes are tailor made for their local environment.

### 3.3 The New Planning System (Post PCPA 2004)

The Planning and Compulsory Purchase Act 2004 (PCPA 2004) brought about a reform of the old Planning Policy Guidance (PPG) statements which are now being replaced by Planning Policy Statements (PPS). Under the new PCPA 2004 framework, spatial planning responsibilities have been delegated upwards to Regional Bodies (RB) from County and Local council levels. Figure 3 above shows how Planning Policy Statements (PPS) define planning strategy structure. Strategy aspects of planning are specified in regional level Regional Spatial Strategies (RSS) and Development Plan Documents (DPDs). Regional Spatial strategies have direct influence on local level Development Plan Documents (local level planning strategy). As Figure 3 shows, local level planning outputs are also influenced by other local level strategies, e.g. community strategy.



### **3.4 Regional Spatial Strategies**

Regional spatial strategies are created by Regional Assemblies (regional planning body). RSS procedures are described in PPS11. The RSS must contain a vision, a spatial strategy (with key diagrammatic form) and an implementation plan (Cullingworth & Vince, 2006). The vision shows what it aims to achieve over its lifespan of 15-20 years (OPDM, 2004a). This includes the compulsory consideration of a variety of regional strategies:

- Housing (including scale and distribution),
- Environmental priorities (e.g. biodiversity and countryside protection),
- Transport, infrastructure, economic development, agriculture, minerals extraction and waste treatment and disposal.

RSSs should coordinate regional strategies, integrating them within a spatial context (non-compulsory strategies for consideration shown in Figure 3). Sub-regional strategies can also be included to deal with issues that warrant smaller scale planning across local authority boundaries (Cullingworth & Vince, 2006). Regional planning bodies (RPBs) are required to take advice from other planning authorities when making decisions; this includes both regional (e.g. Environment Agency) and local level stakeholders (e.g. Local Planning Authorities) (OPDM, 2004a). The RSS has statutory status (OPDM, 2004a). Additionally, new local level planning documents, known as local level planning strategy (which make up the Local Development Framework) must be in conformity with the RSS; and development control decisions must be in conformity with it (Cullingworth & Vince, 2006). Development control is a required process that developers need to undergo to ensure that proposed development is in line with planning strategy. This effectively makes the RSS the foremost planning strategy document in the UK.

### **3.5 Local Level Planning (Local development Framework and Development Plan Documents)**

Local level planning is carried out through the overarching Local Development Framework (LDF). The LDF is a 'portfolio' that contains the planning documents for the local administrative area, as well as information about the implementation and monitoring of the strategy (Cullingworth and Vince, 2006: 119). The LDF draws on local strategies (e.g. community strategy, environmental action plans, etc.) and reconfigures them within a spatial paradigm (See Figure 3). The LDF consists of two types of documents which have most relevance to planning strategy: Development Plan Documents (DPDs) and Supplementary Planning Documents (SPDs) which include Simplified Planning Zones (SPZ). DPDs make up the

‘development plan’ which is the starting point for planning decisions (OPSI 2004: Section 38(6)). The DPDs should consist of: the core strategy, site specific allocations of land; and area action plans (ODPM, 2004c). The Core Strategy should consist of the main policies that underline the strategic development of the area (ODPM, 2004c). Diagrams could also be used to supplement the core strategic principles and map out the general outline of development in the territory (ODPM, 2004c). Site specific allocations and policies identify smaller scale strategies for specific areas (ODPM, 2004c). Area action plans are required for areas where significant change is projected, or conservation is planned (ODPM, 2004c). Supplementary Plan Documents are intended to buttress the development plan documents and adding to their content. They may contain design guides, local policy details, etc. (ODPM, 2004c).

### **3.6 Flood risk management through the planning system**

Flood risk accounting in the planning system is considered in PPS25. Policy Statement 25 (PPS25) ‘Development and Flood Risk’ states that LPAs and RPBs should prepare Strategic Flood Risk Appraisals (SFRAs) and Regional Flood Risk Appraisals (RFRAs) respectively, in order to assess the future flood risk implications of their plans (ODPM, 2006a).

### **3.7 Flood Risk Appraisals at Regional Level**

The RFRA is aimed at influencing the spatial locations for the growth in housing and employment (DCLG, 2007b). The RFRAs are required to use flood risk maps and consultations by the Environment Agency, as well as using information from other sources, such as SFRAs (ODPM, 2006a). The RFRAs should inform the RSS of broad flooding issues, and highlight flooding issues in local areas that local authorities should be dealing with and addressing with their SFRA (ODPM, 2006a). As such, the RFRA is considered as a summarising ‘grand spatial plan of flood risk’ in the region. There are no formal requirements for the way in which the RFRA should be integrated into the RSS process (DCLG, 2007b). The guidance for the RFRA suggests the usage of indicators such as:

- Area and proportion which lies in Zone 3
- Number of existing properties at risk from river/coastal flooding
- Number of properties benefiting from flood defences of defined standard
- Annual average value of the damages caused by flooding across region

(DCLG, 2007b)

The indicators described are based on unitary areas, and do not consider the whole catchment, hence disregard the catchment-basis of fluvial flooding. However, sub-regional Strategic Flood Risk Appraisals (SFRAs) are encouraged in extensive areas of flood risk. The outputs expected include: broad spatial distribution of flood risk, policies for sustainable flood risk management, suitable locations for flood risk management in high risk areas (DCLG, 2007b).

### **3.8 Flood risk appraisals at local level**

Flood risk appraisals through the planning system are carried out through SFRAs (ODPM, 2006a). The SFRAs are aimed at influencing the local level development documents (LDDs). However, as LDDs are not statutory, Local Authorities are able to place development; this effectively negates the relevance of the SFRAs. Additionally, It is not mandatory for the LDDs to be in conformity with the SFRAs. This brings added weight to the SFRAs lack of importance. Despite local level planning being rather ambiguous, development is restricted by development control. Development control is a required procedure that proposed development must undergo to ensure that the development is safe and approved by the local authorities.. Development control (of which the flood risk aspect is under the mandate of the EA) aims to shift development to areas of lowest flood risk in a district using the Sequential Test (see Figure 4) (OPDM, 2006a). The sequential test is based on a tripartite flood zoning system produced by the EA. This includes: Zone 1 which constitutes land of less than 1/1000 chance of flooding; Zone 2 which refers to land in between 1/1000 and 1/100 chance of flooding; and Zone 3 which refers to land with more than 1/100 chance of flooding. Zone 3 also has sub-categories: Zone 3a which refers to high flood risk land; and 3b which refers to functional floodplain (OPDM, 2006a). The Sequential test aims to shift proposed development from higher flood risk zones to lower flood risk zones in the locality (ideally shift development to zone 1, if not zone 1 then zone 2, and then in zone 3). In the events that the sequential test fails to allow developers to allocate development accordingly, and then the exception test shall be applied (OPDM, 2006a). The exception test allows for the sequential test to be overruled when: development is shown to have wider sustainability benefits that outweigh flood risk; or development is planned on previously developed land; or a Flood Risk Appraisal demonstrates that the development is not at flood risk and does not increase flood risk to its surroundings (OPDM, 2006a). Development is classed under one of three broad categories that can be used to evaluate the possibility of applying the exception test: highly vulnerable, more vulnerable, less vulnerable (OPDM, 2006a). However, the exception test does not allow development in floodplains.

**Figure 4 – Flood risk vulnerability and Flood Zone ‘Compatibility’.**

Flood Risk Vulnerability classification (see Table D2)		Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (see Table D.1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	X	Exception Test required	✓
	Zone 3b 'Functional Floodplain'	Exception Test required	✓	X	X	X

Key:

✓ Development is appropriate

X Development should not be permitted

Source: OPDM (PPS25), 2006:27

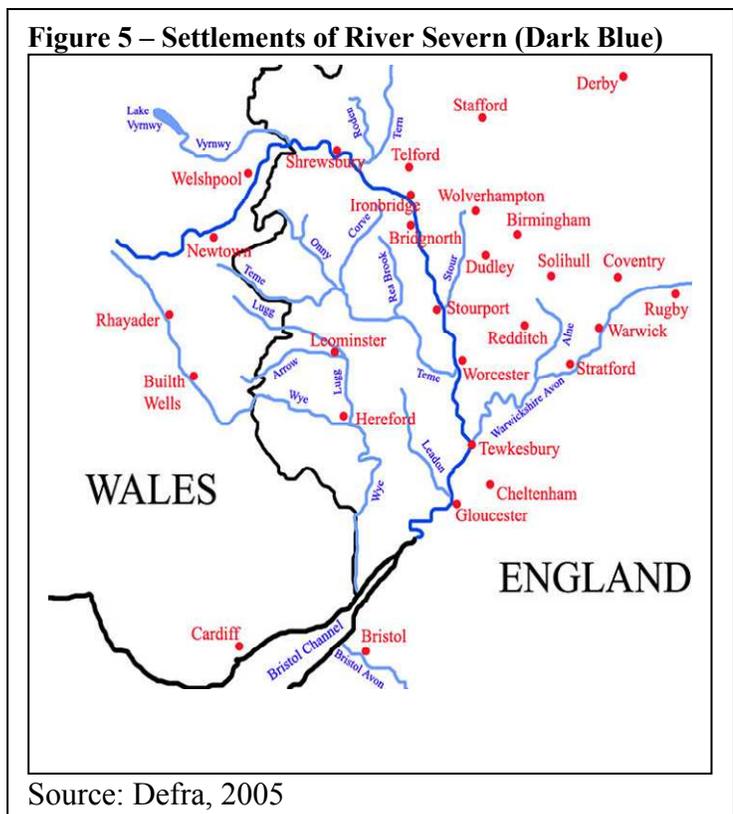
The Sequential test being the general rule applied, aims to move land to the areas with the least flood risk. This would theoretically allow for land with higher levels of flood risk to be kept available for flood storage, thus reducing negative effects on society (social and economic sustainability). However, local authority planners reserve the right to overrule this general rule when they feel that it may constrain their ability to interpret public interest through the exception test. The exception test can only be applied in certain circumstances, the circumstance depending on the classification of the development in question (highly vulnerable, more vulnerable or less vulnerable). However, there are no guidelines which define such definitions, allowing the planners much discretion on these terms. In fact, when PPS25 was undergoing public consultation before coming into force, the lack of information on the circumstances in which the exception test should be applied was a point of complaint by the Royal Town Planning Institute (RTPI) (RTPI, 2006). As such, although flood risk can influence local planning decision making, it is never a factor which can wholly constrain development, apart from in the floodplain.

### 3.9 Preliminary conclusions about the planning system and its own FRA

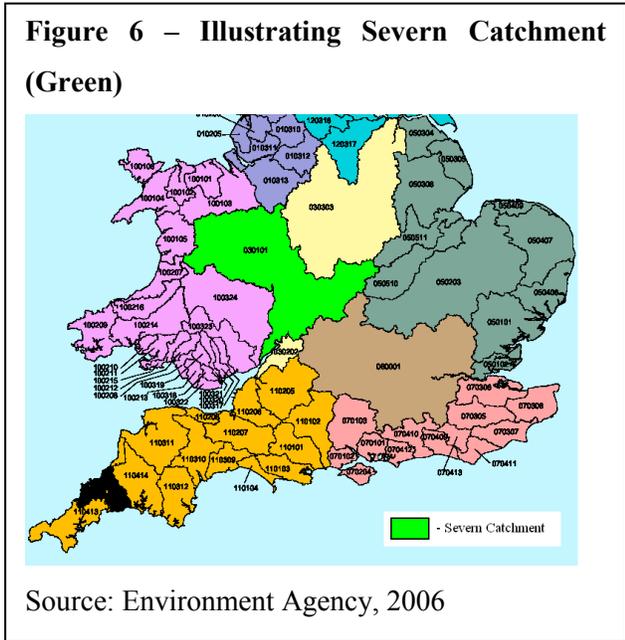
The new planning system means that planning is now conducted at higher strategic levels and is statutory for twenty years. Theoretically, this means that flood risk can be dealt with at higher levels, if considered properly. Regional level spatial strategies encompass economic and housing allocations for its subsidiary settlements. As local level strategies are statutorily obliged to follow this, local authorities ability to manage flood risk particularly over such a long period is linked to its delegated economic and housing outcomes. As DPDs are not statutory, it is presumptive to assume that they will be followed. However, development control decisions are relatively predictable. They aim to move development to the least flood prone areas using the sequential test advocated by PPS25. As such in localities, development will tend towards the least flood prone areas.

### 4.0 Severn Catchment

The Severn River is Britain's longest river from source to tidal waters (about 180 miles [290km]) (DEFRA, 2005) (See Figure 5). It drains an area of 4,350 square miles (DEFRA, 2005). Its drainage basin is the third largest in the U.K. and covers 21,590km<sup>2</sup> (DEFRA, (2005) As well as the River Severn and its main tributaries, the Worcestershire Avon and the Teme, the district includes the rivers of south east Wales and those of the counties of Avon and Somerset that drain into the Severn Estuary. These include the Wye, Usk and Bristol Avon (DEFRA, 2005). The Severn RBD is home to over 5.3 million



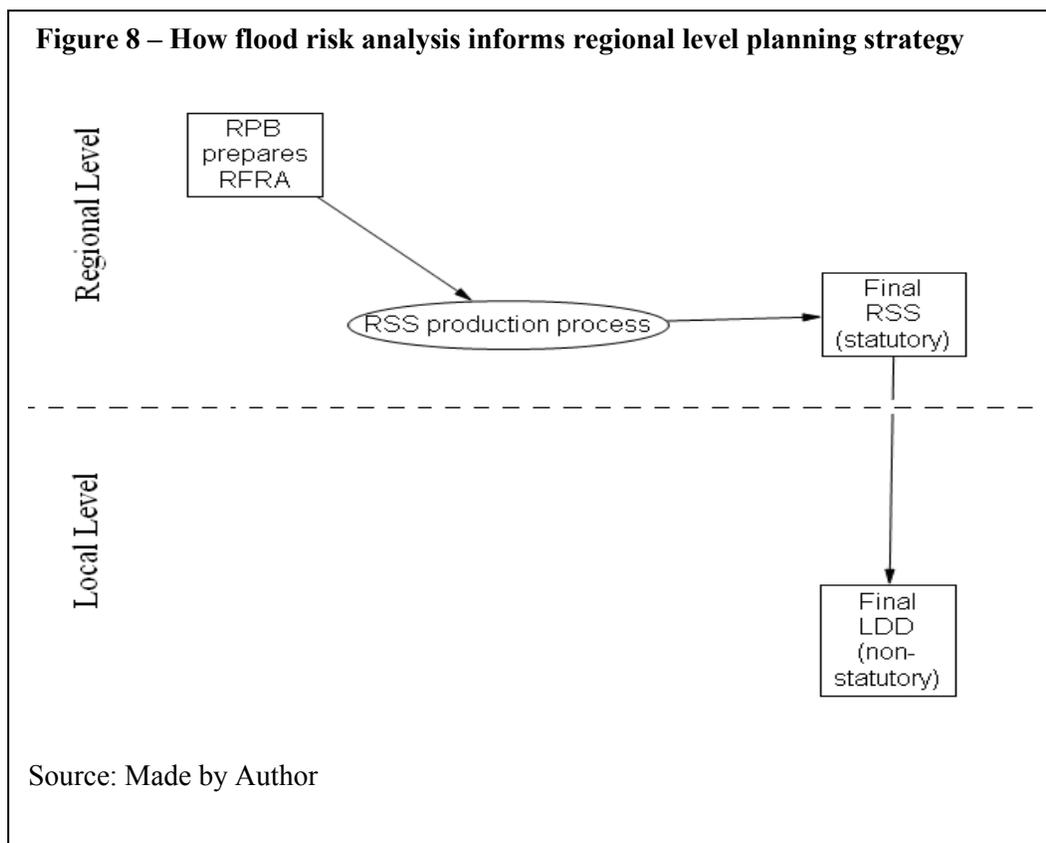
people, and has several major urban centers including, Bristol (380,615), Cardiff (305,353) and Coventry (300,848) (DEFRA, 2005).



The Severn catchment predominately lies in the West Midlands and the South West Regions (See Figure 6 and 7). The upper part of catchment lies in the West midlands region, whilst the lower parts of the catchment lie in the South West region. This paper does not consider the upper part of the Severn catchment because it is predominantly rural in character and thus is unlikely to change flood risk downstream in a significant manner. This has also made this project more manageable.

## 5.0 Objective 1 – National Policy Avocation of Flood Risk Accounting at Regional Planning Level

In order to find how policy advocates the consideration of flood risk at regional level, a theoretical investigation of related policy issues must be analysed. The main way in which policy advocates the coordination of flood risk is through the creation of the RFRA. This regional level flood risk appraisal should inform the RSS process, thus influencing the spatial direction taken. This policy analysis draws on PPS25, its accompanying ‘Best Practice Guide’ and PPS11. The analysis of these documents focuses on the policy recommended methods of data collection and analysis. By carrying out such analysis, we can then find what aspects of implementation in regional strategies in the Severn catchment we should scrutinise.



Planning strategy direction is influenced through the usage of RFRA. As the RSS is the main document which determines the direction of spatial strategy, the RFRA has huge importance when informing of flood risk throughout the region. The RFRA is expected to be prepared before RSS, in order to help identify

spatial direction from a variety of previously prepared regional options. Whilst it is mandatory to consider flood risk options through the RFRA, there is no statutory requirement for the optimal flood risk based option to be picked. The RSS is statutorily required to be in harmony with the regional economic strategy and the regional housing strategy. As such, the flood risk direction of the RSS is highly likely to be linked with the circumstantial flood risk effects of these strategies.

Policy mandates that RFRA methodology only consider existing development when considering flood risk. A thorough analysis of the effects of flood risk should include the understanding of the effects of spatial strategy over its entire length. Comparing the expected flood risk of strategies at the end of strategy lifetime would give a thorough evaluation of comparative flood risk effects.

The consideration of future outcomes would require the usage of urban models, which require specialist expertise. Regional bodies' powers and responsibilities have increased rapidly, whilst their expertise has not (Cullingworth & Vince, 2006). Regional planners may not have the expertise to conduct such analysis. However, the EA conducts this type of analysis when preparing Catchment Flood management Plans CFMPs, so such expertise could be gathered through consultations with the EA (DEFRA, 2004). This lack of future flood risk consideration also negates the requirement for planners to consider the catchment-based nature of flood risk.

This shows that policy indirectly assumes that existing flood risk is the most important factor in determining future flood risk, and spatial strategy directions will have little effect on change in flood risk circumstance around the region. This implies that policy therefore does not properly acknowledge the catchment nature of flood risk. Urban development upstream of flood sensitive parts of a catchment will increase fluvial flows through a sensitive area, thus increasing flood risk in the area more greatly than urban development upstream of flood insensitive areas. Hence changes in flood risk are not simply affected by current flood risk, but are also affected by a combination of size and orientation of catchments on which the spatial strategy is laid. Size and orientation of catchments in respect to regional boundaries should also be considered in order to make a thorough appraisal of flood risk, if only considered within the present. Policy does not advocate such requirements.

The accompanying best practice guide that is provided with PPS25 (to aid implementers) gives information about the types of materials to be used in RFRA creation. The evidence base advocated is basically a list of

all flood risk relevant data that can be found. This guide does not specify methodology. This gives planners much discretion of how to prepare flood risk analysis. As the SFRA and RFRAs are public documents, this discretion would allow planners to present flood risk in the way deemed most appropriate. In areas of significant flood risk where planners are economically orientated, this discretion could be used to try and hide flood risk. In areas of relatively low flood risk with a conservationist or ‘anti-development’ perspective, this discretion could be used exaggerate the amount of flood risk. As such, the way that flood risk is represented is dependent on situational factors (impulse of economic development, level of flood risk) and planners perceptual factors which are dependent on territorial political mindset and maybe even personal factors.

This discretion in RFRA methodology also means that flood risk will be calculated in different ways in different local territories and different regional territories. Different methodologies will reduce the ability for planning authorities within the same catchment to communicate, cooperate and coordinate in relation to shifting development to lesser flood risk prone areas. This will have little effect on local level planners who are statutorily required to accept regional level planning outcomes. However, in interregional catchments, flood risk based interregional cooperation is discouraged by this lack of methodology harmonization. Interregional catchments tend to embody larger levels of flood risk. This is because they tend to be larger, thus having greater water flows which can cause more significant flood risk damage. Therefore, larger catchments tend to require more planning cooperation in order for more sustainable flood risk outcomes in planning strategy. RFRA methodological discretion indirectly discourages flood risk by undermining their capacity for cooperation.

## **5.1 Conclusion of policy analysis**

We can see that policy requires a rudimentary flood risk analysis at regional level. This is particularly clear by the amount of space allocated to the production of RFRAs within the PPS25 text (only one paragraph less than half a page long). This is particularly surprising due to the importance of the RSS in future spatial strategy in determining local planning direction, the length of time that the RSS is statutory for and thus the possible implications that such a long term strategy would have on flood risk.

## **6.0 Objective 2 - Flood Risk Accounting in the Severn Catchment at Regional Levels**

Through analysis of policy, it has become clear that there are certain aspects of implementation which need to be scrutinised. Scrutinising these aspects of policy give us an idea of how well flood risk has been taken into account at implementation. Thus implementation analysis will be focussed on the following objectives;

1. What type of methodology is being used in the RFRA:
  - a) Used to inform RSS (to understand whether flood risk information is being hidden and how)
  - b) Whether the size and orientation of catchment within the region considered in the RFRA? (to investigate whether flood risk appraisals have considered the whole catchment effect of flood risk in localities)
2. The impulse for economic development in the catchment's regions (to investigate the background ideologies which influence RSS direction).
3. Any evidence of interregional (spatial) cooperation in relation to flood risk within the catchment (indicating that planning has been cooperative or coordinated).
4. A combined analysis of RSS planning outputs and existing flood risk in local locations (to find the resulting flood risk effects of RSS, and to find how effective RFRA-RSS relationship has worked)

### **1. RFRA Methodology (West Midlands)**

The WM RFRA has been created to inform the WM RSS. The WM RFRA used evidence from the Environment Agency, LPA, IDB and water companies. The evidence base used for the West Midlands RFR creation has not been presented in the RFRA. The evidence is made up of subjectively derived local information and an objective fluvial information source. Both local and fluvial information are displayed in indicator form. Local information is presented in an aggregated indicator form. Local flood risk information included: inherent flood risk, urban impact mitigation, perceived impact of flooding on future development, and presence of known flooding hotspots (WMRA, 2006). These indicators involved the categorization of information into three broad categories (A, B, C). For example, 'inherent flood risk' was categorized into A (less than 5%), B (5-10%), and C (over 10%) by using EA flood maps. These broad categories seem to aim to allow broad comparison across the region.

However this categorisation was also used in the subjective assessment of objective information; e.g. ‘standards of flood defences’ was split into three categories ‘none (or very few)’, ‘variable (a mixture of high and low’, or ‘all (or most)’. The middle category ‘variable’ could represent a wide variety of flood defences depending on the amount needed, hence has the ability to hide information in the most important settlements for analysis. This same tripartite categorization is used in all of the indicators used at local levels, hence local level information can be easily hidden. This tripartite broad categorization method is also used in the only objective indicator, URBTEXT values. URBTEXT values are nationally relevant research data (from the Flood Estimation Handbook), which gives an indicator of how flood sensitive settlements are to increased development. This tripartite categorization was used despite how easy it would have been to interpret the original data (the higher the value, the higher the sensitivity to urban development).

It seems that this broad categorization has been used to oversimplify data so that comparison across localities is made difficult by its simplicity. In fact, the most descriptive aspect the flood risk appraisal was the questionnaire sent out to local authorities which asked them to comment on their perceptions of flood risk in the borough, as it offered them a relatively large range of 1-10. Additionally, other more physically relevant indicators were aggregated (level of flood defences, level of urbanisation), whilst local authority questionnaire was given prevalence of its own. This seems to emphasize the importance of the political opinion of flood risk when considered at regional levels.

Despite using a variety of indicators that describe aspects of flood risk at local level, this information does not contribute to an accurate understanding of flood risk in these areas. It seems as though For example, the WM RFRA methodology itself states that the sub-indicator ‘level of Zone 3 land’ gives a ‘coarse’ understanding of flood risk as it does not show where this land is located (e.g. town centre, or outside urban area). However, an additional indicator showing where this flood risk prone land exists has not been added. The other indicators used also do not ‘link up’ to give a good understanding of flood risk in local areas.

## **1. RFRA Methodology (South West)**

The South West region’s spatial strategy was created in June 2006. As the new Planning Policy Statement on Development and Flood Risk was published in December 2006, the SWRA followed the mandate of its preceding counterpart, Planning Policy Guidance 25 (PPG25). As PPG25 does not have any requirements for an RFRA, the SWRA did not create an RFRA to inform its RSS process (as required under PPS25). When the RSS was under public consultation, the EA commented on the lack of RFRA (Stuart Macfadzean,

EA). In order to satisfy current planning policy, a post-RSS RFRA was created (Anne-Mette Jacobsen, SWRA). The process of considering flood risk was an informal process in the SW. The SWRA created a spatial plan which delegated preliminary housing and job allocations to local authorities and asked them to comment on their delegations (Stuart Macfadzean, EA). If the local authorities were not happy with the numbers, they could then be reconsidered by SWRA (Stuart Macfadzean, EA). No Local Authorities found any problems with their numbers. As such the flood risk appraisal process in the SW was not specifically linked to flooding but an overall feasibility analysis, considering all limiting factors. In order to assess whether the RFRA methodology used any attempts to disguise flood risk, we must analyse the post-RSS RFRA. The post-RSS RFRA considers that there are two types of flood risk that require concern: significant, and absolute (SWRA, 2007). Absolute flood risk is flood risk that can not be mitigated by flood risk measures (SWRA, 2007). Significant flood risk is flood risk that can be mitigated (SWRA, 2007).

The method of flood risk analysis included the usage of EA flood maps with accompanying textual description of the area and the numbers of properties at risk. This type of information gives a geographical distribution of flood risk in the region. Textual assessment of flood risk allows for planners to interpret and present information as they please. Despite the relatively high level of flood risk in the region (as shown on the map too), no specific conclusions are made in the RFRA. Despite the high level of flood risk indicated on the map, the RFRA states that 'further work is needed to fully understand the impacts of development in this location' (SWRA, 2007). Additionally, despite Gloucester and Tewkesbury being consecutive settlements in a catchment, the RFRA has not considered need for them to be considered within a sub-regional RFRA (although a sub-regional SFRA is considered require for Cheltenham instead). This appears to show a lack of catchment expertise on behalf of the planner conducting the assessment. Despite the fact that Tewkesbury is known to have significant flood risk, it is not considered to have flood risk in the SW RFRA. This also confirms that the methodology allows for much planning discretion (Cullingworth & Vince). Gloucester is the only area within the Severn catchment which is considered to have significant flood risk.

As the appraisal was originally carried out at local level by local planning authorities, who did not explicitly consider flood risk separately, we can also reasonably assume there was no consideration of catchment aspects (size or orientation) when carrying out the flood risk appraisal.

## **2. Impulse of economic growth in the region (West Midlands)**

The West Midlands adopts a ‘polycentric’ (WMRA, 2008) approach to that of the South West. However, as only Phase 1 of the RSS has been created, and the majority of its focus is the Black Country, explicit information about the general impulse for economic growth is not made explicitly clear. Much reference is made to reversing the out-migration experienced in the Black Country, hence economic development is mentioned in the term of increasing regional stability. There are many references to the improved economic growth, but these are often mentioned alongside environmental motivations

## **2. Impulse of economic growth in the region (South West)**

The South West experienced the highest level of immigration of all regions between census of all regions (SWRA, 2006). The SW RSS states that there is need to plan for the increased economic growth in the region of 2.8% or higher, (and towards the higher end of the range, 2.4% to 3.2%) (SWRA, 2006:34). The South West RSS states that there are not enough resources for the high levels of development envisaged in the region (SWRA, 2006:5). It also states that high levels of population growth are envisioned for the region, which will increase infrastructure (SWRA, 2006). It also states that although they are committed to maintaining the excellent environments of the region, this will be difficult (SWRA, 2006). Previous economic growth exceeded what was planned for (SWRA, 2006:12). These references in the RSS suggest that economic growth is considered to be an important factor, and driven by projected future population growth. The RSS aims to ‘manage’ this future growth, thus economic development is considered to be inevitable. From these snippets, we can assume the impulse for economic growth can be considered to be rather high.

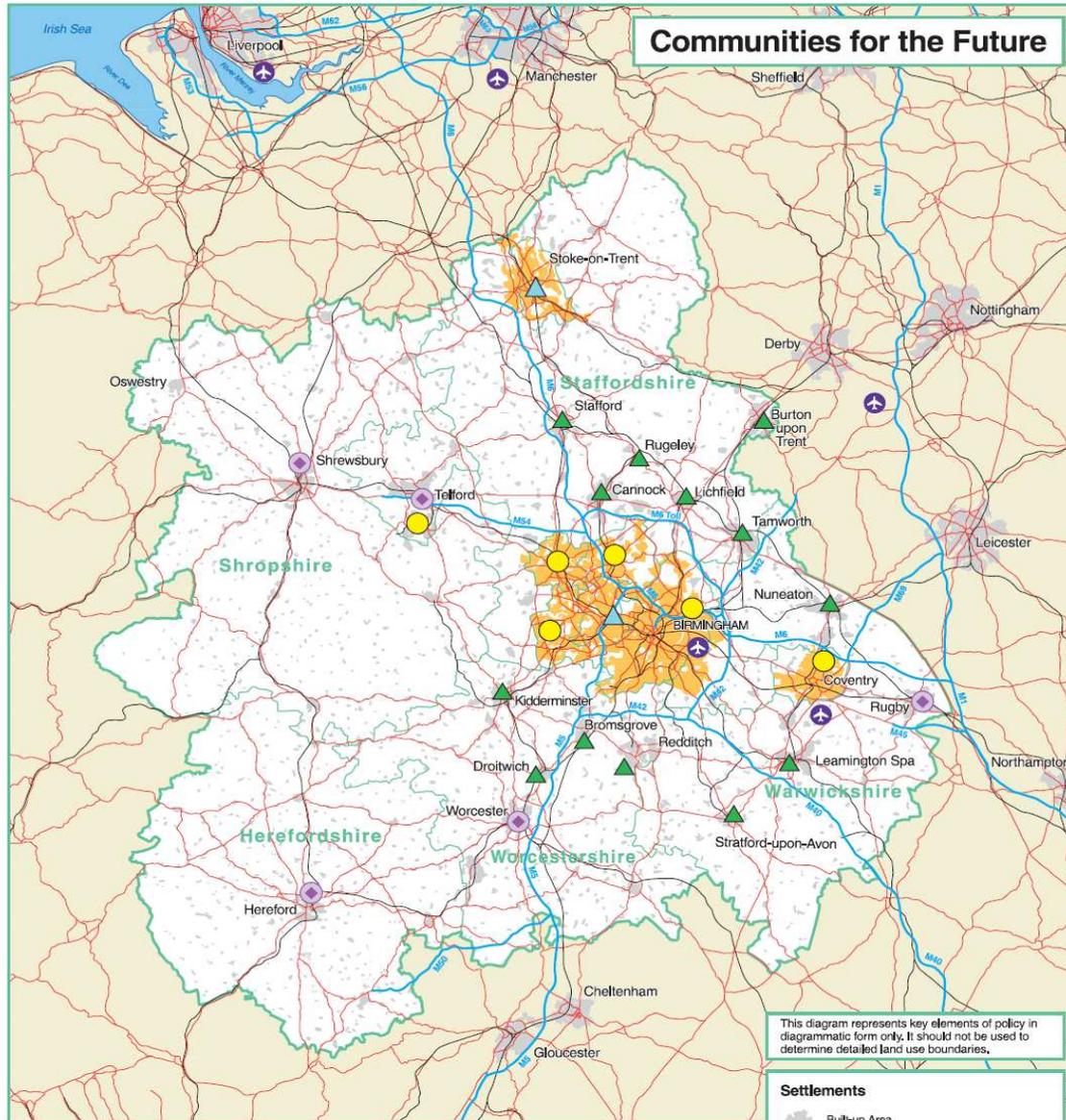
## **3. Evidence for planning cooperation**

Although both RSS’s mention the importance of cooperation with each other in regards to transport, there are no references to flood risk cooperation. Stuart Macfadzean confirms that there was no flood risk cooperation with other regions sharing the Severn catchment. The West Midlands RSS also does not mention any attempts at flood risk orientated cooperation.

#### **4. RSS Strategy in relation to the Areas of significant flood risk in Severn catchment (West Midlands)**

The West Midlands RSS is currently only in phase 1, which has primary relevance to the Black Country. As the Black Country does not lie in the Severn catchment, it cannot contribute to our analysis. However, general information is also provided about where development will be focused throughout the region as shown in the map below. There are various areas which have been designated areas of growth although they are not considered to be urban areas (referred to as Major Urban Areas (MUAs) in the RSS). Of the four settlements which have been designated for future growth, two are in the Severn catchment and have been previously noted to experience significant levels of flood risk: Worcester and Shrewsbury (See Figure 9). Considering that neither Worcester or Shrewsbury are considered to be urban areas by the West Midlands RA, the designation of these areas as areas of growth is an active attempt at encouraging urbanisation in these areas. Considering that these areas are known flood risk hotspots, the RSS can be considered to have disregarded the information produced in the WM RFRA.

**Figure 9 - General picture of the future development in the West Midlands region**



Based on Ordnance Survey mapping with permission of Ordnance Survey and West Midlands Local Government Association.  
 © Crown Copyright. All rights reserved Licence Number: 100018986.2007  
 Cartography by PCW based on mapping provided by jdt MapInfo GIS

Source: West Midlands Regional Assembly, 2008:50

#### **4. RSS Strategy in relation to the Areas of significant flood risk in Severn catchment (South West)**

Spatial strategy aims to be as sustainable as possible by ensuring that development is concentrated in towns and cities. This is mainly aimed at reducing unnecessary commuting and relative self-sustaining growth of towns and cities. The South West RSS implements this by assigning 'Strategically Significant Cities and Towns' (SSCTs), which are broadly chosen by their spatial locations within the region and the existing potential for growth that currently exists within them (SWRA, 2006:43). Gloucester has been designated an SSCT. Gloucester has been allocated a housing provision of 575 houses/yr whilst Tewkesbury has been allocated a provision of 525/yr, the two largest housing allocations in the northern part of the South West region. The Gloucester and Tewkesbury populations were two of the largest in the Gloucestershire region, having experienced increases of 7.1% and 10.9% respectively, two of the largest increases found in Gloucestershire County (Gloucestershire County Council, 2005). As such the relatively large level of housing allocation in comparison to the rest of the district can be considered to represent the anticipation of future trends from the existing economic situation.

SW RSS policy SR10 also expects these districts to maximize the usage of previously used land (SWRA, 2006:78). However, redeveloped land is often the land most exposed to flood risk (Kate Mayes, EA). When considering EA flood maps of the two regions, we find that the majority of flood risk exists in the urban central area of Gloucester and Tewkesbury. As such, such housing allocations will need to be shifted away from such areas at local levels. Whilst this seems possible at Gloucester due to the large urban area, in Tewkesbury this is hardly likely. It seems that the planning strategy outcomes in the Severn catchment have not really paid a great deal of attention to the flooding situation in two of the settlements with greatest flood risk. This may have been because of the lack of requirement for an RFRA at the time of RFRA production.

## 6.1 Conclusions of Regional Level Flood Risk Accounting

We have been able to scrutinize two regions within the same catchment to find how effectively they account for flood risk. Looking at the Severn catchment is important as it has a high level of residual flood risk. Planners in both regions did not innovate to improve the rudimentary methodologies advocated by policy by considering the catchment aspect of flood risk (although this is hardly surprising). We have found that in both regions, flood risk information is hidden. In the West Midlands, RFRA methodologies did not give an accurate understanding of flood risk. In the Severn catchment, the post-RSS RFRA attempted to justify its spatial allocations by claiming there was a lack of information. Although not clearly apparent in the West Midlands, it seems that both of these approaches were underlined by regional economic goals. These implementation outcomes demonstrate that PPS25 and its accompanying best practice guide does not force economically minded regional planners to consider flood risk adequately. This is crucial at regional level as RSS creation mandates economic and housing targets to lower levels for 15-20 years depending on the catchment.

<b>Criteria for policy Analysis</b>	<b>West Midlands</b>	<b>South West</b>
Level of Discretion in RFRA methodology	High	High
Whether size and orientation of catchment considered in RFRA	Described, not used in analysis	No
Impulse for economic development	Difficult to comment	High
Any evidence of interregional cooperation	no	No
RSS outcomes	Significant growth planned in two flood risk area: Shrewsbury, Worcester	Significant growth planned in two flood risk area: Gloucester and Tewkesbury

## 7.0 Objective 3 - Implications of regional spatial strategies

Planning implementation under the new planning system is yet to take place in the Severn Catchment. No local level development plans or accompanying SFRA's have been produced. However, as development plans are non-statutory, they will not necessarily accurately state where development will be planned. On the other hand, development control must follow national policy. PPS25 states that development should be moved to areas of lowest flood risk within the locality using the 'Sequential Test' (ODPM, 2006a). As such, by using the regional spatial allocation and this development control principle, we can broadly predict where development will be placed. This section only considers the settlements which have been delegated growth: Shrewsbury, Worcester, Tewkesbury and Gloucester.

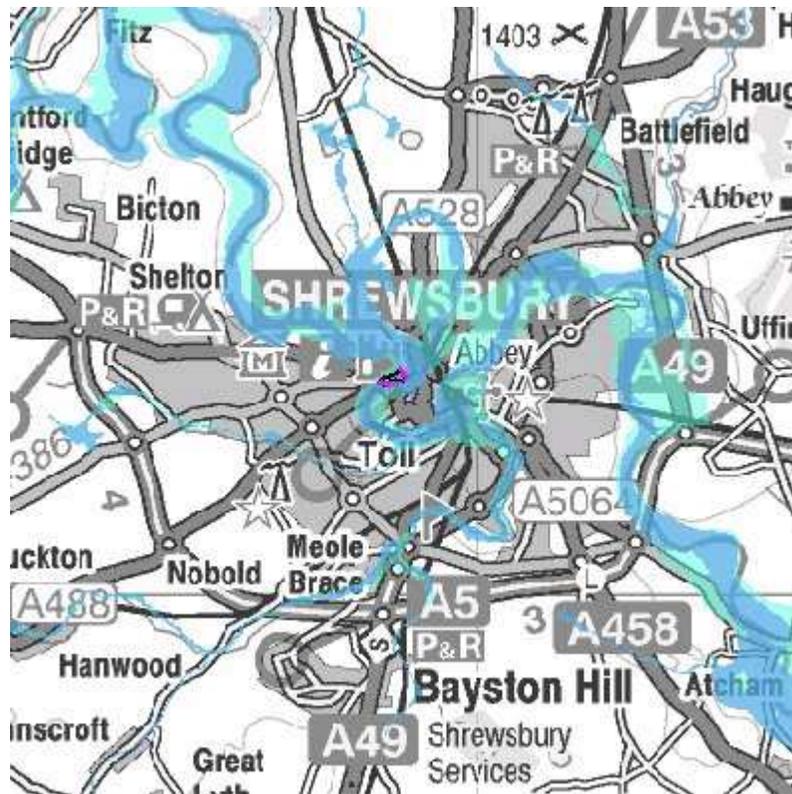
In order to evaluate predicted flood risk outcomes, a series of indicators will be used to evaluate flood risk:

- Population
- Other urban growth factors
- Percentage of urban at flood risk (EA Zone 2)
- Level of defences
- Flatness of terrain
- Number of significant growth settlements upstream in catchment

Finding the population will give us an indication of city size. Thus in the case that housing future figures exist, we can roughly evaluate how quickly the settlement is mandated to grow. Other urban growth factors aim to find if there are any other key information factors that can aid our estimation of future settlement growth. Percentage of current urban area at flood risk will give us an estimation of how easily such proposed development can be incorporated without adding flood risk. Level of defences available shows the capacity that the town has to deal with increased flood risk. The flatness of terrain shows how elastic the flood zones are with climate change. As increased climate change is likely to increase peak flows, it will increase the areas susceptible to flooding. In flat areas, the change is likely to be the greatest. The number of settlements which will experience significant growth upstream will also increase the peak flows thus increasing the gravity of flooding situations.

## 7.1 Shrewsbury

Figure 10 – Flood map of Shrewsbury



### KEY

- - Extent of flood
- - Flood defences

Source: Environment Agency, 2008

Shrewsbury had a population of 96,000 in 2001 (National Statistics Bureau, 2001). Shrewsbury is expected to grow significantly over the next 20 years (exact housing figures are unavailable) (WMRA, 2008). The fact that it is the only large settlement connecting up other local villages will buttress this growth. Shrewsbury has some flood defences, but not all that are required to offer it full protection (WMRA, 2007). It has a relatively large 30% of its city area which is at risk of flooding (estimation from flood risk map). It lies on very flat ground (Severn Scoping Report, 2002). There are no significant settlements higher up in the catchment

## 7.2 Worcester

**Figure 11 – Flood Map of Worcester**



**KEY**

- - Extent of flood
- - Flood defences

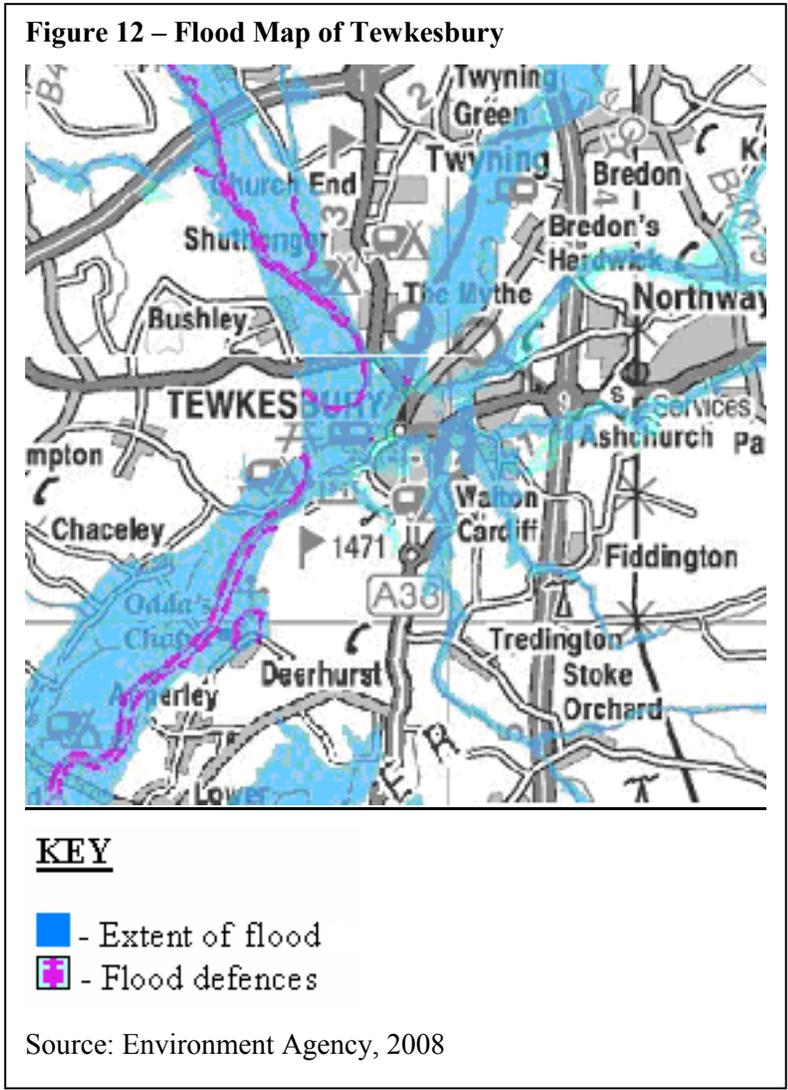
Source: Environment Agency, 2008

Worcester has been designated a strategic growth point within the West Midlands region. As for Shrewsbury, the lack of specific figures reduces our ability to comment on the region. Worcester had a population of 93,400 in 2001, thus it is also a fairly large city (National Statistics, 2001). Being the only city in the southern part of the West Midlands regions, we can expect that it is likely to experience significant growth.

However, we can see that the level of urban area affected by flooding is relatively low (10-15%). This fact, alongside the sequential test prescribed by PPS25 for development control can allow us to assume that development can be accommodated without increasing flood risk to future development.

At this point, the terrain is relatively sloped and runs between deep banks (Severn Scoping Report, p12). This is also evident from the relatively narrow flood risk area. As such, despite possible future changes in climate, we can expect that current flood zoning is likely to be insignificant. The fact that Shrewsbury will experience significant growth suggests that peak flows may be increased.

### 7.3 Tewkesbury

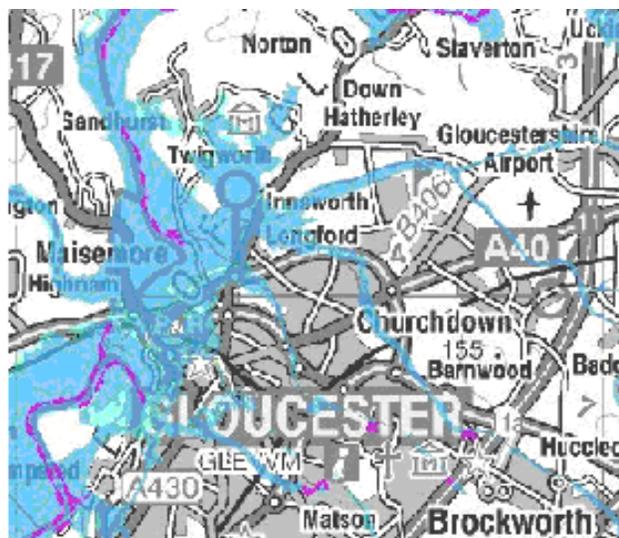


The population in Tewkesbury in 2005 was 78,400. As such it is a relatively small town. However, its designated 525 houses/yr is relatively large for its size. The relatively large delegation is derived from the fact that Gloucester City Centre which had a population of 111,00 was delegated 575 houses a year, a mere 50 houses more. This suggests urban growth inevitable. The fact that the majority of urban area at flood risk zone 2, makes urban area growth even more likely (due to the sequential test advocated by PPS25. Tewkesbury’s defences are completely topped up (Rex Thomas, EA). However considering the flatness of terrain (it is mostly flood plain), climate change is likely to make a significant increase in the size of the flood zones. The fact that there are two major settlements which will

experience significant growth means that peak-flows are bound to increase more thus affecting flood risk future development and effectiveness of flood defences.

## 7.4 Gloucester

**Figure 13 – Flood Map of Gloucester**



**KEY**

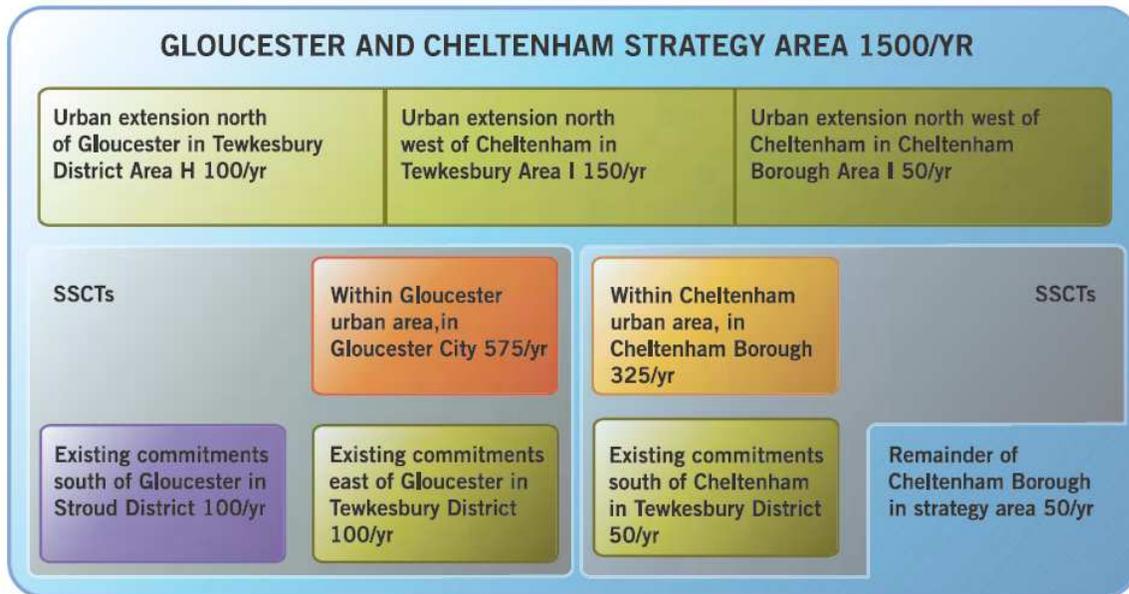
- Extent of flood
- Flood defences

Source: Environment Agency, 2008

The population of Gloucester was 113,000 in 2005, thus a significantly sized city. It has been designated a Strategically Significant City or Town (SSCT) in the SW RSS, thus will experience considerable growth. Around 20% of the urban area is affected by flood risk. However defences are topped to maximum level. Although it can cope with its 575 houses/yr delegation within its city centre, it has also been delegated an extra 100houses/yr in urban extensions towards Tewkesbury. As the river between Tewkesbury and Gloucester has flood defences, this may not be so bad under current circumstances. However, as it is very flat, climate change may affect how well flood defences work in the area. Additionally, being downstream of four growing settlements will mean that flood risk is bound to increase over

time due to increased peak flows. This will also affect how affective flood defences in central Gloucester will work.

**Figure 14 – Illustration of urban housing allocations in and around Gloucester**



Source: South West Regional Assembly, 2006:81

**Table 3 – Summary of indicator assessment results**

<b>Flood Risk indicators</b>	<b>Shrewsbury</b>	<b>Worcester</b>	<b>Tewkesbury</b>	<b>Gloucester</b>
Population	96,000	93,000	78,000	113,000
Other urban growth factors	Designated growth area,	Designated growth area,  Growth pressure from Tewkesbury	525 houses/year  Gloucester has urban ext towards Tewksbury	Urban ext – 100 houses/yr
% urban area at flood risk	30%	10-15%	70%	20%
Level of defenses	Some	None	Topped up	Topped up
Flatness of terrain	Very flat	Not flat	Very flat	Flat
No. of settlements growing upstream	0	1	2	3

## **7.5 Conclusions of flood risk implications of strategy**

By considering the Severn catchment, we have considered two planning regions in England, both of which have flooding hotspots. By scrutinizing implementations, we can make judgments about how effective national policy is at practicing PFRM. As C&V have commented, the vague language in the national policy has allowed planners much discretion in interpreting policy (Cullingworth & Vince, 2006). This discretion effectively gives the planners choice over planning direction, thus they are allowed to interpret public interest. In order to pursue their goals, flood risk is often blatantly ignored. This was clear in the South West RFRA which was created after the SW RSS and did not even consider Tewkesbury as a settlement of significant flooding interest despite it lying at the confluence of two rivers, being a settlement which frequently floods, and was assigned a significant 525 houses/yr development strategy. Thus, in the Severn catchment, regional planners have been able to cover up true flood risk effects in order to continue their commitment to future economic growth.

From this chapter, it is clear that flood risk is likely to increase in all of the settlements of the catchment. The settlements which are reserved for growth which are likely to experience the biggest increases are Shrewsbury, Tewkesbury and Gloucester. Whilst this gives us a good idea of how flood risk is likely to change in the catchment, it is impossible to separate whether these change are results of unsustainable planning strategy. The next section aims to find this.

## **8.0 Objective 4 - Sustainability of Planning Outcomes**

It is difficult to define sustainability of planning outcomes for a number of reasons;

- The outcomes of future policy are not quantifiable thus easily comparable
- It is impossible to compare them with other planning outcomes (as none other exist)
- Sustainability of FRM is linked with many other sustainability aspects which are difficult to deduce before implementation, including:
  - Micro economic sustainability (of settlements)
  - Macro economic sustainability (of regions)
  - Microsocial factors (of settlements)
  - Macrosocial factors (of regions)
  - Micro-Environmental factors (biodiversity hotspots)
  - Macro-environmental factors ( e.g. carbon emissions)

Finding these outcomes is beyond the scope of my paper, as they require much time and many more resources. This makes the analysis of planning outcomes difficult – a point which was not envisaged when carrying out analysis.

One method in conducting such analysis is to consider the sustainability criteria used within planning. planning outcomes in the U.K. Planning at regional level requires Sustainability Appraisals (SA). These SAs are commissioned in Planning Policy 11 to inform the RSS process whilst it is being created, thus allowing for sustainability to be included into the process (OPDM, 2004a). Whilst the SA for the West Midlands RSS is yet to be created (as the final RSS has not been created yet), the SA for the South West RSS has been created. Flooding is shown to increase in many of the major cities and towns of the South West Region, however, flooding has not been considered an overarching issue with the plan (SWRA, 2006b). This discretionary consideration of flooding is in fact perpetuated by PPS 11, which does not consider to what levels component aspects such as flood risk should be considered in the SA. The Royal Town Planning Institute also made reference to this ambiguity when the PPS25, policy for development and flood risk was first published and was undergoing consultation (RTPI, 2006). As such, using the sustainability assessment methodology advocated by the planning system is unlikely to reveal much, rather being a tool for planning justification, particularly in relation to flood risk.

Despite difficulties with the assessment of planning outcomes, we can make qualitative judgements about the sustainability effects of the most significant settlements. Such a qualitative judgement requires an understanding of local flood risk factors including geography, predicted population change (from RSS data) and other flood risk relevant information specific to localities.

All areas at flood risk which are not to experience significant growth are likely to experience negative socio-economic effects of the planning strategies produced. These include: Ironbridge, Bewdley, and Upton-upon-Severn.

Shrewsbury has had flood defences recently installed, although these have not apparently been completed (WMRA, 2007). As such, if the defences are created, Shrewsbury is likely to be safer for society (thus more social sustainable). The fact that defences have already been created means that it is also relatively economically sustainable (in terms of flooding). This is because defences which serve more people are likely make the cost more justifiable. As the local area is accustomed to flooding, the local environments,

e.g. wetlands and river banks, will be accustomed to the level of flooding it will receive. The creation of flood defences may increase localised flooding in river bank environments; however, it is difficult to make such conclusions. However, the implication of urban area growth (which is highly likely to happen over the RSS twenty year strategy period) means that it will have significant effects on other downstream settlements, particularly the flatter settlements, e.g. Tewksbury and Gloucester. This is due to the decrease in water storage space that extended urban development will produce, thus increasing peak flows at times of flood (Environment Agency, 2002). As such, the wider sustainability effects in relation to flooding are likely to be low.

Worcester is located on relatively sloped terrain and the Severn has deep banks at this point (Severn Scoping report). Also, the area of urban area at risk of flood risk means that further urban development can be reasonably accommodated without the need for extra defences or flood structures. As such, urban development in this area can be socially and economically sustainable. Increased flows from Shrewsbury may affect river bank environments negatively depending on their ability to cope with increased water levels.

Tewkesbury has been delegated a relatively large level of annual development over the next twenty years, despite its small size. Considering the level of residual flood risk that exists in the local area, despite the high levels of defences, increased peak-flows from two settlements upstream and changes in climate are likely to increase the residual area at flood risk. In the case the defences are over-topped, the potential economic, environmental and social effects could be disastrous. As the majority of land in Tewkesbury is located in Flood zone 2 and urban area of Tewkesbury is relatively small, it is likely that the town will experience urban growth. This will increase waters downstream.

Whilst Gloucester's urban area will be affected by flooding from the settlements upstream. Considering its flat topography, it will increase the area of land susceptible to flooding, particularly with predicted climate change. However, the housing allocations can be accommodated in non-flooding areas due to its relative urban size. On the other hand, the urban extensions that Gloucester (towards Tewkesbury) has been delegated will put these new developments at flood risk. It will also decrease the ability for floodwater to be accommodated in Gloucester during a flood (by taking up water space).

It is apparent due to the size of these settlements, that these urban areas are likely to experience social and economic growth despite planning outcomes. As such it is difficult to evaluate how sustainable these outcomes are. However, where development encouraged by planning strategy, beyond its requirements, then a qualitative judgement can be made. This is particularly true in the urban extensions advocated for Gloucester towards Tewkesbury. These extensions will reduce the amount of free land to absorb floodwater, and could potentially put these new developments at risk. As such, from this rudimentary sustainability analysis, it seems that the urban extension north of Gloucester towards Tewkesbury is a relatively unsustainable outcome of the spatial strategy.

The sustainability of planning strategy can also be deduced by the level of process that it has undergone. In the case of flood risk management, this can be deduced from the how effectively flood risk management has been taken into account at all necessary levels. Hence for sustainable flood risk management through the planning system, then flood risk management should be taken at regional and local levels. As flood risk management has not adequately been taken into account at regional levels, at which point economic and developmental allocations are delegated to local level, flood risk management through the planning system can be considered to be unsustainable.

## **8.1 Discussions**

It is difficult to evaluate the sustainability of flood risk management when implementation of outcomes is yet to be implemented. However, in objective 1 we found that planning policy offers very little and vague advice about the inclusion of flood risk accounting into the creation of planning strategy. When assessing implementation in the Severn catchment, we also found the vagueness of flood risk accounting in policy has allowed regional level planners to consider flood risk at their own discretion. Although it is difficult to find how sustainable planning strategy outcomes are, from evaluation, it seems that the South West has advocated one aspect of planning strategy that is likely to have avoidable negative flood risk outcomes (urban extension of Gloucester towards Tewkesbury). This unsustainable outcome can be considered to have arisen from unsustainable flood risk accounting at regional levels – the lack of flood assessment in an appropriate manner at regional level. It was difficult to evaluate whether the planning outcomes in the West Midlands region were unsustainable because of the lack of concrete housing figures, thus ability to estimate future growth.

This planning outcome thus begs us to wonder about the role of policy in sustainable PFRM. The planning system has historically been regarded as a sector which has the ability to drive the economy. The continued overarching importance of the economy in planning has been demonstrated by the commissioning and results of the Barker report. The Barker report concludes that in order for England to stay competitive within the global economy, the planning system needs to take a 'positive planning approach' and make the planning response more time efficient (Barker, 2004).

The UK's historical and philosophical roots in land conservation mean that development bans in designated areas have been the sole base through which environmental problems and issues were dealt with, e.g. green belts, Areas of Outstanding Natural Beauty (AONB), National Parks, etc. The fact the flooding is considered an environmental issue which is often considered most problematic due to its effects on society and economy mean that it is an environmental issue that cannot traditionally be dealt with in this way. Holistic flood risk management can not be dealt with by conserving a piece of land, it requires for the consideration of the whole catchment. Considering that flooding often takes place in larger catchments means that conservational management, unless it is strategically resulting from consideration of the entire catchment is even less probable.

In the Severn catchment, it has become apparent that urban areas designated for growth over the next twenty years have included areas which experience significant flooding. Areas which are now susceptible to flooding have often been historically early developing towns founded on the basis of their proximate access to water. Increasing development both upstream, and in these settlements have gradually increased the prevalence of flooding. This has been done in three ways, through surface run off, which increases peak flows, through urban foundations taking water storage space (thus increasing peak-flows) and through development which blocks water paths (thus increasing water levels upstream) (Environment Agency, 2002). As such, the potential disastrous flooding situations that exist today have been created over large periods of time. The nature of the economy means that reducing development in such areas due to flood risk can not be considered sustainable. Tewkesbury, consisting almost entirely of land with flood risk would result in areas of deprivation and out migration. Other settlements with less flood risk prone areas would still require growth but must grow in directions which do not put themselves or development around them at risk, or increase flood risk for the future. As such, this may indicate why local level flood risk consideration is much more rigorous than at regional levels. The difference in emphasis between regional and local level planning is apparent from the fact that PPS25 spends only a paragraph explaining RFRA's, whilst goes into

depth with the explanations of local level development control through the ‘sequential test’ and the ‘exception test’ (over two pages).

Regional performance indicators include ‘sustainability indicators’ which encompass a general impetus towards sustainability, as such although flood risk will be considered, it will be considered alongside other aspects such as reduction in need for travel, reduction in carbon emissions, etc.). This can marginalize the consideration of flood risk if it is not taken into account in a way appropriate to the region. Hence precautionary flood risk management is unlikely to happen at the regional level, when its economic and developmental targets have been set, but at local level which attempts to deal with such development in the most flood sustainable way (allocation in lowest flood risk areas). This is also buttressed by the increased level of powers given to the EA, when considering development control decisions (Kate Mayes, EA). This increased level of power means that if local authorities (who make final planning decisions) choose to disregard flood risk advice given by local EA offices, then the LPA’s are obliged to send their decisions and justifications to the Secretary of State. Although the SoS is unlikely to intervene, it puts added nation emphasis on local level flood risk mitigation.

The lack of consideration of flood risk at regional levels is likely to increase the requirement for technical flood risk solutions. Flood defences are very expensive and thus could lead to economically unsustainable flood risk mitigation (depending on the number of people that these defenses protect). This is likely to increase strain on conservational areas, as it will shift larger volumes of water to such areas in order to protect society. The increased reliance on flood defences means that rather than shifting to the catchment-based flood risk approach advocated by the EU, flood risk is likely to be considered in the locally specific flood risk paradigm.

Planning requires much decision-making to be made on behalf of the people it serves. The fact that the new planning reforms have allowed for the majority of planning allocations to happen at regional levels (as supposed to local levels) means that outcomes are likely to be much more authoritative (RSPB, 2007a). Although procedures have been introduced to ensure that the public have a say in such matters, the level of understanding required to comprehend planning from a regional perspective is likely to lose most of the general public. However, this regional level planning is required in order to make decisions from an appropriate scale. As such, sustainable planning requires an immense understanding of its areas of jurisdiction in order to make sustainable informed decision in the interest of the public. The fact the

regional planning has only been formally integrated from 2004, means that they are unlikely to have the expertise to understand the nature of their regions, particularly when it concerns flood risk. This is because planners for the regional level are likely to have been sourced from local levels thus maybe having expertise of certain locale, not of the entire region (Stuart Macfadzean, EA). This indicates that planners may not have the expertise to deal with flood risk at regional levels. Whilst the delegation of flood risk-based duties to Environment Agency Regional Offices would solve such problems, this would dramatically reduce the discretion or freedom for planners to make decisions on behalf of the public, particularly in relation to the economy. It is therefore vital for regional planners to fully understand the implications of flood risk, its catchment-based nature and the importance for planning communication, cooperation and coordination throughout the catchment, irrespective of planning boundaries. Due to the largely passive roles that implementers take, this effectively requires policy to advocate the proper consideration of flood risk, whilst still allowing discretion when most needed. The English planning framework is flexible and allows planners at the point of implementation to cherry pick national planning policies according to what is needed in localities (Cullingworth & Vince, 2006). As such, the provision of more accurate and comprehensive flood risk accounting at regional strategies would ensure the flood risk is accounted for properly, but also would allow for discretion, according to local socioeconomic and environmental needs.

The lack of consideration of flood risk at planning stages is having repercussions which may affect future negligent consideration of flood risk. The Association of British Insurers (ABI) has become increasingly vocal about the way that flood risk costs are being expected to be absorbed by insurers (ABI, 2004). Despite negotiations with the UK Government, these costs are increasingly being transferred to customers, thus dissuading them from considering house purchase in flood risk areas (Rex Thomas, EA). Insurance companies are requiring yearly top-ups of £10,000 in certain flood zones for flood risk cover in Tewkesbury (Rex Thomas, EA). The dramatic effect that insurance price can have on housing demand means that flood risk may dissuading settlement growth post-planning. In Tewkesbury, many people are already finding it to sell their houses after the 2007 Gloucestershire floods. The housing market will thus work as a mechanism that contributes to precautionary flood risk management through planning strategy, despite its lack of consideration in planning. Although planners could considering flood risk through planning policy, the consideration of the prices of flood risk insurance would also give a good indication of levels of flood risk in local settlements and thus help consider planning in local settlements in a more sustainable and flood risk considerate manner. The risk of not considering flood risk through policy or through its effects on the housing market could lead to disenchantment of planning and lead to highly unsustainable outcomes.

## **9.0 Conclusions**

This paper has found that national policy does not advocate for regional planners to consider flood risk in a rigorous manner. From implementation in two regions of the Severn catchment, it has also found that regional level planners have disregarded and often hidden flood risk. Through regional spatial strategy analysis, it seems that this lack of consideration is in the aim of pursuing economic goals. It is difficult to evaluate the sustainability of planning outcomes, due to the amount of scenario work require, but by deducing where growth is not needed and finding the flood risk implications of these aspects of strategy, it seems that the delegation of urban extensions between Gloucester and Tewkesbury will unnecessarily increase flood risk in Gloucester and new developments placed in this area. National flood risk planning policies should advocate the proper considerations of flood risk in order to inform regional strategies. Regional planners should also be trained in understand flood risk implications properly when considering planning strategy options. This can also be done through inspections of the price of flood risk insurance on the housing market.

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