

Appendix 1

The organisation of surface water management and its relationship to flood risk and spatial planning.

A broad review of France, Germany, Scotland and England.

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Introduction

In France, Germany, Scotland and England, the control of surface water lies within what can broadly be described as a *water resource management* framework, which may encompass conservation and enhancement of the aquatic environment, ecology and nature conservation, water supply, water quantity, water quality, sewage and surface water collection, treatment and disposal. Whilst these frameworks have evolved in more recent years to bring water resource management in line with the EU Water Framework Directive and the principles of river basin management, the current approach to water resource management taken by each country can be differentiated.

The purpose of this report is to provide a broad, comparative review of the institutional and administrative arrangements for the management of surface water in all four countries. In particular, it examines:

- (a) the organisation of surface water drainage and sewerage responsibilities amongst public or private agencies; and
- (b) the administration of surface water drainage and sewerage functions, processes or systems undertaken by public or private agencies.

In addition, it notes some of the broad linkages between surface water management systems and those of spatial planning and flood risk management, where relevant. Indeed, it is clear that flood risk and surface water management systems have traditionally been divided in all four countries. However, there has been a growing realisation across Europe as a whole of the interdependent relationship between

activities in all three of these sectors. As such, it is not surprising that some overlap exists within the organisational and administrative arrangements of each country and therefore, appropriate contextual reference is made to both flood risk management and spatial planning in this report. It should be noted, however, that the principal focus is on the management of surface water or 'water resources'.

France

A focus on managing water, as opposed to regulating water, has been in place since 1959, when a Water Commission was created to develop principles for the reorganisation of the water management system. The Commission reported, *inter alia*, the need to consider water in a river basin as a single resource, so that long term water management must cater for the needs of all users of the river basin as a whole. In other words, it promoted integrated water management, which ultimately led to the creation of France's first water-orientated legislation in the Water Act 1964.

The administrative hierarchy for water resource management hinges on the division of France's domestic mainland water resources into six major river basins, which were defined by the Water Act 1964 (adopted in 1968) and were intended to integrate the management of water as a single resource. Each basin is governed by a Basin Committee; an assembly of around 100 non-elected representatives from the local community, state, professional and industry stakeholder arenas. The primary responsibility of the Committee is to develop water resource management policies and to set (through a system of voting) tax rates and subsidies to be applied to the various stakeholders - users and service providers - within the basin (Piégay *et al.*, 2002).

Each Basin Committee is served by a Water Agency, an administrative body responsible for implementing the policies set by its relevant Committee. This is achieved by collecting taxes from, and distributing subsidies to, the various stakeholders operating within its respective basin. The Water Agencies also undertake basin studies, monitor water quality and quantity, coordinate local water management activities, allocate funds between local municipalities within the catchment and finance conservation programs (Laster, 2000, Enaboulsi, 2001).

France operates a decentralised system of water governance and as such, it is on the local level of public authority that water services are provided. However, it should be noted that statutory responsibilities within the water sector as a whole are divided amongst many different authorities or agencies, operating at different geographic levels and differentiated by the nature of the water resource they govern, the nature of its use and the nature of intervention (Elnaboulsi, 2001). The French territory is divided into 36,700 local municipal authorities, or *communes*, which operate under the supervision of the Minister for the Interior. The mayors of the communes are responsible for providing the various water services – supply, sewerage and surface water drainage. The mayors enjoy a certain element of freedom in that they can elect to provide water services themselves, join forces with several other communes to pool resources and provide water services on a collective basis, or they can contract water service provision to private firms, a process known as delegation. There are approximately 15,500 ‘water and waste water utilities’ (Elnaboulsi, 2001, p.510), comprising either single communes or intercommunal groups. Of these, only 37% have elected to manage the water services themselves, with the remainder having delegated the responsibility to private firms. Two types of delegation contract exist: the lease contract (*affermage*) lasts 10-15 years with the municipality retaining financial responsibility for infrastructure; the concession contract lasts 20-30 years and the financial responsibility for infrastructure lies with the concessionaire. With both types of contract, the commune or intercommunal group sets water service tariffs and retains ownership of infrastructure.

Only three firms currently exist in what is considered a natural monopoly of an essentially privatised system of water service provision. The majority of the French population is served by private companies. In a country where the state plays a significant social and economic role, the system has been fraught with problems. This has principally been because of the absence of any legal and institutional frameworks to govern water services delegation; insufficient public funds and antiquated water service networks, the upgrade of which was prohibitively expensive, made delegation (privatisation) necessary in many cases, thereby exacerbating the problem. As such, eight new laws have been passed since 1990 to regulate delegation (Elnaboulsi, 2001).

Since the adoption of the Water Act 1964, various legislative refinements have been made, most notably with the Water Act 1992. This was significant in that it emphasised the need to protect water resources as an environmental concern by giving a *primary* legal requirement to conserve aquatic ecosystems, it promoted water resources as a national heritage asset, and it aimed to provide a water policy that would be ‘decentralised, consultative, collective and well-balanced reconciling the different uses of water whilst protecting the natural ecosystems’ (Piégay *et al.*, 2002, p.239). However, the most significant feature of the 1992 Act was the introduction of new procedures to implement water policy: the *Schéma Directeur d’Arménagement et de Gestion des Eaux* (SDAGE), a Masterplan for Water Development and Management, and the *Schéma d’Arménagement et de Gestion des Eaux* (SAGE), a Local Water Development and Management Plan.

The SDAGE operates on a regional level according to the boundaries of the basin (Piégay *et al.*, 2002). It ‘defines the general criteria for the use, development and qualitative and quantitative objectives for surface and ground water in the basin’ (Laster, 2000, p.439), spanning a 10-15 year period. It is developed and approved by the Basin Committee, through debate between users, polluters and government representatives, can be subject to periodic review and is implemented by the relevant Water Agency. As a minimum, each SDAGE must provide for domestic and European legal obligations. Indeed, the French Water Act of 2002 confirms that the SDAGE is to serve as the river basin management plan required under Article 13 of the Water Framework Directive (Bongaerts, 2002). The SDAGE also ‘takes account of State programmes in progress ... and defines the guidelines for the development of SAGES’ (Piégay *et al.*, 2002, p.245), which may include the identification of sub-basins. A key feature of the SDAGE is that it is binding on water service undertakers or administrative organisations operating within the field of water resource management, and these (e.g. local authorities, water utilities) must integrate the SDAGE into their decision-making processes. However, the SDAGE ‘is not binding on third parties and carries less weight outside the domain of water, notably in respect of town planning’ (Piégay *et al.*, 2002, p.245).

Given that the SDAGE is implemented by the Water Agencies, it is noteworthy that Camphuis (2007) considers that the Water Agencies ‘do not have any specific mission

pertaining to flooding' (p.485). However, depending on the typical characteristics of a basin, a SDAGE may cover a multitude of water-related objectives which are defined according to the hydrologic conditions and main land use features of the basin. As such, if flood risk emerges as a principal policy concern in one SDAGE, implementation of this policy concern is bestowed upon the relevant Water Agency. In terms of urban water management, for example, the Artois-Picardy SDAGE expresses the need to 'integrate water in the urban landscape'. This may indeed lead to measures that reduce flood risk, where for example, awareness of the presence of watercourses or drainage channels that may have been 'hidden'. More explicit is the Loire-Brittany SDAGE, which expresses the need to 'know how to live better with floods'. The Rhone-Mediterranean SDAGE programme created a number of constituent working groups to organize implementation of different themes within the SDAGE, one of which was focused on 'river management and risks of flooding'. Indeed, amongst the aims of this group was the need 'to define flood management at basin level' (Piegay et al, 2002, p.251) and technical reports have been produced to help local municipalities define and preserve the streamway and manage flood risk, riparian vegetation and channel sedimentation.

The SAGE operates on a local level and applies to the sub-basins identified in the relevant SDAGE. The sub-basins are essentially geographically distinct entities that are 'coherent from a climatic, hydrologic and land-use point of view' (Piégay *et al*, 2002, p.247). Preparation of a SAGE for each sub-basin is initiated either by a local authority, agency or collective, or by the basin committee. Initiation is usually done under the premise that current water management procedures need to be broadened to encompass aquatic conservation obligations or that a conflict currently exists between different users and decision-makers. Whilst the remit of the SAGE is to manage the water resource in terms of its use and supply (e.g surface water drainage, groundwater and sewerage), the relevance to flood risk can be seen in the SAGE for the River Calavon:

“One of the main reasons for the SAGE ... was a conflict between urban communities located downstream, which were liable to flooding (the town of Apt), and upstream rural communities seeking to regulate the river to protect themselves from flooding but with the effect of increasing flooding risk downstream”

(Piegay *et al.*, 2002, p.248)

A further possible motive to initiate the preparation of a SAGE may stem from the fact that the municipality is legally responsible for water services, even if they have been delegated and the mayor is personally liable for any damage due to negligence and is prohibited by law from insuring him or herself against this (although, with delegation, the mayor can offset his or her personal liability which may be transferred to the delegated firm) (Elnaboulsi, 2001).

Once initiated, the process of SAGE preparation (Box 1) begins with the definition of the boundaries of the SAGE and the appointment of a local water commission (CLE); elected representatives (50%), stakeholders (25%) and State administration (25%), who will draft the SAGE. The guidelines and objectives for the development of the SAGE are defined by the CLE through discussion, debate and exchange of knowledge and information. However, not all citizens concerned are allowed to participate. The CLE must also source the funding required to fulfill the objectives of the SAGE. The number of SAGES completed to date is not extensive, although progress is being made across France, as shown in Figure 1.

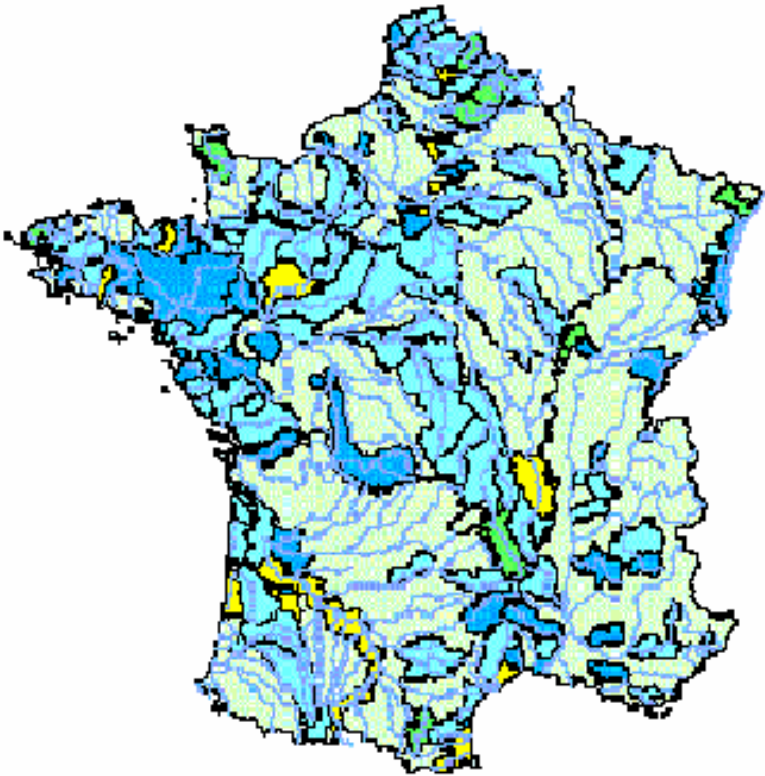
An important feature of the SAGE is that, unlike the SDAGE, it is legally binding on all third parties. In other words, 'all administrative decisions outside the domain of water resources have to take SAGE into account' (Piegay *et al.*, 202, p.248). This has significance in the realm of town and country planning, for example, where any land use, development or spatial plan that does not account for the SAGE in its policies will be subject to sanctions requiring revisions to the plan in order that it accurately reflects the objectives and requirements of the SAGE. It is here, therefore, that practical linkages may be found between water resource management, flood risk management and land use and development planning.

Box 1. Stages of SAGE development

- (1) Identify and report baseline conditions of river basin or sub-basin (to include ecosystem function, water uses, land use, socio-economic conditions, statutory obligations imposing on basin, stakeholder and decision-maker opinion)
- (2) Analyse compatibility of water and land uses with water resources (including ecosystems), taking account of stakeholders and decision-makers.
- (3) Identify trends and projects emerging from analysis and construct different management scenarios
- (4) Develop a strategy, determining key objectives and measures to implement them. The completed SAGE should identify:
 - Management guidelines for the project (such as regulatory measures)
 - Development guidelines and programming of amenities
- (5) Produce a management chart to monitor SAGE implementation

Adapted from: Piegay *et al.* (2002)

Figure 1. SAGE preparation in France



Phase of SAGE preparation	Number of SAGEs ^{*1}	
Initiation stage (Local initiation, constitution of preliminary dossier)	14	
Instruction (Local consultation and opinion of the basin committee on proposed boundaries)	10	
Development (Boundaries defined and CLE constituted)	76	
Implementation (SAGE developed and approved)	37	

Major Basin	Number of SAGES ^{*2}
Adour-Garonne	15
Artois-Picardie	15
Corse (La) (NB: not shown in map)	1
Loire-Bretagne	48
Réunion (Ile de la) (NB: not shown in map)	4
Rhin-Meuse	7
Rhône-Méditerranée	28
Seine-Normandie	27

1 Shaded boxes refer to shaded areas in Figure 1.

*2 Note that discrepancies in the totals between the number of sub-basins and the number of SAGES arise due to the collaboration of more than one sub-basin in some cases.

Source: International Office for Water (2007)

The new Water Act 2002 was brought to bear in response to the WFD, although the principles of basin-wide water resource management contained in the WFD have been applied in France since 1964. As such, the administrative framework for water resource management remained largely unchanged. However, certain refinements made by the Act have been instrumental in bringing about improvements. For example, SAGE preparation has been a long-winded, cumbersome process for most authorities or agencies: the Act sought to speed up the process to ensure WFD targets can be met.

The Act has also provided ‘a set of rules and amended rules with respect to the proper functioning of sewerage systems’ (Bongaerts, 2002, p.241). These rules clarify the rights and obligations of landowners, property owners and public and private organisations that have responsibilities pertaining to sewerage systems and connection to these systems. Of particular note is the inclusion of ‘so-called servitudes (i.e. rights of access or rights of trespassing) and the payment of compensations [sic] for benefits enjoyed or negative impacts suffered by affected parties’ (Bongaerts, 2002, p.241). Furthermore, the Act empowers regional and local governments to set up their own water management and/or risk prevention schemes, which *may* (emphasis added) include compensation payments for certain non-actions such as a decision not to construct a dike, the commissioning of preventative public works, expropriation of land by regional or local governments, recreational schemes, wetland creation and compensation payments for damages caused to private owners (Bongaerts, 2002). In terms of surface water drainage and/or sewerage, these legislative refinements can

only serve to manage or prevent flooding from sewers and/ or surface water drainage systems in practice, if fully implemented and enforced by the relevant local or regional authorities. In other words, water resource management is highly decentralised with local and regional authorities enjoying a certain amount of permissive or discretionary powers and as such, may not promote universal measures of, for example, damage limitation or non-action mitigation.

The management of riverine flood risk, on the otherhand, is founded on a wholly different set of principles. The Ministry of Ecology and Sustainable Development is responsible for developing regulations and national policies for flood prevention and protection in France. These are implemented by State agencies, acting under the authority of the Prefect of each of the 100 departments in France. Of particular note is that the Prefects 'are directly nominated representatives of the central government operating locally' (Pottier *et al.*, 2005, p.6). On a local level, the mayors of the communes are responsible for flood risk prevention within the boundaries of the commune. However, the only legal obligation to provide protection against flooding lies with riparian owners. In other words, riparian owners must protect themselves against flooding. It is noteworthy, however, that this responsibility must be implemented under state control (Camphuis, 2007). As such, unlike the decentralised system for water resource management described above, the system for managing flood risk is operated centrally, driven by 'regulation and compulsion' (Pottier *et al.*, 2005, p.8).

The approach to flood risk management in France revolves principally around the need to control encroachment of development into floodplain areas. For this, a distinct 'hazard specific' (Pottier *et al.*, 2005, p.5) planning system has been developed, which relates specifically to floodplain land and operates as a separate system to the usual land use and development planning processes applicable outside of floodplain areas. This regulation of development in the floodplain is achieved through the Flood Prévention Plan (Plan de Prevention des Risques d'Inondation) or PPRi, which was introduced in 1995 and defines prevention, protection and mitigation measures that should be undertaken in areas directly at risk of flooding where all new development is prohibited, and in areas not directly at risk of flooding but which may contribute to risk elsewhere as a result of new development (Camphuis, 2007). The PPRi is applied

at the level of commune, carries statutory weight and is enforceable against third parties, including spatial planning.

A requirement of central government is that the PPRi includes maps that delimit hazard zones (avalanches, earthquakes etc., as well as floods, are covered) on a sequential basis and impose land use restrictions and control measures. Such maps are formal documents with legal standing. One of the most significant features of the French approach to flood risk, is their respectful attitude towards the power of natural hazards. Consequently, non-structural preventative measures as a solution over the traditional methods of structural defence dominate the French system of flood risk management (Pottier *et al.*, 2005). However, that flood risk management relates solely to flooding as a *natural hazard* (emphasis added) highlights an important point. For example, insurance against flooding is based on the principles of ‘community risk-sharing’ whereby ‘any citizen who has contracted an insurance policy covering damage ... contributes to the “natural catastrophes” cover, whether or not they are concerned by these natural risks’ (Camphuis, 2007, p.487). However, Camphuis (2007) also points out that flooding has to be recognised as a natural catastrophe by Interdepartmental decree, before any damage can be covered by this system. This may, in effect, exclude localised flood damage as a result of sewer or stormwater drainage systems from cover. As such, the flood risk management system of France may have little influence on the management of surface water drainage and sewerage as a potential source of flooding, in practice.

Germany

Water resource management in Germany dates back to the Water Resource Management Act 1957 (WRMA), which was the only piece of legislation to impose any form of restriction on activities that may have an effect on water. This came in the form of a permit issued as a consent to carry out an activity that may have an effect on water. This related principally to maintaining potable water quality and ensuring adequate water supply and the relevant water authority was ‘entrusted with the decision to find the solution most effective for the optimal protection of water’ (Zöttl, 2000, p.283), so even if an applicant fulfilled the relevant legal obligations for a proposed activity, the water authority still has the right to refuse the permit. As such,

unlike France, Germany's focus has traditionally been on *regulating* water as opposed to *managing* it. Indeed, the regulation of water emerged in Germany as an entirely separate system to that of other environmental management systems, which may have reduced the scope for adopting an 'integrated' approach to water management.

As a consequence of the federal structure of the German government, water resource management is highly decentralised. The organisation and administration of water resource management varies considerably across the country. On a national level, the federal government prepares the *framework* (emphasis added) legislation for water management. Each of the 16 federal states (Länder) of Germany are then responsible for implementing the national legislation by means of their own water laws, regulations and policies, which provide the more detailed legislation and policies to manage water resources at regional, county and municipal levels within the individual Länd. The regulation of water services, therefore, has been predominantly under public control.

Amendments to water legislation during the 1980s and 1990s saw the organisation of water resource management in Germany undergo a number of changes and by the end of the 1990s, privatisation of water services was advancing. Water supply and drainage responsibilities were increasingly carried out by 'semi-autonomous municipal agencies (Eigenbetriebe) and private companies' (Kemp, 2001, p.254), with some Länder adopting 'the French model of long term management contracts' (Marshall, 1998, p.432). A small number of the municipalities also 'established sewerage associations (Abwasserzweckverbände), public law bodies that take care of the sewerage services (and sometime also of water supply) for a number of municipalities' (Kemp, 2001, p.255). Given that the regulation and management of water was undertaken within the same autonomous government that regulates and manages spatial planning practice, Marshall (1998) argues that the increasing privatisation of water services in Germany may have had detrimental consequences in that the 'private (often monopolistic) control of infrastructure may reduce the scope for Länd water regulation, and within that for the spatial planning dimension of such regulation' (p.432).

With such diversity of legislative and policy provisions for water resource management between the 16 Länder, a review of current practice on a national basis becomes somewhat challenging. In general terms, the Länder are responsible for the preparation of state-wide water framework plans - 'general plans assessing supply and demand within river catchments' that can be used to inform spatial planning processes (Marshall, 1998, p.430) and the municipalities are responsible for water distribution and waste water disposal via their public water companies. Whilst the specific responsibilities of this administrative arrangement can vary between different Länder, it should be noted that there are six professional, technical-scientific associations operating on a national basis in relation to achieving water resource management planning objectives (ATT *et al.*, 2005):

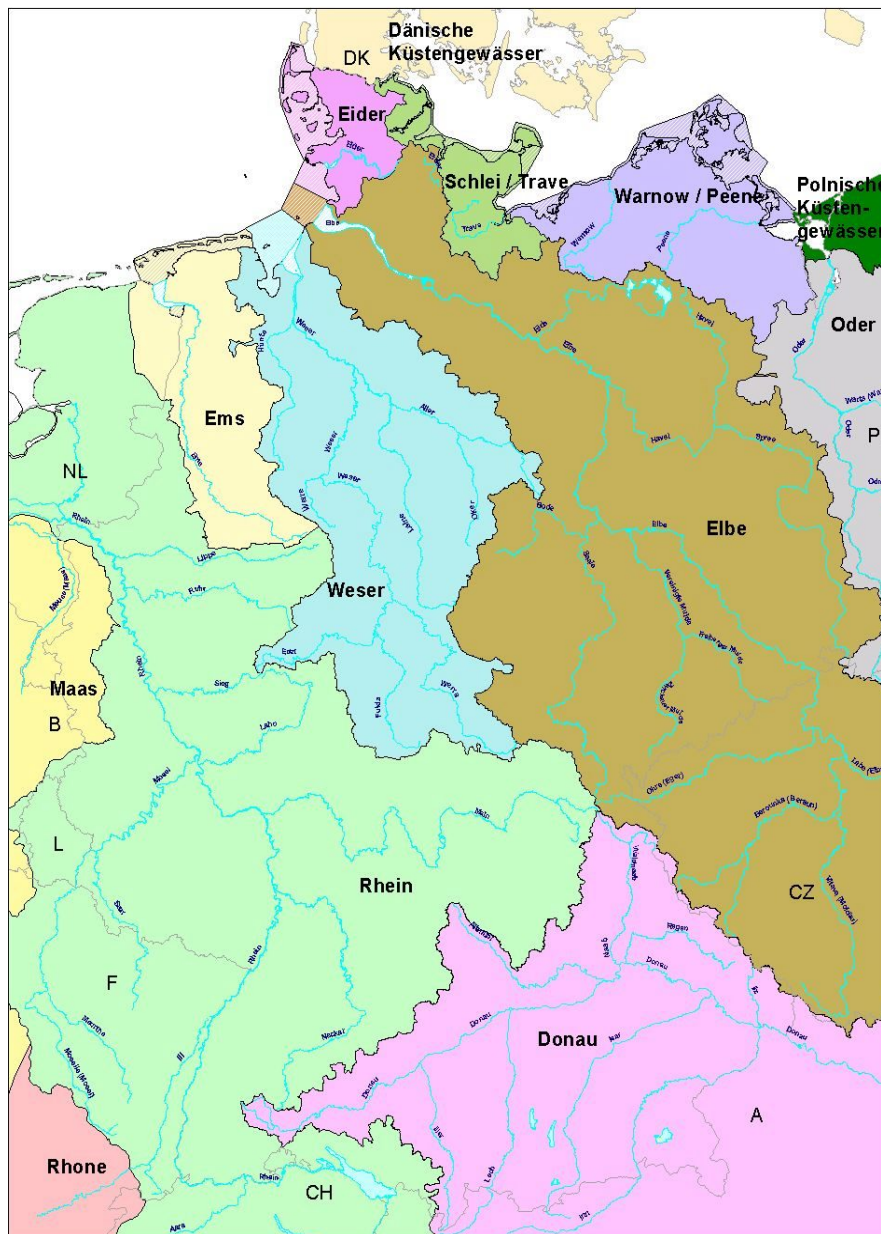
- Association of Drinking Water from Reservoirs (ATT)
- Federal Association of the German Gas and Water Industries (BVGW)
- German Alliance of Water Management Associations (DBVW)
- German Technical and Scientific Association for Gas and Water (DVGW)
- German Association for Water, Wastewater and Waste (DWA)
- Association of Municipal Utilities (VKU)

It is also possible to ascertain that, throughout Germany as a whole, the water resource management framework hinges on principles of environmental protection and enforcement by the Länder's water regulatory systems, which have 'direct binding effect on all public and private entities' (Marshall, 1998, p.432). This emphasis on environmental protection has certainly evolved in response to the WFD and the Federal Water Act (FWA) 2002, brought into force to implement the requirements of the WFD, requires the Länder to take account of basin-wide concerns by assigning the river basins within their regional boundaries to one of the 10 river basin districts (Figure 2): Danube, Rhine, Maas, Ems, Weser, Elbe, Eider, Oder, Schlei/Trave and Warnow/Peene. It is noteworthy, however, that unlike France the system of water resource management in Germany is operated on the basis of the Länder's administrative boundaries and not according to river basin or catchment boundaries.

Although the German system has been criticised in the past for failing to promote public participation in water resource management, stakeholder involvement is now

clearly high on the agenda. The Länder operate on a cooperative basis, enforced by the FWA 2002, which states that ‘coordination of the management of river basin districts shall be regulated by Länder law, in particular; coordination with other Länder....’ (Art.1b(2)). In practice, this ‘can be seen most prominently in the Länder Working Group on Water or Länderarbeitsgemeinschaft Wasser (LAWA), in which the State Ministries of Environment, as the highest water management authorities, organise cooperation among themselves and their common participation in the affairs of the European Union’ (Hansen *et al.*, undated). The LAWA may, for instance, develop guidelines and recommendations which, although not legally binding, enjoy a considerable amount of political weight in cooperative, voluntary agreements such as the LAWA recommendation for integrated flood management (Jedlitschka, 1998). Furthermore, the FWA 2002 states that river basin management must include ‘consultation of the competent Federal authorities within the context of coordination’ (Art.1b(2)).

Figure 2. River basin districts in the Federal Republic of Germany



Source: Federal Water Act 2002

Indeed, it is apparent that Germany's long term water management objectives are very much dependent on principles of user participation and local autonomy:

“water management associations can be formed by land owners, private enterprises, municipalities and public corporations for a wide variety of functions. Corresponding to local and regional needs, these associations can be small neighbourhood schemes in rural areas or cover a large territory..... the Länder have established the legal framework for associations to operate irrespective of any territorial boundaries that might otherwise hinder water management ...[and] for the

organisational structure of such associations. These operators of water infrastructure systems are not involved in the manufacturing or service sectors associated with the 'water industry' ”

(German National Committee of ICID, 2007)

The system of water management is evidently complicated. However, responsibility for the provision of public water supply and sewerage services ultimately lies at the local level, and municipalities are free to delegate this responsibility in various ways as described above. Currently, there are more than 1,200 water service providers. Although in some cases, the same utility provides water supply *and* sewerage services, approximately 6,000 utilities provide waste water disposal services alone. Whilst there has been a steady increase in delegation and privatisation of water service provision as a whole, wastewater disposal (or sanitation) is a 'sovereign undertaking' (ATT *et al.*, 2005, p.19) of the municipalities in Germany. Therefore, most of the municipalities provide sanitation directly through a municipal sanitation department and none of the 6,000 service providers are utilities under private law. However, municipalities or municipal utilities can delegate service provision to private companies through the use of operating contracts. Out of the 900 largest sanitation service providers, about 10 percent have signed such contracts for sewerage services (ATT *et al.*, 2005). Given that wastewater disposal is the responsibility of the public sector, it is important to note that there is no autonomous regulatory agency for water and sanitation at the state or federal level. Furthermore, tariffs for water services are approved by the state, usually the Ministry of Economy, once it has been independently reviewed by an auditor. In city-states, such as Hamburg and Berlin, a conflict of interest emerges therefore, whereby the Minister of the Economy, acting as the chairman of the board of the utility requests a tariff increase and also approves this request (ATT *et al.*, 2005).

The diversity of practice in water resource management between different Länder means that any reference to a specific system, process or policy in this review will not necessarily reflect practice on a national scale. Nevertheless, the use of certain, universal policy instruments are provided for by the FWA 2002. As stated previously, the key policy instrument for general water management is the state-wide water management framework plan, which must be prepared by all Länder. In addition, smaller scale water management plans may be produced. Whilst the latter tend to

focus on protecting the quality of water and may be produced under the auspices of, for example, effluent disposal plans and surface water body protection plans, they may also relate to drainage capacity and designate flood risk areas. The protectionist approach of Germany has led to the establishment of 'water protection zones' of various kinds under the FWA 2002. The zoning system is implemented by the Länd water and waste offices, with the aim of protecting surface and ground waters from harmful effects on quantity and quality, and it 'is increasingly being recognised as a model solution' (German National Committee of ICID, 2007, p.4). This may be due to the fact that it is well supported by Länder water legislation, which may prescribe specific activities and land uses that will or will not be permitted in the designated water protection zones. Importantly, the water protection zones have direct binding effect on all public and private entities, and property owners are obliged to tolerate any water protection measures that have been prescribed for the zones

Additionally, the water and waste offices also advise the Länd spatial planners on water protection zones and these may be extended to greater areas than those legally designated under the Länd water laws. The zones are transferred to the general map contained in the Länd's state-wide spatial plan (Ländes-Raumordnungsprogramme) (LROP), which provide the general requirement that water protection must be taken into account in the zones indicated on the map. The LROP may also identify conflicting or competing interests, although will not necessarily resolve such conflicts at this level. The next tier of spatial planning is the regional plan (Regionales Raumordnungsprogramme) (RROP), which is prepared in accordance with the policy requirements of the LROP and provides more policy detail according to specific water protection needs: these needs can range from pollution prevention to protect drinking water supply, to water conservation, management of surface water runoff or nature conservation, depending on the characteristic needs of different areas within the Länd. Although it is referred to as a *regional* plan, it may be prepared by and applied to counties or cities within the Länd, as opposed to whole regions, and can therefore be considered akin to the UK's structure plans and unitary plans in terms of their scale of application. The RROP can, if provided for by the LROP, extend the areas of water protection yet further, beyond those designated in the LROP. More importantly, it is also at this level of spatial planning that the 'balancing out' of competing water needs and land use interests is performed and resolution of conflicts are sought, which feeds

through to the local tier of spatial planning in the form of municipal plans. The fundamental feature of this water protection planning system is the integration of spatial and sectoral planning, which is advocated by Marshall (1998) as follows:

‘These spatial protection forms are backed up by much broader non-spatial (quality, extraction, etc.) policies within the *Land*’s water laws and management. There is an overall similarity to the policies developed by the National Rivers Authority (NRA) in England and Wales The difference is that water protection zones have been brought directly into the regional (*Land*) strategy, by carrying out a ‘balancing out’ exercise within the LROP preparation process. Potentially at least, this is spatial planning with teeth, backing up and complementing the sectoral planning, giving it a co-ordinated spatial dimension. By protecting large areas, it gives a two stage protection, allowing the sectoral plans (water protection districts) to follow on with legally binding controls at a later date’

(p.426)

In spite of the praise given to the German model for water resource management planning, the water framework plan-making process has been slow for some *Länder*, due to insufficient staff and financial resources but particularly, due to low political priority in *Länder* where problems of water quantity and/or quality are generally absent.

Water planning and spatial planning are undertaken by the same autonomous government, namely the *Länder* and their subsidiary agencies. In addition, the *Länder* are the most significant institutions for flood risk management in Germany, with land use planning playing a pivotal role in the process (Samuels *et al.*, 2006). As a consequence of the federal structure of Germany, however, there is no single unified organisation responsible for managing flood risk as a whole (Zöttl, 2000). Arrangements may, therefore, differ markedly between the 16 *Länder*. As with water resource management, this diversity of governance implies a need for cooperation to ensure any flood management strategies are effective and consistent across catchments. Indeed, flood risk management is now regulated by the Flood Control Act (FCA) 2005, which requires the *Länder* to make regulations that ‘stipulate cooperation in flood control within the river basin districts of the relevant *Länder* ... , particularly the coordination of flood control plans and protection measures. It shall be possible to devise joint transboundary flood control plans’ (Art.32).

Other legal obligations imposed by the FCA 2005 include the requirement for all Länder to designate floodplains on the basis of the 1 in 100 year flood level. They must also inform the public and other stakeholders of their decisions in designating floodplains of different levels of risk, thereby involving the public in the whole process (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), 2007). In addition to floodplains, the Länder are required to distinguish flood-prone zones; areas currently protected by flood defences. This is done principally to raise awareness among the general public and the planning authorities of potential risks of flooding in non-functioning floodplains. Floodplains and flood-prone zones have to be marked in spatial plans, land use plans and development plans. Spatial planners are now prohibited by the FCA 2005 from allowing new development, including housing, in floodplains although, as in the UK, exceptions may be made if certain criteria are met (Article 31b).

The FCA 2005 also requires the Länder to prepare flood control plans to coordinate flood defence and management measures, which must be completed by 2009 (i.e. within four years of the adoption of the Act). Of particular merit, is that such plans may combine the mapping of flood risk areas with the reservation of open spaces within the river corridor, where measures to reduce flood damage potential can be undertaken (e.g. provision of water retention ponds) (Art. 31d), and this has direct applicability to land use and development plans where the effects of new development in one area may be felt elsewhere:

“In the process of developing these plans, the interests of upstream and downstream riparians of a water body may be co-ordinated. This measure is intended to point to the danger of flooding at an early stage”
(BMU, 2007, online)

Nevertheless, in spite of these statutory provisions laying down certain obligations on the public authorities, it remains the case in Germany that all parties potentially affected by floods are responsible for protecting themselves from the effects of a flood.

Whether or not, and how, flood control plans should be linked with water management plans and water protection zones, prepared under the Federal Water Act 2002, is unclear. The FCA 2005 was, effectively, the first piece of legislation to make provisions for a coherent, uniform flood management framework to be applied nationwide, but because of the federal nature of Germany's governance, this framework is necessarily broad brush. Clearly, it would be the responsibility of the individual Länd to stipulate such links, given its obligation to coordinate other flood control strategies, but there is unfortunately no statutory onus on them to do so that has been provided for in the FCA 2005.

England and Scotland

English water laws have been developed over several centuries on a piecemeal basis, the result being to create a fragmented, incoherent system of water governance, with multiple different authorities and agencies involved. The pivotal statute in modern legislation, however, was the Land Drainage Act of 1930, the adoption of which saw all previous legislation repealed with the aim of creating a more unified legislative framework for water management in the UK (Howarth, 2002). One of the most fundamental accomplishments of the LDA 1930 was the establishment of 'catchment boards' - public sector water authorities, each responsible for the entire area of a single river basin – thereby establishing a water resource management system that operated on the basis of river basin boundaries, as opposed to administrative boundaries. It also established internal drainage districts and associated internal drainage boards (IDBs), a few of which remain in place to this day.

Whilst maintaining the basic principles of the LDA 1930, institutional responsibilities for the supervision of land drainage, water utilities and flood defence were reorganised several times over the following decades (see for example, Scrase and Sheate, 2005). Amendments to the LDA in 1976 essentially 'provided for the functions, powers and liabilities of the various drainage authorities, with respect to drainage schemes, drainage works, control of watercourses, flood warning systems and for the financing of water authority activities through precepts on local authorities, and the financing of internal drainage boards through drainage rates' (Howarth, 2002, p.33). It is noteworthy that throughout these changes, the variously titled water

authorities continued to remain under public control. Perhaps the most significant change, therefore, took place when the Water Act was introduced in 1989, which privatised the water supply and sewerage utilities in England. Whilst water supply and sewerage services were given over to private undertakers, regulatory control of the aquatic environment as a whole, along with flood defence responsibilities, were passed to a newly-created public body for England and Wales - the National Rivers Authority (NRA). In Scotland, however, no such agency with the same, wide remit as the NRA was created. Instead, Scotland's equivalent agencies were the 'river purification boards' and the regional councils' Departments of Water and Drainage (Edwards-Jones, 1997). It wasn't until further institutional revision came with the Environment Act 1995, which replaced the NRA with the Environment Agency (EA) in England, that Scotland saw the creation of the Scottish Environmental Protection Agency (SEPA).

Given the laudable aim of the LDA 1930 to unify water-related legislation and management, the current administrative hierarchy of water resource management remains disjointed and dispersed amongst multiple agencies and organisations in both England and Scotland. This is of particular relevance to water services such as drainage and water supply in England, for example:

“There are land drains, watercourses, highways drainage, and curtilage drainage and there is no one body trying to manage them together. Surface water drainage has almost been thrust on the Water Companies by default, but they are only responsible for curtilage drainage.”

(White, 2005, p.116)

Indeed, because of the traditionally combined sewer system in Britain, rainwater runoff has been collected and managed as an incidental by the water companies during the process of collecting waste water, and not as a specific task – responsibilities for the management of rainwater runoff have not been specifically identified. Furthermore, land drainage is the responsibility of individual land owners and the IDBs, who 'have a duty to be accountable for watercourses running through their land.... water companies are not funded to manage land drainage, have no remit to be liable for land drainage and have no mechanism to bill for such services and therefore may not wish to have responsibilities in this area' (White, 2005, p.116).

Similarly, although institutional reorganisation came about in Scotland, under the Environment Act 1995 and the Local Government (Scotland) Act 1994, a more coherent, unified framework for water resource management failed to emerge and regulatory powers still lay with various, different agencies:

“the Scottish Environment Protection Agency (SEPA) undertaking the responsibilities of the former river purification boards (RPBs) has responsibility for water quality and assessment of flood risk; Scottish National Heritage (SNH) for nature conservation; the water associations (formerly the Departments of Water and Drainage within the regional councils) for flood protection, water supply and sewage treatment; and local authority departments for recreation”

(Edwards-Jones, 1997, p.126)

Currently, there are 10 regional water and sewerage companies in England and Wales (Figure 3), and a further 16 smaller, water only companies, all of which are private companies. In Scotland, a publicly-controlled, single water and sewerage company remains in place (Scottish Water), although changes are anticipated that may see it become a not-for-profit trust organisation that is subject to competition. This may be considered by some as a ‘publicly-acceptable form’ of privatisation (Garvin, 2007, pers. comm.). The economic regulator of the water supply and sewerage industry is the Office of Water Services (OFWAT), which makes decisions independently of the government, its principle function being to set limits on water service tariffs. It also works to ensure water companies are able to carry out their statutory responsibilities, which are set out in the Water Industry Act 1991 (as amended), improve water efficiency and service standards and meet sustainable development objectives (OFWAT, 2007). Drinking water quality, on the other hand, is regulated by an independent government body, the Drinking Water Inspectorate. In Scotland, regulation is performed by the Scottish Executive. This arrangement does, to some extent, exemplify the divisive nature of water *service* provision, as well water resource management as a whole, in the UK.

The principal legislation governing the activities of statutory sewerage undertakers is contained in the Water Industry Act 1991, ‘which imposes a general duty upon undertakers to provide, improve and extend a system of public sewers and make

provision for emptying sewers and for effectually dealing with their contents, by means of sewage disposal works' (s.94(1) Water Industry Act, 1991). Sewerage undertakers must also 'ensure that the sewer does not cause flooding of other properties' (Howarth, 2002, p.299), by virtue of the fact that the Act requires them 'to ensure that their areas are properly drained', which is enforceable by the Secretary of State. In Scotland, the same requirements are laid down in the Sewerage (Scotland) Act 1968.

Figure 3. Regional administrative boundaries of water services



Source: Water UK (2007)

With governance of water resources being distributed between several agencies or organisations, a 'sectoral' division of responsibilities has emerged. England's central government Department of the Environment, Food and Rural Affairs (DEFRA), and Scotland's Scottish Executive, are both responsible for setting national level policies and strategies for the management of water, which are to be implemented by the regional and local level agencies and organisations. The principal organisations with statutory undertaking powers are the water companies, as described above, the EA and SEPA, and local authorities (the British equivalent of communes and municipal councils). However, the IDBs, highways authorities, environmental organisations such as Natural England and Scottish Natural Heritage, and various other independent government and non-government organisations such as the publicly-owned British Waterways (responsible for Britain's canal network and some navigable rivers) also have a role to play in water management.

With this arrangement comes a complex array of plans, policies or strategies for the management of different aspects of the water resource as a whole. For example, the responsibilities of the EA and its counterpart in Scotland, SEPA, now relate to water conservation, environmental monitoring and protection, controlling and preventing water pollution, and flood defence, as defined by the Environment Act 1995. The various plans and strategies that have been prepared to fulfill their responsibilities reflect the diversity of activities being undertaken within the water resource management arena, for example catchment management plans (CMPs), flood and coastal defence strategies, catchment flood management plans (CFMPs), water level management plans, catchment abstraction management strategies, local Environment Agency plans (LEAPs) and shoreline management plans (SMPs).

As stated above, local authorities also play a role in water resource management, with a similarly diverse range of activities. For example, water companies are able to enter into an agreement with a local authority, whereby certain sewerage functions within its area of administration are delegated to the local authority. Furthermore, a local authority houses the highways authority and the local planning authority, which are responsible for highways drainage and for placing planning conditions on new developments for surface water drainage, respectively. Of particular interest is the process of consultation undertaken by a local planning authority in formulating its local development plan policies and in determining the outcome of a planning application. Certainly, the water companies, EA and SEPA are statutory consultees in both aspects of the planning process; as such, their advice, plans or strategies will certainly have some influence on the content of local development plans through the consultation process, and developers can be required by the planning authority to enter into an agreement concerning drainage, as advised by the relevant water company, and concerning flood alleviation and water quality protection, as advised by the EA or SEPA.

The relationship between local planning authorities, water companies and relevant environmental regulators has, however, been fraught with problems, predominantly due to the historical divorce of, for example, water quality planning (the responsibility of the EA) and land use planning (the responsibility of LPAs), both systems having reciprocal impacts (Penning-Rowsell, 1976; Howarth, 2001; Edward-Jones, 2007). In Scotland, for example, there has been much debate concerning Scottish Water's frequent objections to new development proposals on the basis that there has been insufficient capacity to allow their connection to the existing drainage systems and on the basis of its failure to invest in new drainage infrastructure needed to accommodate new development (Boddy, 2006). However, the publication of planning advisory note (PAN) 79 on water and drainage (Scottish Executive, 2006) has alleviated such concerns, by encouraging early and open dialogue between the councils, Scottish Water and developers. Indeed, it addresses the conflict between development and water resources with practical planning advice and, positively, this has led to Scottish Water's pledge not to object so stalwartly on the grounds of insufficient drainage capacity.

However, it is perhaps more noteworthy that although the EA, SEPA and water companies are statutory consultees in the planning process, local planning authorities are not legally obliged to accept their expert advice or recommendations in formulating their local plan policies or development control decisions and often, planning restrictions may apply that prevent them, legally, from imposing certain conditions that have been requested. Where the advice or recommendations of either organisation have not been met through the imposition of planning conditions or obligations, it is a natural consequence that tensions between them may develop.

Recently, water legislation has been revised and consolidated with the introduction of the Water Act 2003 (England) and the Water Services and Water Environment Act 2003 (Scotland). Although they were brought into force principally as a means to implement the requirements of the Water Framework Directive, the Water Act 2003 also makes significant amendments to the Water Industry Act 1991, to the effect that it is now 'a statutory duty for water companies to prepare, consult, publish and maintain a water resources management plan' (Environment Agency, 2007, online). These plans will consider the future of water resources over a period of 30 years, and are to be reviewed every 5 years. In Scotland, water management plans are prepared under the Water Services and Water Environment Act (Scotland) 2003, and cover a period of around 10 to 15 years, reflecting the more immediate priority of modernising the current water supply system (Wade *et al.*, 2006). However, WRMPs are focused solely on the supply of water, with no reference to surface water drainage and the conveyance of wastewater. As such, they are unable to cater for an integrated system of water resource management. There is an expectation that all water companies will have prepared and submitted their first statutory WRMP by the end of March 2008 (Environment Agency, 2007), following guidance on their content and process of preparation issued by the EA and SEPA. This guidance requires water companies to undertake, *inter alia*, a process of consultation with all statutory stakeholders, the general public, non-government organisations and local authorities on the content of their WRMP (DEFRA, 2007).

Given the limitations of WRMPs, it is noteworthy both Acts also give the EA and SEPA overall responsibility for preparing river basin management plans (RBMPs) for river basin districts, as required by the WFD. With such an array of organisations

involved in water resource management and land drainage, their responsibilities and functions being embedded within a long and complex history of legislation created by successive governments (Werrity, 2006), RBMPs perhaps offer the most potential for *integrated* water resource management in England and Scotland. This may be so because, although the EA and SEPA have the lead role in relation to RBMP preparation, other agencies have also been given duties in respect of either the process of RBMP preparation or the completed RBMP.

For example, under Scotland's new legislation, a 'duty to have regard to river basin management plans and sub-basin plans' is placed on 'the Scottish Ministers and every public body and office-holder' (s.16, Water Services and Water Environment Act (Scotland) 2003). Indeed, the steps that should be taken for public consultation and stakeholder involvement are also laid down within the legislation, the intention being 'to try and bring those with a particular interest into the [river basin management] planning process', although it should be noted that 'SEPA has considerable discretion' as to how businesses and environmental groups are to be involved in the process and this is yet to be determined (Hendry, 2006, p.6). Nevertheless, SEPA is proposing to take significant action in the realm of public and stakeholder participation, by publishing a Participation and Communication Plan setting out how it will involve the public and wider stakeholders. A National Advisory Group will involve key individuals from various organisations at the level of river basin district. Below this, Area Advisory Groups will involve the key stakeholders within a sub-basin district and an Area Advisory Group Forum will capture all those with an interest in river basin planning and involve the largest number of people in the process (SEPA, 2007, online).

England has adopted a similar pattern, albeit with fewer levels of administration and consultation. A National Stakeholder Panel for England and Wales, made up of representatives from national organisations has been created to 'gather views and concerns from a national perspective' (EA, 2007b, online). Below this, Liaison Panels have been created for each river basin district, made up of key sector representatives who will make decisions concerning the relevant RBMP. The EA's proposals for consultation and participation also appear to be pared down somewhat, with the publication of a 'Working Together' document for each river basin district forming

the first stage out of three stages of consultation available for the public and wider stakeholders to participate in the preparation of an RBMP. However, whilst the EA clearly states that ‘stakeholders and members of the public can contribute to consultations at different stages in the preparation of River Basin Management Plans’ it appears to be less robust in terms of how this will be achieved, proclaiming simply that ‘we will use the internet and other channels to make sure that anyone can obtain information about what we are doing’ (EA, 2007b, online).

In both England and Scotland, flood risk management is a sector that has been given more and more consideration over the last decade, particularly in respect of the linkages between flood risk and wider water resource concerns. This has been to the extent that the ‘flooding agenda’ has moved away from the traditional approach of flood protection to a more sustainable approach of flood prevention or management (Richards, 2005). In both countries, the only legal responsibility for protecting against flooding lies with the individual land or property owner (DTLR, 2001; Scottish Executive, 2004). In other words, there is no public authority with a statutory duty to defend land or property against flooding. That is not to say, however, that no public authority is involved in dealing with flood risk. Indeed, both the EA and SEPA have significant roles to play in terms of flood risk management and both England and Scotland demonstrate a number of similarities in their approach to flood risk management. However, there are also a number of differences in terms of the functions of different agencies or authorities.

For example, in England, there are four ‘operating authorities’ – statutory agencies with differing *permissive* (emphasis added) powers and duties relating to flood defence, conferred upon them by the LDA 1991 (as amended) and the Water Resources Act 1991. These agencies are the EA, Local Authorities, Internal Drainage Boards and Maritime Local Authorities, although it is the EA that has the lead role for flood risk management with responsibilities for the provision and maintenance of flood defences, implementation of flood warning systems, provision of planning advice, flood risk assessment and mapping and provision of general advice to the public. However, the flood defence powers of the EA are permissive only. In other words, the EA has the power, but not a duty, to provide and maintain land drainage and flood defences (Wynn, 2005). It should be noted that the EA’s responsibilities

and activities in flood risk management and flood defence provision apply only to 'main rivers' and 'critical ordinary watercourses' and not 'ordinary watercourses', which are the responsibility of local authorities.

In Scotland, there are three agencies with statutory responsibilities in flood risk management - SEPA, Local Authorities and the Water Authority. However, unlike in England, it is the Local Authority that has the greatest role in terms of flood risk management and SEPA's role is confined to the provision of a flood warning system, planning advice to local planning authorities in relation to development and flood risk and general advice on flood risk to the public. In addition, SEPA has prepared indicative flood risk maps, similar to those of the EA, although this was a 'project' commissioned by the Scottish Executive as opposed to a statutory duty, as it is for the EA. There is a much greater emphasis on the legal obligation for property and landowners to provide flood protection measures. As such, whilst local authorities do have certain powers and responsibilities in relation to the provision and maintenance of defences, depending on any funding agreed with the Scottish Executive or with property developers, SEPA does not have any particular endeavours within this area of flood risk management.

The main similarity between the two countries is the role of local planning authorities in controlling land use and development in the floodplain. In both countries, local planning policies, land allocations and development control decisions are formulated, taking on board the advice of the EA and SEPA. Decisions are also very much based on the floodplain maps prepared by both agencies, which provide an indication as to the level of flood risk a particular location is exposed to, up to the 1 in 100 year flood level. Furthermore, decisions are supported by national government planning guidance. In Scotland, this is 'Scottish Planning Policy (SPP) 7: Planning and Flooding' (Scottish Executive, 2004) and in England, it is 'Planning Policy Statement (PPS) 25: Development and Flood Risk (Department of Communities and Local Government (DCLG) 2006). Both adopt a very similar, risk-based approach in terms of guiding inappropriate development away from areas at risk of flooding and encouraging appropriate flood mitigation measures to be undertaken by the developer. PPS25 is, however, considerably more extensive and prescriptive in terms of what is required of the various organisations and individuals with roles or responsibilities in

flood risk management. Indeed, one principal feature of PPS25 is that it requires local planning authorities to undertake a strategic flood risk assessment of their area, which must be approved by the EA; this is not a feature of Scotland's guidance, where the requirement for a flood risk assessment is limited to those undertaken by developers in relation to individual planning applications.

The 'strategic' approach is an important development in the realms of flood risk management. In particular, it widens the scope for consultation and participation, the pooling of knowledge and resources and provides opportunities to link with other water resource management issues. In both countries, surface water drainage and sewerage services are provided *in the main* (emphasis added) by the water companies, whilst flood risk management is performed *in the main* (emphasis added) by the national environmental regulators – EA and SEPA – and by the local authorities. However, local planning authorities appear to have a coordinating role to play and as such, are central to the pursuit of *integrated* (emphasis added) water resource management.

Conclusion

This review has demonstrated a number of similarities and differences in the management of water resources, between the four countries of France, Germany, England and Scotland. The main findings are now summarised below, in terms of the organisation and administration of water resource management, and in terms of the way water resource management can link into spatial planning and flood risk management processes.

Organisation

- Institutional responsibilities for surface water drainage and sewerage services may be given to the private sector (England), public sector (Germany, Scotland) or a combination of both (France).
- In all four countries reviewed, the main organisations with statutory responsibilities for surface water drainage and sewerage services are different to those organisations with statutory responsibilities for managing or defending against flood risk arising from rivers.

Administration

- A ‘water resource management’ framework is in place in all four countries, which can be applied to surface water drainage and sewerage systems. In England and Scotland, for example, this emerges in the form of several different plans or strategies prepared by different organisations, although with some overlap.
- The policy contexts, legal regulation and environmental regulation of water resource management may be centralised (England, Scotland) or decentralised (e.g. Germany, France)
- Systems for surface water drainage and sewerage provision, and for flood defence are undertaken separately in all four countries, although there is growing recognition of the reciprocal impacts between surface water runoff and flood risk.
- Plans for the management of surface water have varying degrees of influence on spatial planning: France is the only country to impose legal obligations (and sanctions) on planning authorities to account for surface water drainage in their plans. As such, although spatial planning has the potential to provide a coordinating role in the management of different sectors of water resources, the degree to which this can be achieved varies between countries.
- In all four countries, the emerging ‘water resource management’ frameworks, which hinge upon the EU Water Framework Directive, offer the most potential to integrate surface water drainage, water services and flood risk into one management ‘package’.

Given the above, opportunities to develop a more coherent, integrated system of water resource management emerge, which are based on the influence of the EU Water Framework Directive on surface water management in all four countries. In particular, it is likely that the river basin management plan (and its European counterparts) may be the most appropriate tool to strategically link flood risk management with the management of surface water drainage and sewerage services, and to develop organisational and administrative cooperation in riverine flood management and sewer flood management, to reduce urban flooding. The involvement of spatial planning at the local level, therefore, may be to facilitate the cooperative achievement of the river basin management plan's objectives, by recognising them in their policies, land allocations and planning decisions.

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Legislation

France

Water Act 1964

Water Act 1992

Water Act 2002

Germany

Water Resource Management Act 1957

Federal Water Act 2002

Flood Control Act 2005

England and Scotland

Land Drainage Act 1930 (as amended)
Sewerage (Scotland) Act 1968
Water Act 1989
Water Industry Act 1991
Local Government (Scotland) Act 1994
Environment Act 1995
Water Act 2003
Water Services and Water Environment (Scotland) Act 2003

Appendix 2

Effectiveness of local land use and development planning in flood risk management

A broad review of England

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Planning Overview

The English planning system comprises a vast amount of features and functions on a number of different geographical and government levels. It is a hierarchical system in which national planning policy guidance, prepared by central government, governs the content of regional planning policy guidance, prepared by regional government, which in turn governs local planning policy contained in development plans prepared by local planning authorities (LPAs). Development plan policies provide the basis upon which development control decisions are made in relation to individual planning applications. The roles of LPAs at the level of development plan preparation and development control are highly influential in terms of shaping land use and the built environment. Of particular relevance, is the way in which LPAs interpret and implement the upper tiers of planning policy guidance, which will affect the outcome of development plan policies and development control decisions and determine the effectiveness of national planning policy at the local level.

The Town and Country Planning Act of 1947 was the first piece of legislation to truly formalise the planning profession by establishing development plans as statutory instruments for managing the development and use of land. It defined a development plan as a 'plan indicating the manner in which a local planning authority propose that land in their area should be used' (Cullingworth and Nadin, 2002, p.92). In the decades since, the administrative, political and legislative frameworks governing the planning system have undergone a number of reforms, which are well documented in the literature (see for example, Rydin, 1993; Cullingworth and Nadin, 2002). Perhaps the most significant change took place during the 1970s and 1980s, when development plans were viewed as somewhat of a hindrance to development and economic progress. Consequently, a presumption in favour of development was fostered by the then Conservative government. This had the effect of undermining the relative influence of development plans on planning decisions, by making it a

material consideration⁷ equal to all other material considerations in the determination of planning applications for development (Tewdwr-Jones, 1994).

The ethos of today's system is broadly the same as it was in the 1950s insofar as the development plan forms one of a number of material considerations to be taken in planning decisions and it is discretionary, i.e. policies contained within it are not binding. However, the importance of the development plan increased with the introduction of a new Town and Country Planning Act in 1990. It was amended a year later by the Planning and Compensation Act in 1991, which made the development plan the *primary* material consideration, thus ensuring that the modern system is planned:

“Section 54A requires that an application for planning permission or an appeal shall be determined in accordance with the plan, unless material considerations indicate otherwise”

(DETR, 1999, p.3)

For the development plan to carry its full weight as the primary material consideration, however, it would have to 'be up to date and consistent with national and regional policies' (Tewdwr-Jones, 1994, p.586) and this in itself formed a further material consideration for planning officers.

Two further principles have been retained since 1947: firstly, the remit of the development plan does not extend to farming or forestry practices (Rydin, 1993); secondly, existing development or land use that does not conform to the plan is allowed to remain under planning legislation (Cullingworth and Nadin, 2002). These issues have a direct bearing on inland flood risk, in that farming and forestry practices and development in the floodplain have played a significant role in exacerbating the

⁷ Material considerations are wide-ranging and may include issues such as environmental impact, economic and social benefit, siting and appearance, or amenity value. National planning policy is a significant consideration, but what constitutes a material consideration depends upon the individual circumstances of the planning application (Cullingworth and Nadin, 2002).

flood problem and potential measures to offset or reduce their effects on flood risk cannot be enforced through the planning system.

The preparation of the traditional development plan was essentially a laborious and time-consuming process; during the 1990s, the average time taken for development plans to reach adoption was approximately five and a half years (Steel *et al*, 1995, cited in Cullingworth and Nadin, 2002) and in 2000, 20% of LPAs in England had still failed to adopt a local plan or UDP under the 1990 Town and Country Planning Act (Cullingworth and Nadin, 2002). As such, there has been a very clear desire to increase the speed and efficiency with which local planning policies are formulated and adopted, whilst maintaining local democracy and public involvement in the process. LPAs today are responsible for the preparation of Local Development Frameworks (LDF), a new form of development plan introduced by the Planning and Compulsory Purchase Act 2004. A number of specific features of the LDF are intended to achieve greater speed, efficiency and public participation in the democratic policy-making processes of the spatial planning system.

A hierarchy of planning levels exists, whereby the highest level of planning policy constrains the level below it, which in turn constrains the level below that (Bruton and Nicholson, 1985). Planning Policy Statements (PPS) (formerly Planning Policy Guidance notes – PPGs) form the uppermost level of policy and are on a national scale. Whilst they carry no statutory weight, they are important material considerations in both forward planning and development control decision-making processes and to an extent, they equal statutory instruments in the level of influence they exert on planning decisions (Therivel, 1998; Tewdwr-Jones, 1998). Most are designed to convey central government policy objectives in general terms and broadly speaking, they are intended to enable local planning decisions to be delivered that are consistent with national planning policies, but also reflective of local conditions. The next level is the Regional Spatial Strategy (formerly Regional Planning Guidance), which is prepared by one of nine Regional Planning Bodies. This provides the regional planning context for local planning authorities to implement national policy objectives. In other words, regional planning forms the middle tier between national and local spatial planning processes.

Although the system is intended to be plan-led, central government can still intervene ‘to amend development plans at the lower end of the policy framework and, on appeal or in the courts, can utilise national policy to undermine the development plan as a principal material consideration’ (Tewdwr-Jones, 1994, p.586). Indeed, ‘regional officials pore over the wording of local policies to ensure they accurately reflect those established at the national level’ (Cullingworth and Nadin, 2002, p.48). For example,

‘at one time, the word ‘normally’ was acceptable, now it is taboo, a ‘presumption against’ is also out of order – unless this accords with specific national policy’ (Cullingworth and Nadin, 2002, p.48). Consequently, a preoccupation with policy wording has developed, again to the detriment of policy content, with development plan-makers striving to express national policy almost to the letter, in order to avoid any possible backlash at appeal or in the courts. In doing so, LPAs may fail to tailor their policies according to local circumstances.

Development control is concerned with individual planning applications for development or land use. Whether or not an application should be permitted is assessed by an individual, trained planning officer and in certain cases, the final decision rests with a planning committee, based on the case planning officer’s final report. In general, LDF policies convey ‘the criteria which will be used to judge whether planning applications should be allowed in a particular area’ (DETR, 1999, p.19). Although the LDF is the first port of call in deciding planning applications, and the plan-led system favours applications that are in accordance with the LDF, planning officers are given a considerable amount of discretion in reaching a decision. An LPA has the authority to grant planning permission, in the light of material considerations, even if the development or land use proposal does not accord with the LDF policies. This feature allows decisions to adapt to different planning scenarios and changes in local circumstances, and is therefore of considerable merit in terms of achieving a flexible planning system. Indeed, the issues surrounding each individual planning application that need to be considered by planning officers can be numerous, wide-ranging and in many cases, unique to that application. It is precisely because of this diversity that discretion is allowed at the level of development control, since it is a practical impossibility to address every issue in development plan policy (Cullingworth and Nadin, 2002). The uniqueness of individual planning applications is emphasised by Kelly and Gilg (2000), who considered that:

“the relationship between development control decisions and planning policies relies on the simple theoretical assumption that there is a straightforward cause-and-effect between policy and its implementation.... [but] that such an approach is valid only if broad trends are being evaluated underlying explanations as to why decisions occur may be relegated to a secondary role.”

(p.336)

LPAs must undertake a statutory process of consultation with a range of organisations. Which of these are consulted is largely dependent on the type or location of the proposal, but where there is no statutory obligation, it is generally at the discretion of the deciding LPA. However, for most non-minor applications, the EA, highways authority, water companies and sewerage undertakers are particularly important.

Consultees are usually given a statutory time limit of 21 days within which to respond to the LPA and their response constitutes a material consideration. The LPA is not, however, obliged to accept any comments made by consultees. An important aspect of the statutory consultation process, is the fact that consultation responses are not simply a matter of support for, or objection to a planning application. Consultees may make a number of recommendations to mitigate the effects of a development or land use proposal. LPAs can make use of this 'expert' advice to make an informed planning decision and, where appropriate, attach certain conditions to any planning consent, in an attempt to control certain characteristics of the development such as design, siting, layout and environmental impact. Indeed, consultation serves to open up negotiations between planning officers, developers and consultees, although there has been some reluctance on the part of LPAs to enter into negotiations before reaching a decision (Cullingworth and Nadin, 2002).

An important aspect of negotiation is the ability for developers to enter into a planning obligation, under Sections 106, 106A and 106B of the Town and Country Planning Act 1990 (as amended by the Planning and Compensation Act 1991), whereby the LPA can secure the provision and maintenance of infrastructure or environmental improvement that is needed as a result of the development, with the developer shouldering the cost. Such agreements have not been used widely, however, with fewer than 1% of planning decisions involving a planning agreement (Cullingworth and Nadin, 2002). The advantages of planning obligations, when compared with planning conditions, are that LPAs can enforce planning obligations against successive landowners (Moore, 1997).

In parallel with the statutory consultation process, LPAs undertake a process of publicity and notification, which serves to inform the general public and non-statutory interest groups of the proposal, including those who may be affected by the proposal (usually neighbouring property and landowners). Publicity and notification are essential means of enabling public participation in the decision-making process. The role of public participation, however, has not always been so widely accepted and planning professionals were generally entrusted to make decisions in the interests of everyone. This proved not to be the case, however, in that 'the physical bias of the planning system had failed to address social and economic problems' (Cullingworth and Nadin, 2002, p.356).

Essentially, the presumption in favour of development prevailed, often at the expense of the good of the local community and environmental interest groups. Recognition of the need to encourage, and more importantly enable public participation gained momentum with various new legislated requirements to enable public access to information, for example, the Local Government (Access to Information) Act 1985 and more recently, the Freedom of Information Act 2000. Nevertheless, the fact remained that 'the 'public' are much more likely to be engaged with the system on site-specific issues which affect them' (Cullingworth and Nadin, 2002, p.357), rather than on broader, community-wide issues. A contributory factor in this was the fact that the language, even jargon, of the planning profession was difficult for the public to understand. The consequence of this, in a plan-led system, is that interests or concerns raised at the planning application stage would be less likely to be given any weight in the decision-making process, if those interests or concerns have not been addressed in earlier stages of LDF preparation.

Developers can appeal against a decision by the LPA where planning permission is refused, or they can appeal against conditions attached to planning permission. A developer can also appeal if the LPA fails to deliver a decision on a planning application within the prescribed period of 8 weeks. It should be noted, however, that third parties have very little rights in respect of planning decisions and no right to appeal against a decision to grant planning permission. Appeals are made to the Secretary of State (SoS), but the role of the SoS is delegated to a planning inspector, from the Planning Inspectorate, in almost every case. A planning inspector considers

evidence by way of written representation, informal hearing or adversarial inquiry. Written representations and hearings are the quickest and cheapest method and as such, are by far the most popular.

The powers of a planning inspector are significant: he or she may reverse a LPA decision, or add, delete or modify conditions. This is of particular importance, since:

“Although each appeal is considered on its own merits, the cumulative effect is to operationalise policy. It is here that the sometimes vague, sometimes contradictory, messages in government policy must be resolved.....[appeals] are a route for the imposition of government policy on local authorities. Inspectors pay particular attention to national policy, which is the determining factor in many appeals.”

(Cullingworth and Nadin, 2002, p.139)

The appeal process essentially creates a ‘win-lose’ courtroom-style situation and this can be problematic, indeed daunting, for anyone taking part who does not have the benefit of professional representation. The outcome of an appeal is decisive and the wider effect can be to influence other LPA decisions (Cullingworth and Nadin, 2002), particularly given that the costs of appeal may be apportioned to the ‘loser’; LPAs would therefore strive to avoid any backlash in the courts as a result of their decisions.

Relationship between planning and flood risk

Local authorities have certain powers in relation to flood defence provision and drainage. The Land Drainage Act of 1991 essentially ‘re-enacted powers permitting local authorities to carry out work on [ordinary and critical-ordinary] watercourses..... so far as may be necessary in order to prevent or alleviate flooding and to carry out other drainage work’ (DoE, 1992b, p.27). However, the ‘control of floodplain development has been recognised as a non-structural method of flood hazard reduction’ (Parker, 1995, p. 343).

Of particular relevance is central government’s national planning policy on development and flood risk. Planning Policy Statement (PPS) 25: Development and Flood Risk (DCLG, 2006) is the latest replacement of a long line of flood-related guidance documents produced by central government, whose restrictive stance towards floodplain development dates back to the issue of Circular 31/47 (Penning-Rowell, 1976). Further circulars emerged over the following two decades, all of

which attempted to discourage floodplain development, culminating in the empowerment of local planning departments to refuse permission for floodplain development proposals (Penning-Rowsell, 1976). For example, Circular 30/92 (DoE, 1992a) was written in the context of climate change and the increase in flooding that might arise as a result. The then National Rivers Authority (NRA) and LPAs were required to tackle this issue by avoiding land allocations in flood risk areas and preventing development that would be affected by flood risk or would increase flood risk elsewhere. The nature of the Circular is prescriptive in that it sets out the likely consultation responses from the NRA to planning applications in flood risk areas, which include the recommendation for outright refusal. It also sets out the government's plans to defend existing development in flood risk areas but not to finance the upgrade or provision of defences that become necessary as a result of new development (DoE, 1992a). Where LPAs lack the commitment to central government policy, this kind of coercion can be effective in achieving compliance with the *minimum* requirements of national policy, but it is not the best means of achieving improvements where commitment already exists, more likely amongst those local authorities that have experienced problems of flooding (Handmer, 1996). It was considered, therefore, that the Circular has failed to assuage floodplain development (Hewitt and McGeady, 2001).

Following two consultation drafts, PPG25 was formally published in July 2001. This was considered by some to be fortunate timing, given its coincidence with the flood events of autumn 2000, in that the government could be seen as taking positive action to deal with the growing flood problem (White and Howe, 2002). The essence of PPG25 is to explain 'how flood risk should be considered at all stages of the planning and development process in order to reduce future damage to property and loss of life' (DTLR, 2001, p.3). Climate change remains a feature of the guidance, although the emphasis of its policy concerns is given in the context of sustainable development and the use of the precautionary principle. Three important features of the guidance are:

- (a) a sequential test, which enables LPAs to adopt a risk-based approach to their development plan allocations and development control decisions according to specific flood risk zones. Zones are defined by the annual probability of flooding in that zone, the extent and standard of existing flood defence, the

extent of existing development and the nature of development appropriate for that zone;

- (b) it extends the consideration of flood risk in planning decisions to a catchment-wide basis; and
- (c) the EA is emphasised as having the lead advisory role on all matters pertaining to flood risk and is advocated as an important consultee on all development proposals where flood risk may be a consideration. At the time, the EA was not a statutory consultee¹ in relation to flood risk, however, and LPAs are not obliged to accept the EA's advice.

Coercion is still present in the guidance, however. Coercive policies require LPAs to adhere to a set of prescribed standards or processes, which is controlled by some form of compliance monitoring by central government (Handmer, 1996; Parker, 2000). The sequential test is applicable to development control and forward planning processes and PPG25 required that any departures from the test must be satisfactorily explained. Additionally, central government aimed to monitor the implementation of PPG25 by LPAs in their local planning policies and development control decisions via High Level Target (HLT) 5 reports (see for example, EA and LGA, 2005)². There is also an expectation of all LPAs 'to give the matter early and serious attention, regardless of whether their areas have experienced major flooding in recent years' (DTLR, 2001, p.13). Penning-Rowsell (2001) is of the view that underlying these requirements is the intimation that, 'more use will be made of 'calling in' procedures if authorities fail consistently to follow the guidance provided' (p.109), although this is not specifically expressed in PPG25 itself. The guidance does state that the need for further legislative tools will be considered on the basis of the results of the monitoring process.

Although the emphasis of PPG25 was on sustainability, adopting the precautionary principle to prevent flood risk, rather than to protect against flooding, White and Howe (2002) argue

¹ More recently, the EA has been made a statutory consultee in relation to development and flood risk, although it remains the case that LPAs are not obliged to accept the advice of the EA

² The former Ministry of Agriculture, Fisheries and Food produced a series of high level targets for flood and coastal defence provision. HLT 5 (formerly HLT 12) requires the identification of development plans which do and do not contain flood risk statements or policies and to identify development control or appeal decisions where the EA sustained objections on flood risk grounds, decisions were in line with EA advice and decisions were contrary to EA advice. The findings are reported jointly by the EA and Local Government Association (LGA) each year.

that PPG25 did little to improve previous guidance with the exception that it extended consideration of flood risk beyond LPA boundaries to a catchment-wide perspective and highlighted the need for developers to also take responsibility in minimising flood risk. However, it failed 'to exhort prevention over protection' (White and Howe, 2002, p.737) and an emphasis on economic efficiency of flood defence provision remains in place, which may be to the detriment of wise decision-making. According to Penning-Rowsell (2001), however, PPG25 strengthened what has previously been viewed as weak and ineffective government guidance. It 'gives planning authorities more power to resist development in flood risk areas, but draws back from giving the Environment Agency greater powers [so] there is no Agency veto here over development in flood risk areas, since these locations are correctly seen as valuable areas where development can be permitted if appropriate safeguards are taken' (p.109). He considers the sequential test 'innovative' and flexible, in that it allows development in less vulnerable flood risk areas provided the development need outweighs the risk, it is appropriate and safeguards are put in place. Although this applies to *less* vulnerable areas, they are nevertheless still vulnerable to flooding and Thomalla (2001) warns that 'local councils quite frequently approve planning applications against the advice of the Agency owing to the overriding expectation of the economic benefits associated with the proposed development' (p.112). This indicates that there are potentially other forces inherent within the planning system that may prevented PPG25 from succeeding where its predecessors have failed.

PPG25 has very recently been replaced by 'Planning Policy Statement 25: Development and Flood Risk' (PPS25) (DCLG, 2006). At less than 12 months old, it remains to be seen how effective it will be. Nevertheless, some positive features include the retention of a catchment-wide approach to flood risk management and the risk-based sequential test (albeit, this has been considerably refined and improved). It also provides a number of new features, including a good practice guide to its implementation. Of particular note, however, is the requirement that Regional Planning Bodies and Local Planning Authorities must now prepare regional flood risk assessments and strategic flood risk assessments, respectively, which are to be approved by the EA and used to inform LDF policy-making and development control decision-making. These assessments may enable more collective approaches to flood risk mitigation, consideration of potential cumulative impacts of several individual developments in a particular area and provide a series of strategic planning recommendations based on expert advice that can help LPAs tailor their local planning policies according to local flood risk characteristics.

Given that planning policy guidance has been in existence since 1947, suggestions that policy has been ineffective and that the planning profession have failed to address flood risk in their planning decisions abound. Urban development of floodplains was particularly active in the inter-war period, prior to the Town and Country Planning

Act of 1947. Since then, development has been piecemeal throughout the country, particularly where planning control has been less strict. However, it was considered that floodplains could be developed wisely, if the overall benefits of the development to the community as a whole outweigh the costs of flooding, although data to accurately assess the benefits and costs was generally unavailable (Penning-Rowsell, 1976).

In permitting so-called inappropriate floodplain development, LPAs have become prominent targets in a frenzy of accusations following the Easter 1998 and Autumn 2000 floods, fed by both the popular press and academic publications. It would be trite to say that floodplain development has occurred, but academic evidence of inappropriate floodplain development caused by planning decisions has been anecdotal at best (Parker, 1995). Over the last two decades, little work has surfaced that empirically demonstrates the phenomenon in England. The most recent exception to this has been the work of Wynn (2005), preceded only by that of Parker (1995).

Largely in response to the Easter 1998 and autumn 2000 floods, a flurry of literature emerged, all of which speculate on where the blame should lie for the flood problem (see for example, Baines, 2001; Boardman, 2000). Under Hewitt and McGeedy's (2001) alluring title 'Who's to blame for the flooding crisis?' (p.14) is the suggestion that the proper policy tools have been in place at least since the release of DoE Circular 30/92, but the reason for their failure is due to the local perceptions and practice on the part of the LPAs and the EA. At a Town and Country Planning Association (TCPA) conference in November 2001, evidence was presented concluding that around 40,000 planning applications to develop in the floodplain are made each year, the majority of which were permitted (Young, 2001). In 1996, around 4,000 houses were built in the floodplain compared with around 24,000 being built in 2000 (Crichton, 2001).

According to Thomalla (2001) the EA has been frustrated by having to defend areas at flood risk because of unwise planning decisions, that would not otherwise need defending. Flood alleviation objectives have traditionally been focussed on 'economically justifiable defences which are technically sound and environmentally sympathetic' (DoE, 1992b, p.28). This emphasis on economic efficiency has perhaps been a driving force behind many planning decisions, particularly given the historical context of benefits and costs described above and the existence of other environmental and physical constraints to development. Indeed, Parker

(1995) considers floodplain development may actually be wise, where it achieves wider environmental benefits.

The potential to mitigate the effects of floodplain development has long been recognised by planning professionals. The government approach has traditionally been one of protection, rather than prevention, but floodplain development ‘can only be partially protected because structural flood mitigation measures are prone to overtopping and failure’ (Parker, 1995, p.342). Indeed, other measures (albeit not always sustainable and sometimes creating new problems downstream), such as the raising of ground levels to remove a development site from risk and the provision of compensatory flood storage downstream, have been promoted by the former NRA (Parker, 1995) and by the EA (EA, 1997) as suitable planning conditions.

Given the EA’s feelings on ‘unwise’ planning decisions and that evidence has shown beyond doubt that some developments have indeed been inappropriate, some arguments suggest this is historical. For example, the majority of properties affected by floods in Lewes and Uckfield, East Sussex, two of the worst hit areas during autumn 2000, were considerably old, many being within the historic town centres. Of all the developments permitted in Lewes during the decade prior to the floods, none were affected. Floodplain development policies were in place and, in reference to one particular planning application, ‘considerable thought had been given at the planning stage to siting and levels of the new [development]’ (Wilkins, 2001, p.114). The annual High Level Target 12 report for the year 2003/2004 (EA and LGA, 2004) also indicated that nearly all development plans contained some form of flood policy and a survey of LPAs showed that, of those that responded, less than 50% had received a recommendation from the EA to refuse planning permission for development on flood risk grounds and of these, a large majority of LPAs accepted this recommendation. Indeed, the EA appeared to favour conditional consent rather than outright refusal (RTPI, 2001).

Nevertheless, despite removing new developments from risk by implementing certain mitigation measures, the issue remains that downstream effects of development may also arise, putting previously non-risk properties at risk. In this regard, floodplain development has been a focus in that, by reducing the capacity of the floodplain to store water, floodwaters are forced further downstream. However, surface water run-off and inadequate drainage have also created downstream risks. Notwithstanding the fact that agricultural run-off is effectively beyond the control of LPAs, the contribution of planning decisions to these problems relates primarily to the ability of LPAs to impose planning conditions and obligations and to the difficulties in assessing the cumulative impacts of individual developments.

Planning conditions provide ‘considerable scope for the flooding potential of a development to be reduced, or for the adverse flooding effects upon other properties to be mitigated’ (Howarth, 2002, p.364). However, ‘there may be limitations upon the use of planning

conditions insofar as they may not be used to require off-site work to be undertaken where downstream flood defence works will be needed as a consequence of a proposed development and the developer has no legal power to undertake such works' (p.364). Planning conditions 'must normally relate to matters that are within the boundaries of the proposed development [and] may not involve monetary payments' (p.365) and must 'fairly and reasonably relate to the development that is authorised' (p.364). The validity of requiring on- and off-site flood alleviation measures, including drainage, has been upheld by the courts, however (Howarth, 2002). Despite this, the use of planning conditions to mitigate flood risk appears to be low. For the year 2003/2004, it was reported that, of all the approved planning applications it was consulted on in relation to flood risk, just over half included conditions to mitigate flood risk, with the remaining applications being approved without any flood-related conditions (EA and LGA, 2004). One possible reason for this, is the difficulty in 'enforcing conditions against successive landowners' (Howarth, 2002, p.365) where any measures required as a condition need ongoing or future maintenance.

Planning obligations can be used to overcome this problem, in that they can be transferred to successive landowners. However, the use of planning obligations has been criticised as a means to buy and sell planning permissions and as a means to enable development that would otherwise be considered unacceptable (Howarth, 2002). Furthermore, their use must meet a number of criteria, which Howarth (2002) considered as potentially difficult to balance or indeed, to challenge at appeal given the amount of discretion enjoyed by LPAs and the Secretary of State. Consequently, the use of planning obligations has been far less frequent relative to the use of planning conditions (Cullingworth and Nadin, 2002), potentially because of these uncertainties.

Compounding the uncertainties surrounding the use of planning conditions and obligations, is the difficulty in assessing the cumulative impact of development on flood risk. Whilst PPG25 requires developers to undertake flood risk assessments as a prerequisite to submitting a planning application, a distinct lack of these assessments at the statutory consultation stage of planning process was reported (EA and LGA, 2004). Planning conditions can not be used to secure flood alleviation measures by one developer, which would be necessary to mitigate the cumulative effect on flood risk resulting from several future developments. Planning obligations, on the other hand, can be used to secure financial contributions towards local infrastructure such as flood defence, but without adequate information on the likely impacts of the proposed development on flood risk, the fairness and reasonableness of any obligation is unlikely to be appropriately balanced.

The EA, as a statutory consultee, advises LPAs on flood risk in relation to planning applications. There have been suggestions that EA advice is often misplaced, ignored or not forthcoming and that LPAs have gone against EA advice in granting planning permission to certain applications. Whilst LPAs are under no statutory obligation to accord their decisions with EA advice, it is not unreasonable to assume that, given the EA's expertise and advisory role on issues relating to flood risk, LPAs would give serious attention to EA advice. The question arises, therefore, why LPAs do not always follow that advice.

There is a perception that tensions between LPAs and the EA and its predecessors have been ongoing, predominantly due to the historical divorce of water quality planning (the responsibility of the EA) and land use planning (the responsibility of LPAs), both systems having reciprocal impacts (Penning-Rowsell, 1976; Howarth, 2001). Welsh (2001) reported one planning committee councillor as saying ‘the Agency blows hot and cold. It moans about the homes and then does nothing about the defences’ (p.17). The local knowledge of LPAs about flood prone areas is also considered to be superior to that of the EA (Hewitt and McGeady, 2001; Welsh, 2001) and Hewitt and McGeady (2001) announced that the EA’s consultation responses to planning applications were inconsistent, often not forthcoming at all, and generally unfounded. They describe the incredulity expressed by planning officers at the EA’s objections to development where flooding is not a problem and EA’s non-objection to development where flooding is known to be a problem.

Whilst the LGA confirmed that it was taking action to improve the relationship between LPAs and the EA (Welsh, 2001), it has been suggested that:

“The crucial question is whether the perceived tension between the democratic mandate of local authorities and the technical mandate of the Agency is genuine or not. Whilst it might seem undemocratic to give the, non-elected, Agency power to overturn decisions reached by the, elected, local authority, the reality may be that decisions of local planning authorities are so confined by law and policy guidance that the scope for political considerations to enter into planning determinations is relatively limited. it might be argued that the real tension is between national and local, democratically determined, environmental imperatives”

(Howarth, 2001, p.45)

Certainly, the EA faces the difficulty in ‘that its view of the undesirability of a particular development proposal is only one amongst many material considerations that the local planning authority will have to take into account in determining whether to grant the planning permission which is sought’ (Howarth, 2001, p.40). This is also evident in the Select Committee on Agriculture’s (1998) report:

“On occasions it has to be said that local authorities have acted in accordance with Environment Agency advice but seen their decisions overturned on appeal to the Planning Inspectorate.”

(para. 86)

That a number of material considerations exist for local planning officers, it is interesting that Cullingworth and Nadin (2002) comment on national planning policy as follows:

“ [National planning policy] advice can be conflicting, perhaps as a result of piecemeal revision at different times. Moreover, as is demonstrated repeatedly at public inquiries, differing interests can ‘cherry pick’ from the twenty-five PPGs to show how well their arguments meet the official guidance. In applying policies to particular cases, interpretation is required; and often there has to be a balance of conflicting considerations”

(p.49)

High targets for housing provision set by the government have placed significant pressure on LPAs. Perhaps more contentious, however, is government’s policy on the reuse of ‘brownfield’ land. Not only has the government promoted the efficient use of land by reusing previously developed land (DETR, 2000a), it has also emphasised the importance of high density housing. An ODPM news release (ODPM, 2005) confirmed that new housing densities have indeed increased to 39 dwellings per hectare, but that the density of new housing on brownfield land is even higher at 44 dwellings per hectare. Indeed, it proclaimed that ‘brownfield development is at a record level’ (ODPM, 2005, online). Central government’s planning guidance on housing development clearly favours the provision of new housing where existing infrastructure can be utilised, particularly in town centres, and new settlements that make use of previously developed land have been positively encouraged (DETR, 2000b).

Such policy priorities, when coupled with restrictions on development in the green belt and restrictions in environmentally sensitive areas may serve to drive new housing onto brownfield sites located within the floodplain (see for example, Parker, 1995; Wilkins, 2001; Howarth, 2002). Although not functional, having been previously developed, the increased density of housing on such sites can only serve to increase the level of flood risk particularly where the intensity of occupation exceeds the design standard of existing flood defences that had been put in place to protect the previous, perhaps less intense, use of land. The conflict with national policy on flood risk is evident: PPG25 promoted the restoration of floodplains to their natural functions wherever possible, but this is unlikely to be achieved given the pressure exerted by government to accommodate 60% of new homes on brownfield land, particularly where available land is at a premium. Indeed, PPS25 has introduced an

Exception Test for planning officers to use, which essentially provides a ‘get-out’ clause for local planning authorities to allow development that does not meet the criteria of the sequential test, but does make use of previously developed land.

Conclusion

This broad overview has highlighted a number of constraints within the planning system that potentially limit the ability of LPAs to prevent flood risk through land use and development planning processes. National planning policy relating to development and flood risk is contained in PPS25. Its predecessor, PPG25, has been criticised for failing to advance a flood prevention agenda, over the traditional protectionist approach. It also contains an element of coercion, which is not necessarily effective at achieving improvements in compliance where problems exist, but particularly amongst LPAs where commitment already exists. It has, however, improved upon its predecessors by extending consideration of flood risk to a catchment-wide perspective and providing the sequential test, which divides the floodplain into different zones of risk, since some areas of floodplain are capable of being developed appropriately.

LPAs have been accused of frequently permitting inappropriate floodplain development owing to an overriding expectation of the economic or social benefits the development can bring, and often against the advice of the EA. This criticism is countered by LPAs complaining that the EA’s advice is often inaccurate, inconsistent and often not forthcoming within the statutory consultation period. The system of planning appears to have played some part in limiting the ability of LPAs to achieve flood prevention objectives. The complexity and lengthy process of bringing development plans to adoption, the hierarchy of sometimes conflicting planning policy guidance and the target-driven system of development control have created a certain amount of inflexibility at the local level, with policy-makers striving to repeat national policy in what is intended to be a ‘plan-led’ system. Local discretion and the quality of development control decisions have been compromised. Furthermore, the EA has frequently recommended conditional planning permission for development in flood risk areas, but planning conditions can only be required for site-specific mitigation that relates to the development itself and cannot be enforced upon successive landowners. Planning obligations do offer a solution to this, but their use is uncertain and infrequent. Compounding the problem of site-specific mitigation is the inability to account for the cumulative impacts of several individual developments. There is clearly a need, therefore, for planning policy and practice to foster flood prevention objectives, rather than flood protection objectives.

Recent reforms to the planning system, principally in relation to the new LDFs, and the replacement of PPG25 with PPS25, may overcome a number of these problems, but in particular, they will speed up the delivery of local development policies and enable LPAs to target areas in need of attention through the use of strategic flood risk assessments and the more refined sequential test.

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Appendix 3

Appendix 3

Buildings resilience - strategy:

Heywood - small urban catchments

1 Introduction

This note outlines a strategy for flood resilience of properties in the Heywood area of Greater Manchester. The strategy is based upon a dry proofing approach, where existing buildings are protected from flood using technology, techniques and equipment that prevent water from entering the property.

The Heywood area of Rochdale, located near Manchester, has recently been hit by two floods, in 2004 and 2006. The area had no previous record of flooding and was not shown on the Environment Agency's flood maps to be at risk of flooding. The two floods were caused by two extreme rainfall events, which overwhelmed the outdated combined sewer system.

This type of flooding is called pluvial flooding. BRE was involved in an ERA NET CRUE project (add web site reference?) to analyse the causes of the flooding and appropriate measures to manage flooding in the future. The extent of the sewer system was unknown and it was found out that two culverted streams were part of the sewer system. Severe flooding had occurred along these streams. New development had recently been connected to the system and this clearly had made the flooding worse. Part of the measures proposed was to add flood resilience to vulnerable buildings.

The options for flood resilience, based on dry proofing, are provided in some detail in this note. It should be noted that the requirements for individual buildings should be assessed. Issues such as the location of any building in relation to the urban layout are important to the risks and the degree of impact in any future periods of intense rainfall.

2 Determining the buildings resilience strategy for Heywood

Choosing the right resilience strategy for the repair of buildings in Heywood requires consideration of a number of aspects of the area, the floods and the buildings. This section considers each of these aspects in order to determine the correct approach.

Consideration has been taken of the main guidance documents in the UK on flood resilient buildings. The first of these items of guidance considers repair standards (Garvin et al, 2005), whilst the standards for new build can be found in recent guidance from the UK Government (CLG, 2007).

2.1 Assessment of the area impacted by the floods

Heywood can be characterised as an undulating urban landscape. Developments took place from before the 1900's to recent development that fills gap site or redevelops older non-residential sites into housing.

The two culverted streams originally drained the area and they have been incorporated into the area's drainage and sewer system, a combined sewer system. Since the 1960's the developments attached to this system have been increasing the 'water' load in times of intense rainfall. The extent of the sewer system is not completely known and new property development is still receiving planning permission.

Before the floods the area was not generally known to be flood prone and therefore the residents and their homes, naturally, were not prepared for the floods.

The area is vulnerable to flash flood (pluvial flooding) and the highly urbanised nature of the area means that individual properties, streets or even a wider area may be subject to flood.

2.2 Assessment of flood risk

The Heywood area has flooded twice in the last 4 years, in August 2004 and July 2006, there has been no record of earlier flood events. Both events can be characterised as extreme summer rainfall, the July 2006 storm was estimated as a 1 in 50 or less storm. The excessive rainfall overwhelmed the drainage system and caused flooding. This type of pluvial flooding (flash flooding) is difficult to predict, an advance warning can only be given at a maximum of two hours in advance

Both floods resulted in the flooding of approximately 200 homes with flooding depth of up to 0.9 m of sewage contaminated water for up to three hours. Around 90 properties had to be evacuated for renovation. Figure A3.1 shows the different mechanisms for flood water to enter a home. In Heywood water typically entered because of sewer backflow, through air vents and doors and windows.

The flood risk typically shows that short duration floods of shallow depth are likely to occur. Only in exceptional circumstances are the buildings likely to be flooded to a depth of greater than 1 m.

2.3 Assessment of building damage

The damage to the homes in Heywood which experienced internal flooding was typically to all downstairs flooring, plaster, furniture, fixtures and fittings. The repairs that resulted involved decontamination to rid the property of contaminated matter and then drying. The repairs

required vary considerably in the area, dependent on the flood depth and the type of building structure and its design. The detail of repairs was not available other than descriptions given by householders.

The damage caused by flooding was primarily associated with the following:

- Internal walls
- Floor structure
- Furniture
- Carpets and wall coverings.

No structural damage was found in any of the properties, although material damage to the above items resulted.

2.4 Flood resilience strategy

The flood proof strategy which could be applied in this area is dry proofing. This means preventing the flood water from entering homes and indeed other buildings. This type of flood proofing strategy is especially suitable for area with floods that have the following:

- short duration, less than four hours,
- flood depth of up to 1 m,
- relatively high (in this case unknown) frequency.

Basically, dry proofing measures delay the entering of flood water into a home, if consistently applied. As the floods experienced have a relative short duration and shallow flood depth, flood water will not enter the homes over this period.

For additional risk reduction some wet proofing might be used. This might involve items that reduce the vulnerability of the internal parts of the building to flood water should it get past the dry proofing measures. Some recommendations on easy wet proofing measures are described later in this report.

The cost of the flood repair methods, dry proofing and additional wet proofing, should be in proportion with the cost of repair that is likely to occur. The cost may be offset against reductions in insurance premiums and higher excess payments.

3 Assessment of dry proofing measures for Heywood

Dry proofing can be done in two ways, which partially overlap: temporary dry proofing and permanent dry proofing. Permanent dry proofing is typically more expensive, but more reliable, as it does not require a person to install it in the event of a flood. In this case it is important to note that for the floods there is only limited warning available. For the cheaper temporary dry proofing system to work a person or local organisation has to be available at all time. In this section three strategies for flood proofing are described and analysed, one is a temporary strategy and two are permanent. The strategies are described here in limited detail.

3.1 Temporary dry proofing

This variant protects a home against flooding with a depth of up to 0.7 m (CLG, 2007). Furthermore components are only used in case of floods and usually don't have permanent fittings. In this way the exterior of homes is little altered. Most products need to be installed, so they should be able to put them into place when floods are expected.

Typical components of dry proofing that could be used at Heywood are as follows:

- Install airbrick covers to prevent flooding through air vents. A number of proprietary products are available that can be used to cover air bricks and other air vents. These should not be left in place permanently as the air bricks supply vital ventilation of subfloor voids. If air bricks do not exist then the floor is likely to be solid and thus no subfloor void exists.
- Use door boards, like the kitemarked Floodgate, to close door openings. These need to be put into place in the event of a flood warning.
- Seal holes, cracks, joints and re-point the mortar to make the wall water tight. This will require the use of appropriate materials and good workmanship in order to create a water tight wall. Advice on materials and workmanship is provided in the flood standards of repair report (Garvin, 2005). These repairs to the wall may be considered permanent by some, but they will require maintenance and checking as to their ongoing effectiveness.
- Use of colourless water repellent treatments to apply a waterproof coating to brickwork, blockwork or possibly stone surfaces. These coating will help to resist wetting of the masonry wall over short duration floods. The materials used should be suitable for the substrate and be of the correct quality. Colourless water repellent treatments need to be reapplied on a frequency of approximately every five years.

See examples in figure A3.2.

Strengths

The strengths of temporary dry proofing are as follows:

- Quick deployment possible
- Relatively cheap, costs around £3,000 per house
- Proven in certain flood situations, including small urban catchments floods.

Weaknesses

The weaknesses of temporary dry proofing measures are as follows:

- Require deployment, maintenance and suitable storage
- If people are away from home or are unable to deploy them e.g. elderly or disabled people then flood water will enter the home.
- Most floodgates offer protection up to approximately 0.7 m, in order to work up to 1 m then different products will need to be sourced.

3.2 Permanent dry proofing – variant 1

This variant offers the same protection as the temporary variant, but does not need deployment in the event of flood warning. It can result in an alteration to the exterior of the home.

Permanent dry proofing of this type consists of the following components:

- Flood proof doors, which should prevent leakage of the flood water through the door leaf or through the junction between the door and the surround masonry.
- Backflow valves to prevent sewage backflow. Flooding can cause sewage from sanitary sewer lines to back up into houses through drain pipes. These backups not only cause damage that is difficult to repair but also create health hazards. Backflow valves are available in a variety of designs that range from the simple to the complex. A gate valve is one of the more complex designs available. It provides a strong seal, but must be operated by hand. So the effectiveness of a gate valve will depend on how much warning you have of the flooding. Simpler valves include flap or check valves, which open to allow flow out of the house but close when the flow reverses. These valves operate automatically but do not provide as strong a seal as a gate valve.
- Periscope air bricks, the water cannot enter the wall through the air bricks when the external ventilation is above the likely flood depth. The use and positioning of the periscope vent will depend on assessment of the likely flood depths around the individual building.
- External render applied to the external wall of the building, this could be a proprietary product or a site mixed material. The render will be effective over a short duration flood, although it may become wet it will resist leakage of water if it is in good condition. Renders typically have a lifetime in excess of 30 years and therefore are considered permanent.

See examples in figure A3.3.

Strengths

The strengths of permanent dry proofing of this type are as follows:

- Reliable protection
- Effective.

Weaknesses

The weaknesses of permanent dry proofing of this type are as follows:

- Relatively expensive, costs around £6,000 per house
- Flood resistant doors only applicable in flood depths smaller than 0.6 m.

3.3 Permanent dry proofing - variant 2

This dry proof variant aims at flood protection on the property border. Rather than flood proofing the home, a protecting wall around the property prevents flood damage.

The components of this variant of permanent dry proofing include the following:

- Flood protection wall around the home or multiple homes. The wall should be of good construction, using low absorption masonry materials such as engineering brick. Good quality workmanship as well as design of the freestanding walls are required.
- Floodgate across the driveway or entrance walkway. These gates should be kept closed at all times except when there is a need for car access or people to access the property.

See examples in figure A3.4.

Strengths

The strengths of permanent dry proofing of this type are as follows:

- Suitable for flood depths up to 1.2 m
- Effective.

Weaknesses

The weaknesses of permanent dry proofing of this type are as follows:

- Expensive, costs around £ 8,000 per house
- Might require pumping facilities to pump seepage away.
- Increases flood risk to neighbours

3.4 Wet proofing recommendations

If the flood water does manage to enter the building despite the use of the dry proofing measures proposed above, to limit the damage there are some simple (permanent) wet proofing measures recommended here. A list of affordable wet proofing measures and their approximate extra costs per home can be found, as follows:

- Replace mineral insulation with more flood resilient closed cell insulation (£300-400).
- Raise electrics to at least one metre above floor level (£300-500).
- If plasterboards are used, make they are hung horizontally, because in case of flood damage only on has to be removed (£0).
- Use lime or cement based plaster in stead of gypsum based plaster. Gypsum deteriorates rapidly after being in contact with flood water (£3000).
- Move washing machines and other equipment to the first floor (£0).
- Raise kitchen equipment like the oven and the fridge 0.5 metre above ground level (£400).

4 Conclusions

The flooding events of 2004 and 2006 in Heywood indicate that the people of Heywood could expect more flooding in the future. Especially when no big measures are taken to reduce the flood risk, the community should be prepared for more. The proposed resilience options are useful to reduce the flood risk on a property level.

The following points are concluded from the Heywood study of buildings resilience strategy:

- The nature of the urban land, flash floods of short duration and shallow depth and buildings lends itself to the use of dry proofing technologies to protect against future floods. Some limited wet proofing may also be considered.
- Two types of dry proofing can be considered, either temporary or permanent measures.
- Temporary measures require either installation once a flood warning is given or flood is imminent. These are lower costs, but have risks that they may not be fitted in time.
- Permanent measures may either be applied to the building or to the boundary of the property. They will be more expensive, but should not require to be fitted in the event of a flood.
- Further wet proofing measures should be considered if there is a risk of the dry proofing being 'over-topped' and they are of a cost that is in proportion to the benefit realised.

Flooding Mechanisms

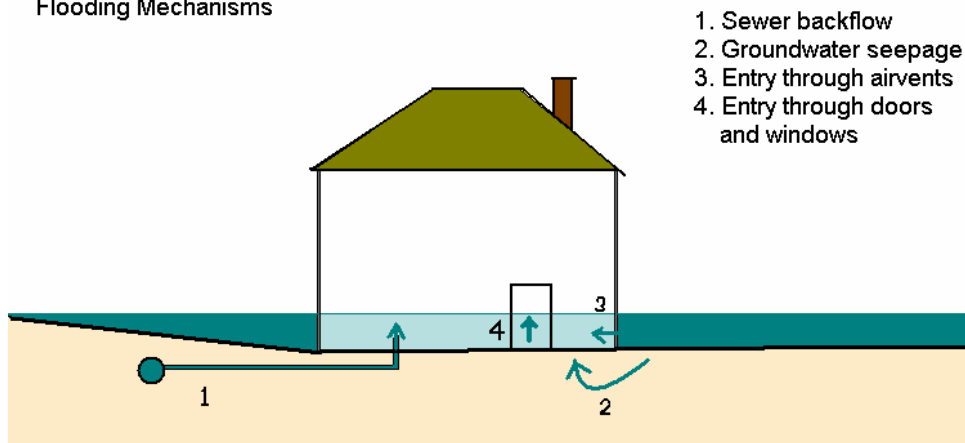


Figure A3.1: Flood water entry in buildings

Temporary dry proofing

1. Door board
2. Air brick cover

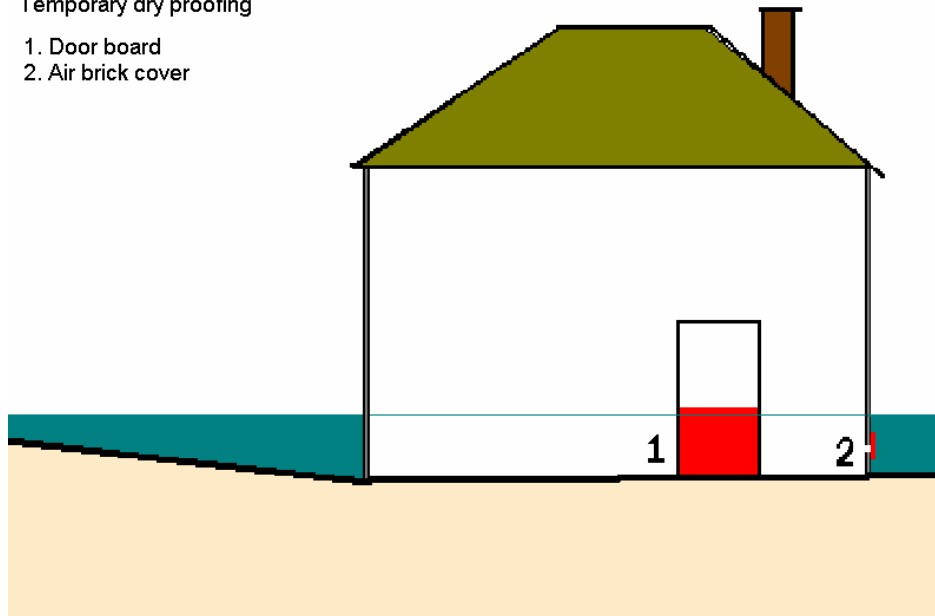


Figure A3.2: Temporary dry proofing

Permanent dry proofing 1

1. Backflow valve
2. Floodproof door
3. Periscope air brick
4. External render

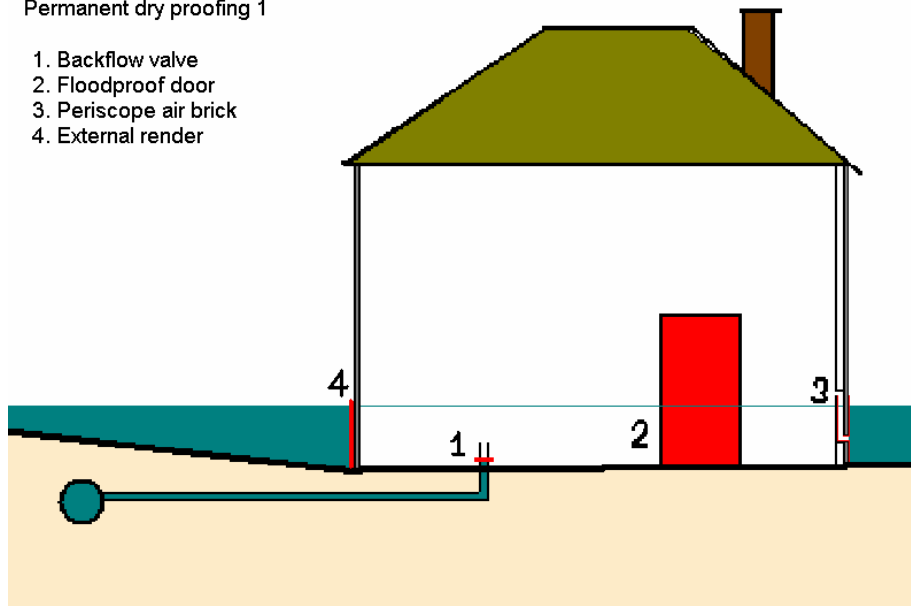


Figure A3.3: Permanent flood proofing – variant 1

Permanent dry proofing 2

1. Flood wall

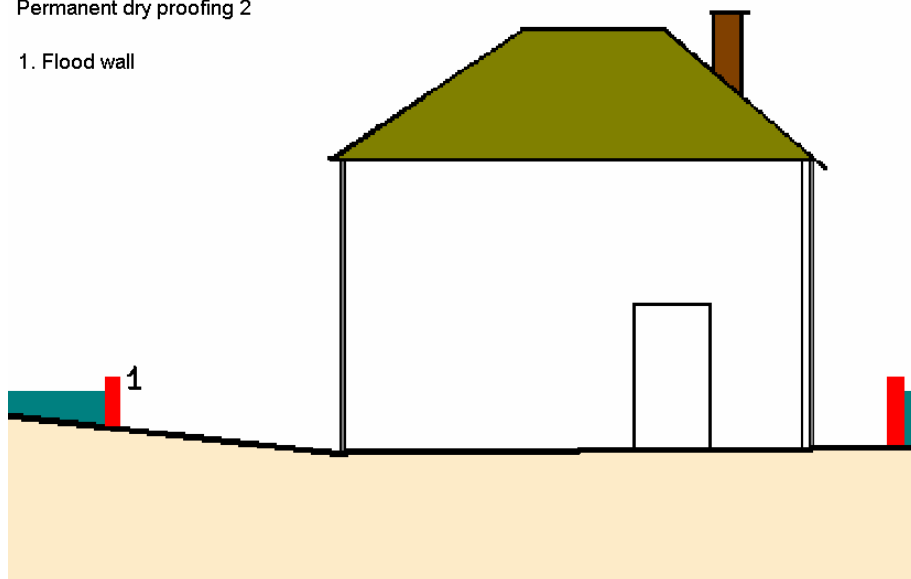


Figure A3.3: Permanent flood proofing – variant 2