LOCAL DEVELOPMENT FRAMEWORK

CORE STRATEGY SUBMISSION DOCUMENT

STRATEGIC FLOOD RISK ASSESSMENT

OCTOBER 2006

1 EXECUTIVE SUMMARY

This is an overview document for those involved in the Ashford Town Centre, the Greater Ashford Development Frameworks and the wider borough. It presents the main points from PPG25 in the context of the Ashford growth area. It is intended to provide clarification but in no way prejudices the rights and responsibilities of the Environment Agency, Ashford Borough Council, developers, landowners or other operational and planning organisations. Please refer to PPG25 (Development and Flood Risk) and 'Land Drainage and Flood Defence Responsibilities' (Institute of Civil Engineers) for further detail and guidance.

Ashford Borough Council (henceforth referred to as 'the Council') and the Environment Agency (henceforth referred to as 'the Agency') seek to:

- Protect floodplains and prevent development that would create an unacceptable increase in the risk of flooding on site or elsewhere;
- Restrict developments that would be subject to an unacceptable risk of flooding;
- Prevent developments that would adversely affect the water environment as a result of an increase in surface water run-off;
- Protect existing or proposed flood defences and prevent interference with the ability of the Agency or other bodies to carry out flood control works and maintenance activities;
- Prevent developments that would require additional public finance for flood defence works.

The Agency's following policy has been adopted for accepting or rejecting planning in relation to the flood plain in the Ashford Growth Area:

1.1 GREEN FIELD SITES (GREATER ASHFORD AREA)

The Agency will object to inappropriate development within the area defined by the 'Undefended' 1% (1 in 100 year) flood unless the conditions in Section 7.7 can be met to the Council's and Agency's satisfaction. As a precautionary measure, the Agency would strongly advise that inappropriate development is not permitted within the area that includes the predicted effects of climate change (20% increase in peak flows).

1.2 ASHFORD TOWN CENTRE

The Agency would object to any inappropriate development within the area defined by the 'Defended' 1% (1 in 100 year) flood. Development within 'Undefended + Climate Change' (see above) will only be accepted when areas outside the flood plain have been exhausted and given a number of conditions set out in PPG25. The Agency will require a thorough Flood Risk

Assessment for any proposals in these areas. No development should be within 8 metres of any watercourse.

1.3 TENTERDEN AND THE VILLAGES

The Agency would object to inappropriate development within the area defined by the 'Undefended' 1% (1 in 100 year) fluvial flood nor the 'Undefended' 0.5% (1 in 200 year) tidal flood unless the conditions in Section 7.7 can be met to the Council's and Agency's satisfaction.

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2 INTRODUCTION

The Government aims to reduce the risks to people and the developed and natural environment from flooding by discouraging further built development within floodplain areas and promoting best practice for the control of surface water run off.

This document is intended to give guidance on how Ashford Borough Council will make objective judgements on land allocations relative to a risk based approach to development through the application of the sequential test, as described in Planning Policy Guidance Note 25 "*Development and Flood Risk",* (PPG25). In this regard it supplements the guidance on site specific Flood Risk Assessment given in Appendix F of that document.

PPG25 does not explicitly require local planning authorities (LPAs) to produce a Strategic Flood Risk Assessment (SFRA) when preparing development plans. However, PPG25 does recommend that, when drawing up or revising local development documents, LPAs should give priority in allocating sites for development in descending order of flood risk. Ashford Borough Council will do this through the application of this SFRA.

There is, therefore, a requirement for LPAs to use the Sequential Test, as set out in paragraph 30, Table 1 of PPG25, and to explain reasons for any departures when preparing their local development documents.

The Environment Agency has produced Indicative Floodplain Maps, (IFM), which show the extent of Flood Zones as defined in Paragraph 30 of PPG25. This information has been used by Ashford Borough Council to determine the appropriateness of otherwise of development locations.

Actual flood risk may vary within flood zones according to any number of factors, including the standard of any protection provided, distance from the source of flooding, local topography and features. These issues should be investigated further in site specific Flood Risk Assessments (FRAs).

The SFRA has been strongly informed by the Integrated Water Management Study (IWMS) carried out for the Ashford Growth Area, completed in 2005. The Ashford Integrated Water Management Study (EA/BV 2005) considered all aspects of water management that will need to change to accommodate the additional pressures that will result from the growth of Ashford to 2031.

The purpose of this SFRA is to:

- Set the planning context under which flood risk should be considered.
- Increase the understanding of flood risk and explore the history of flooding as it has affected the Borough.
- Identify the areas within the Borough that are at risk of flooding for all Flood Zones identified in Table 1, PPG25.

- Identify, within Flood Zone 3, the variations in the actual flood risk including the affect of any defences, and the possible implications of climate change.

- Assess the impact of surface water run off from proposed developments in areas where the receiving system is known to be inadequate.

- Advise on locations where specific flood mitigation measures are likely to be required.

- Provide guidance on planning policies to ensure development is safe.

The above will enable Ashford Borough Council to make informed decisions on allocating sites using the risk-based, sequential test. At this strategic level the SFRA will address flood risk issues at the catchment / development plan scale. Guidance suggests that SFRAs should be undertaken by LPAs as early as possible in the planning process to avoid misplaced effort and raising landowner expectations where land is not suitable for development from a flood risk perspective.

2.1 PRINCIPAL OBJECTIVES

The principal objectives are to produce an assessment of:

- Flood risk to potential development areas within the identified PPG25 Zones. [It should be noted that the Environment Agency might object to any land allocations identified within Zone 3 if it is shown (as a result of this SFRA) that there are suitable alternative sites in areas of lower flood risk].

- Actual flood risk in Flood Zone 3 where, because of the area covered by the indicative floodplain, there are no alternative sites available for allocation in areas of lower flood risk. The assessment has regard to all factors that may reduce the risk, including the presence and standard of existing flood defences.

- The potential increase in flood risk to existing developments due to the run-off from any future large-scale developments in all flood zones. Where large-scale developments are proposed, and there is an identified need to reduce surface water run off, the opportunities for the use of SuD systems are suggested.

- The potential increase in flood risk having regard to the standard climate change scenario, assuming that the existing flood defences are maintained at their current standard over the next 50 years.

- The effect of flood defence failures, principally bank breaching, to establish areas of rapid inundation, (see paragraph 69 PPG 25), and the extent of flooding from such a breach.

- The extent and budget cost of any works required to raise the flood defence standard to 1% for fluvial defences, or 0.5% for coastal/tidal defences, wherever the existing standard of defence is found to be below this.

2.2 GENERAL CONSIDERATIONS

2.2.1 Origin and Accuracy Of Flood Envelope

In consultation with the Agency the derivation of the flood envelopes shown on published flood maps should be determined. The following should be assessed:

- If a recorded event – what is the estimated return period?
- If a modelled event what was the model methodology and what degree of confidence can be attached to the results?
- If a tidal flood envelop, how was this defined?
- Do flood extents for varying return periods exist? – the Agency may have limited data for other return period events.

2.2.2 Flood Defence Standard of Protection

The actual standard of protection against flooding, i.e. the flood return period event above which channel capacity or defence level is exceeded, should be established for each location where land allocations or developments are proposed.

In consultation with the Agency and/or Internal Drainage Board (where appropriate) the following should be determined for particular development areas and should take into account appropriate allowances for model tolerances, freeboard, climate change, settlement etc:

- Flood return period event determined in accordance with the procedures in the Flood Estimation Handbook, at which channel capacity, or defence level, is exceeded. It should have regard the appropriate degree of freeboard (see below)
- *It should be noted that where the Agency may have data relating to actual flood defence standards of protection, the probability will be that these were assessed using techniques in the now superseded Flood Studies Report. Therefore in order to be satisfied as to the actual standard of protection, a re-assessment in line with the techniques in the current Flood Estimation Handbook should be made*
- Condition of raised defence (if appropriate).

2.2.3 Freeboard

In determining the standards of protection against flooding offered by existing flood defences an appropriate allowance for freeboard must be included.

Freeboard (the difference between designed flood level and the lowest point of the defence level) is essentially a safety margin to ensure that the defence performs with a high degree of certainty. The freeboard allowance takes account of, inter alia, uncertainties in hydraulic modelling, accuracy of hydrological method, physical processes, etc.

The Agency has produced:

- R&D Technical Report W 178 "Tidal & Coastal Freeboard Guidance Note" for the detailed assessment of potential for overtopping of seawalls and;

- R & D Technical Report W 187 "Fluvial Freeboard Guidance Note" for practical guidance for the design and benefits of freeboard for fluvial flood defences,

Overtopping or breach scenarios for raised defences, whether tidal or fluvial, should consider the resulting speed of inundation and the extent of the area behind the defence over which this is likely to occur. This area, the rapid inundation zone, would obviously be at greatest risk in the event of a breach and development within this zone should not be considered unless absolutely necessary, (see paragraph 69, PPG 25).

Additional scenarios to consider are the consequences of failure of either pumped drainage and/or the non-operation or structural failure of barriers intended to prevent tidal ingress into fluvial systems.

In upland defended areas consideration should also be given to the possible effects of mechanical or structural failures where for example the defence comprises a flood storage facility or some type of barrage structure.

The potential for overtopping of public water supply reservoirs as a result of major rainfall events should also be considered. Where canal systems are present it should be borne in mind that these too can present a flood risk in major events and that water levels within them may even be influenced by events occurring outside the natural river catchment.

3 THE PLANNING FRAMEWORK

The purpose of this SFRA is to investigate the probability and the consequence of flooding to potential development sites identified in the Ashford Local Development Documents.

There are, however, higher level documents that have to be taken into account. These include national planning legislation and policy guidance, Regional Planning Guidance, the South East Plan and the Kent Structure Plan. This SFRA has not tested the viability of these higher level plans.

The planning process is driven by legislation and guidance developed at national, regional and local level, with flood risk being one amongst many planning considerations which have to be balanced with each other in making land use decisions. The challenge for an SFRA is to develop pragmatic solutions that take into account the different requirements of all of these policies and deliver guiding principles to steer future development in a sustainable manner whilst mitigating flood risk. These policy drivers are listed below, a more detailed description of the polices can be found in Appendix A.

Table 1 Planning Framework

National Planning Policy	Planning and Compulsory Purchase Act PPG25 Development and Flood Risk Other Planning Policy Statements The Sustainable Communities Plan Making Space for Water
Regional Planning Policy	RPG9 Draft South East Plan (Regional Spatial Strategy) Kent and Medway Structure Plan (KMSP) River Stour Catchment Flood Management Plan Shoreline Management Plan Draft Catchment Flood Management Plan
Local Planning Policy	Ashford Borough Local Plan 2000 Greater Ashford Development Framework (GADF) (2005) Ashford Local Development Framework Core Strategy Development Plan Document (DPD) Ashford Town Centre Area Action Plan (DPD) Sustainable Drainage Supplementary Planning Document (SPD)

4 UNDERSTANDING FLOOD RISK

Floods come in many sizes, with varying degrees of magnitude and frequency. Rivers and coastlines are, on occasions, expected to flood – it is a natural process. Rivers and coastlines each have their own probability of flooding. Probability is a statistical term having to do with the size of a flood and the odds of that size of flood occurring in any year.

For each river, or coastal location, engineers assign statistical probabilities to different size floods. This is done to understand what might be a common or ordinary flood for a particular river, or coastal location, versus a less likely or more severe flood for that same river, or coastal location.

In order to have common standards it has become normal practice in England and Wales to refer to the 'one-percent annual chance flood'. This approach is also followed in the USA where it is known as the 'base flood'. The one-percent annual chance flood is the flood that has a one-percent (one out of 100) chance of occurring in any given year (the annual probability of occurrence). This event is often referred to as the 100-year flood or the 1 in 100 year flood.

The one-percent annual chance flood was chosen as a compromise between a more frequent flood (such as a 10% flood (or 10-year flood)), which would permit excessive exposure to flood risk, and a more infrequent flood (say, a 0.1% flood (i.e. 1,000-year flood)), which would be considered an excessive and unreasonable standard.

The annual probability is sometimes also known as the 'return period'.

4.1 THE 1 IN 100 YEAR FLOOD

The one-percent annual chance flood is also called the 100-year flood because the inverse of one percent (one divided by one percent or 0.01) equals 100. This calculation gives us the flood's recurrence interval, in terms of probability, which is 100 years. The term "100-year flood" is often misconstrued. Commonly, people interpret the 100-year flood definition to mean "once every hundred years." This is wrong. You could experience a 100-year flood two times in the same year, two years in a row, or four times over the course of a hundred years. You could also not experience a 100-year flood over the course of 200 or more years. However, over an extended period you could expect to experience a 100-year flood, on average, once every hundred years.

It is to avoid this confusion (and because probabilities and statistics can be confusing), in the USA the term "base flood" is used. A 100-year base flood is defined as having a one percent (1%) chance of being reached or exceeded in any single year. Thus, the 100-year flood also is called the "one-percent annual chance flood." To restate, "100-year flood" and "base flood" both refer to a flood that has a one percent chance of occurring in any given year. The terms "base flood," "100-year flood," "1% flood" and "one-percent annual chance flood" are often used interchangeably.

It is important to recognise that a 1% flood has a 26% probability of being equalled or exceeded at least once in 30 years (the duration of a typical mortgage) and a 50% chance of being equalled or exceeded at least once in 70 years (a typical human lifetime).

4.2 OTHER FLOOD PROBABILITIES

Whilst it is standard practice to use the 1% flood for comparative purposes for river floods, a more severe event - the 0.5% flood (200-year flood) - is commonly used for tidal events. For a site with a 0.5% annual probability of flooding there is a 36% chance that the property will flood at least once in a 100 year period.

Planning Policy Guidance Note 25 "Development and Flood Risk", published in July 2001, categorises three Flood Zones for planning purposes as shown below. These flood zones form the basis of our Flood Risk Maps.

Table 2. Flood Risk

FLOOD ZONE	DEFINITION	ANNUAL PROBABILITY (%)	RETURN PERIOD
1	Little or no risk	River, tidal or coastal less than 0.1%	River, tidal or coastal less than 1000-year
2	Low to medium risk	River 0.1% - 1.0%	River between 1000-year and 100-year
		Tidal & coastal 0.1% - 0.5%	Tidal & coastal between 1000-year and 200-year.
3	High risk	River 1.0% or greater	River equal to or greater than 100-year.
		Tidal & coastal 0.5% or greater.	Tidal & coastal equal or greater than 200-year.

4.3 PPG25 SEQUENTIAL CHARACTERISATION OF FLOOD RISK

On the maps provided by the Environment Agency Zone 1, little or no risk is shaded white. Zone 2, low to medium risk, is shaded turquoise and defines the area between Zone 1 and Zone 3. The outer edge of this zone is referred to as the 'Extreme Flood Outline' and defines the limit of the 0.1% flood (1000-year). Zone 3, high risk, is shaded blue and shows those areas with the highest probability of flooding.

4.4 FLOOD PROBABILITY AND INSURANCE

The Association of British Insurers (ABI) has stated that the minimum level of protection which would enable insurers to offer cover *at normal terms* for residential properties is a 0.5% probability (200-year return period).

Insurance may be unavailable or unaffordable in areas at greater than 0.13% flood probability (75-year flood).

Chance of Flooding over a Period of Years

It is important to appreciate that flood probability should be evaluated over the lifetime of a development. Most of today's new development can be expected to last a minimum of sixty years. It is therefore essential to consider the probability of flooding over a much longer period, in keeping with the development's expected life.

Table 3. Annual Probability of Flooding

Development life (years)	Annual Probability of Flooding			
	2%	1%	0.5%	0.1%
	1 in 50	1 in 100	1 in 200	1 in 1000
10	18%	10%	5%	1%
20	33%	18%	10%	2%
50	64%	39%	22%	5%
70	76%	50%	30%	7%
100	87%	63%	39%	10%
200	98%	87%	63%	18%

4.5 LIFETIME PROBABILITIES OF FLOODING

Even these numbers do not convey the true flood probability because they focus on the larger, less frequent, floods. If a house is low enough, it may be subject to the 10-year or 25-year flood. During a 30-year mortgage it may have a 26% chance of being hit by the 100-year flood, but the odds are 96% (nearly guaranteed) that it will be hit by a 10-year flood. Compare these odds to the only 1-2% chance that the house will catch fire during the same 30-year mortgage period.

4.6 CLIMATE CHANGE

It is widely acknowledged that climate change will place further pressures on our rivers and coastlines. It is predicted that future climate change will result in more frequent river flooding through increased storms and winter rainfall. Coastal flooding is also predicted to increase as a result of sea level rise and increased storm surge conditions.

In the South East it is anticipated that winter peak flows in our rivers may increase by 20% over the next 50 years. The impact of this is to effectively halve return periods, or, put another way, double probability. So an event currently with a 2% probability (50-year return) would have a 4% probability (25-year return) in 2050.

Sea levels along our coastline are already rising by 4 to 7 mm a year, as the sea becomes warmer. More severe coastal storms can be expected – storm surges can raise sea levels by as much as 5 metres. In addition, mean wave heights are increasing.

The January 1953 tidal flood was the most catastrophic flood to hit the South East. At the time this event was calculated to have a probability of one in 200 years (0.5%). An event of similar magnitude can now be expected once in 50 years (2%). Obviously our flood defences are more robust now than they were then.

4.7 FLOOD DEFENCES

Flooding from natural events can be reduced but can never be eliminated. The Flood Zones defined in PPG 25 and presented on our Flood Zone Maps ignore the existence of flood defences. Maps currently being produced will show the location of defences and the areas currently protected.

The standard of defences provided varies from location to location, and also with time. For example, the defences that were constructed along much of the Thames Estuary were designed to protect to a 0.1% standard (1000-year) until the year 2030. With climate change the standard progressively reduces and we are currently assessing what works will be required to maintain this standard until 2100.

For example, a property currently shown on our maps to be in a High Risk Flood Zone, that is within the 1% (100-year) river floodplain. The location benefits from a flood defence constructed 20 years ago to give protection from a 2% probability (50-year) flood event for a 60-year design life. It can be seen that it is not simple to define the probability of flooding. A location such as this would not be considered suitable for new development unless the defences were substantially improved to give the appropriate minimum standard of defence for the lifetime of the development. The property may or may not be likely to flood from a 0.13% (75-year) flood and therefore insurance may be unobtainable. The site is definitely at risk from the 200-year event (0.5%) and therefore insurance premiums are likely to be affected.

4.8 FLOOD RISK

We have concentrated above on flood probability or likelihood. However, "Flood Risk" is a combination of both likelihood and consequence. Some sites, such as much of the Ashford Borough, have low probability of flooding (due to the good standard of defences, such as the two flood storage reservoirs at Aldington and Hothfield) but a high consequence should flooding occur because of the development there. Other sites may have a high probability of flooding due to the lack of defences or low-lying ground levels but low consequences because the land use is flood tolerant (for example, Willesborough Dykes).

It can be seen that risk is a factor of probability and consequences of harm (or damage) associated with a particular hazard.

4.9 MORE INFORMATION

The Environment Agency provides a variety of information regarding flood risk and flood risk management. The main sources of information are Floodline (08459 88 11 88), the Environment Agency web site: www.environment-

agency.gov.uk our flood warning service and flood mapping. We also run annual flood awareness campaigns.

We have developed a look-up tool on our web site called "What's in my backyard?" which enables the public to input their postcode to find out general information on flood risk in their area. The local Area office can provide more detailed information for which an administrative charge may be required. Contact our general enquiry line on 08708 506 506.

The Association of British Insurers (ABI) also have information on flood risk on their web site: www.abi.org.uk

4.10 FLOOD PLAIN MAPPING

The Indicative Floodplain Maps, (IFM), published by the Environment Agency indicate the best estimate of flooding as a result of a 1% fluvial or 0.5% tidal annual event, ignoring the presence of defences. These maps therefore indicate the extent of flood zone 3, PPG 25, and are indicative only. The Agency will refine and republish maps, as better information becomes available. These flood maps will provide a starting point for a SFRA. The Agency may hold additional data such as flood defence standards and computer models that may be utilised as part of SFRA.

5 BACKGROUND TO ASHFORD FLOODING[1]

5.1 PHYSICAL GEOGRAPHY

The Kentish Stour catchment is the second largest catchment in Kent, encompassing 255km of designation Main River, which discharges to the English Channel through Pegwell Bay, near Sandwich. Ashford lies at the confluence of five designated Main Rivers, the principal ones being the Great Stour and East Stour.

The physical geography of the catchment is dominated by the chalk of the North Downs, which forms both the main topographical feature and results in the baseflow dominated nature of many of the river channels. The catchment is largely rural in character and includes some of the most productive agricultural land in Kent.

The geology of the catchment is predominantly Chalk, with outcrops of Gault Clay, Lower Greensand and Weald Clay along the south-west margins. The East Stour rises on the Weald Clay and is consequently clay-bedded along most of its length. The Great Stour, however, rises on the permeable Lower Greensand and receives a greater proportion of its flow from Chalk springs at the foot of the North Downs.Average annual rainfall varies over the catchment and averages 750mm around the upper Stour, but is higher on the top of the North DownsUpstream of Ashford - Annual surface runoff is strongly influenced by topography and geology. The Upper Great Stour receives some quick runoff from Gault Clay but is generally slower to respond to heavy rainfall than the East Stour and the smaller Aylesford Stream, Whitewater Dyke and the Ruckinge Dyke. This is because Gault and Weald Clays dominate their catchments.

Significant channelisation measures have been limited to key points within urban areas, such as the Aylesford Stream, through Ashford and where the Great and East Stour flow beneath the Channel Tunnel Rail Link and conventional railway. Flow in the Great Stour and East Stour is influenced by the operation of the Hothfield and Aldington Flood Storage Reservoirs during flood events.

[1] From 'Stour CFMP: Draft Inception Report R02' Environment Agency (2003)

Figure 1 Geology

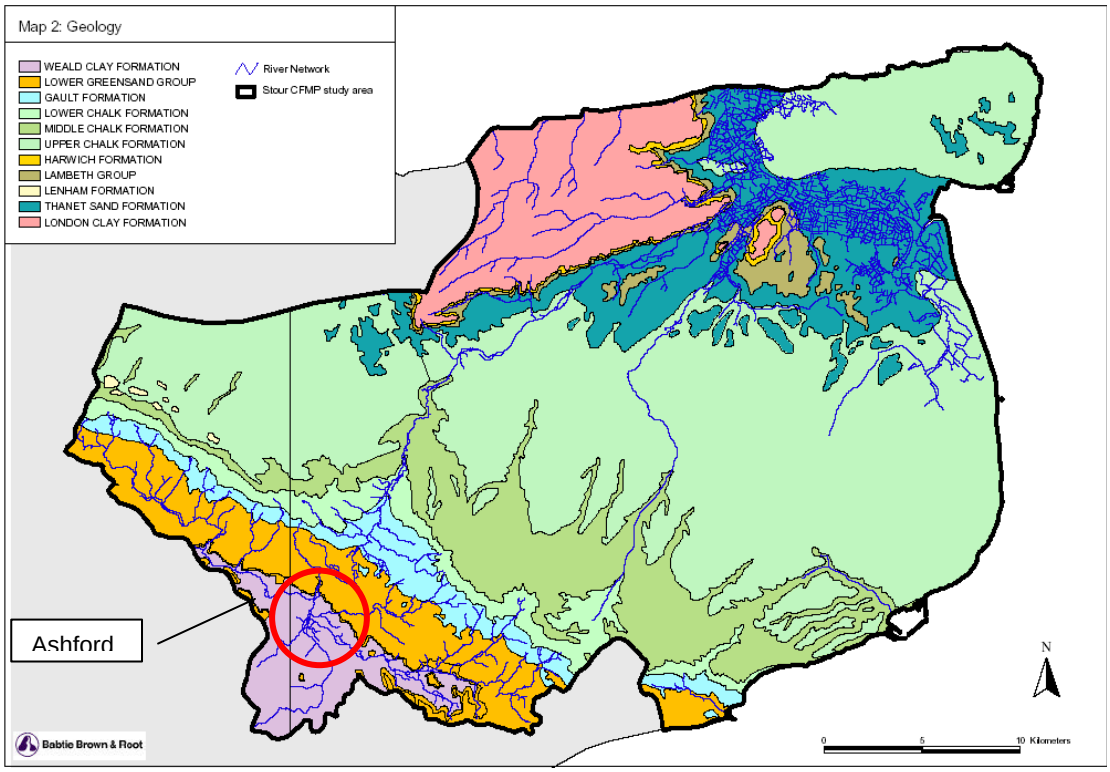
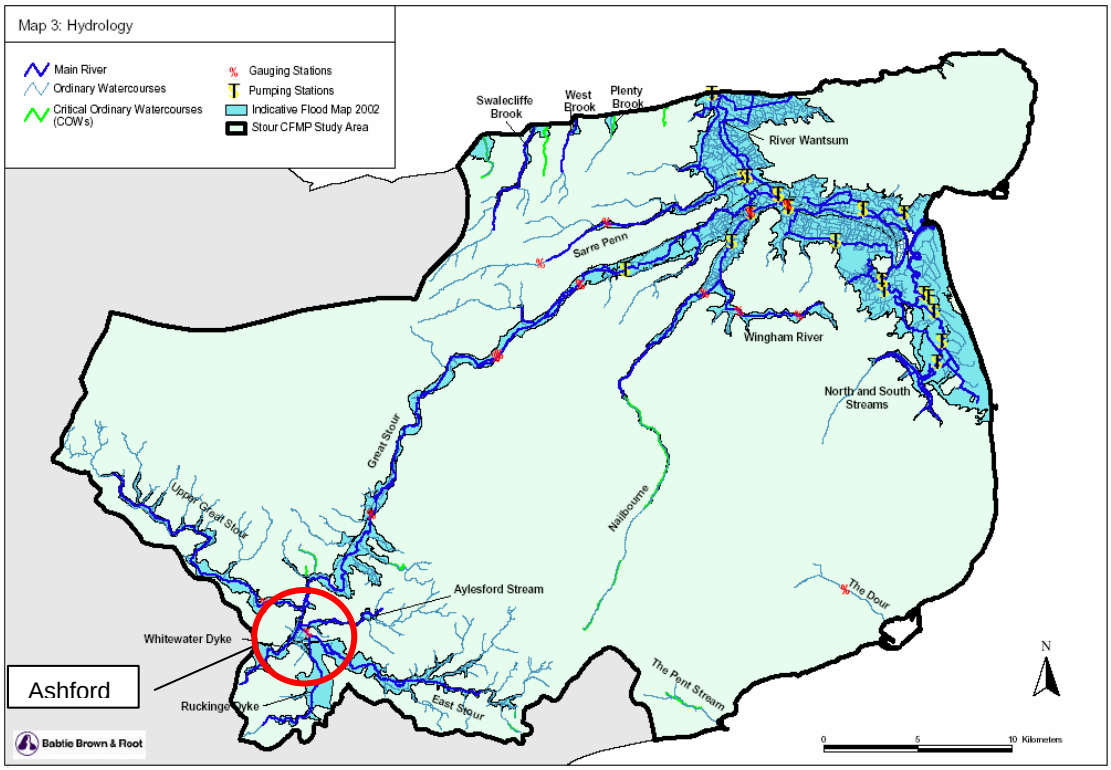


Figure 2 Hydrology



5.2 FLOOD KNOWLEDGE

The way in information about past flood events is recorded, disseminated and used, is material to the development of knowledge about flood risk and the development of solutions to risk avoidance and reduction.

The Environment Agency maintains records of past flood events and these are used in the preparation of the flood risk maps which are regularly revised and publicly available on the internet.

Southern Water keeps records of surface and groundwater flooding arising from surcharging of drains and sewers within its responsibility.

The level of awareness of past flood events in Ashford Borough is considerable and resides officers of longstanding employment who could be relied upon to recall past flood events, their causes, effects and any remedial measures taken from memory. Officers in engineering departments are more likely to be aware of these events than their planning colleagues because of their historic responsibility for drainage.

However, there is an urgent need to begin the process of codifying tacit knowledge held by employees and recording it on a database accessible to all officers who may need it.

The introduction of the National Flood & Coastal Defence Database (NFCDD) should ensure that such information is held in a central register in a GIS database format with clear responsibility for inputting and updating of data.

5.3 FLOOD RISK MAPPING

Crucial to the control of present and future development in the Ashford area are the Section 105 indicative flood risk maps generated by the Agency. The maps show the predicted 1 in 100-year flood extent. The maps are described as "indicative" as the Agency recognises the flood extent may change for a variety of reasons, including development changes in a river basin, improved hydrometric data, revisions to the standard methods of design flood estimation, and perhaps climate change.

Standard Section 105 flood risk maps for the Great Stour basin have recently been produced. These reports contain details of the hydrological studies carried out to help calibrate a computational hydraulic model of the Great Stour basin upstream of the M20 motorway and to derive the design flood runoff hydrographs for component sub-catchments of the model, that enable the model to define maximum flood water levels throughout the water courses included in the model.

A review of hydrological studies contained in these two reports for this study identified a number of issues likely to undermine confidence that can be placed in the 100-year flood outline maps for the Upper Stour basin based on these studies. These issues can be grouped under three headings, namely:

Data issues; including the general paucity of relevant information and the poor quality of the flood data at Chart Leacon and South Willesborough gauging stations;

Methodology; notably problems arising from the use of the version of the FSR/FEHTP PT unit hydrograph rainfall-runoff and losses model described in Volume 4 of the Flood Estimation Handbook to compute historic and design flood hydrographs for individual sub-catchments; and

Model calibration; particularly the poor calibrations obtained at critical locations in the Upper Stour basin during selected historic events.

The 2003 maps show a flood extent that generally lies within that predicted by the earlier indicative flood plain mapping. This is consistent with the improved flood protection provided by Aldington and Hothfield reservoirs. The Agency considers that the 2003 maps currently provide the best estimate of the flood extent in the Upper Stour basin. However, at a sub-catchment level within the Study Area,, it is self-evident from the issues identified above, that flood estimates associated with the proposed spatial development would be uncertain.

5.4 FLOOD HISTORY

During the 1960's and 1970's there were a number of instances of widespread flooding of both rural and urban areas in the vicinity of Ashford from the headwater tributaries of the River Stour. Further flooding from the Great Stour around Ashford in 1985 and 1986 increased the momentum for flood mitigation for Ashford.

A series of later studies culminated in a 1987 report that recommended the construction of two flood storage reservoirs upstream of Ashford. The reservoirs became operational in 1989 (Aldington) and 1991 (Hothfield) and appear to have been generally effective in defending Ashford.

There were three major flood events in the Upper Stour basin in Autumn 2000. One was possibly the worst in Kent since 1927 in many areas. Aldington and Hothfield reservoirs were unable to completely empty between these three events, and during the third, Aldington Reservoir overspilled. A second over-spilling of Aldington reservoir occurred in the spring of 2001.

Notwithstanding these local problems, there was only limited flooding downstream of the reservoir and in Ashford. The Agency Autumn 2000 Floods Review (Environment Agency, 2001) shows that the floods were less serious in the Upper Stour basin than elsewhere in Kent and suggests that these events may have had a return period as low as 1 in 25 years.

Historically, Ashford has been particularly vulnerable to fluvial flooding since run-off from the higher ground converges into the town via the East Stour, the Great Stour, Ruckinge Dyke, Whitewater Dyke and Aylesford Stream, all designated 'main' rivers.

Over the last 50 years the catchment has been subject to regular flooding, with notable events occurring in 1947, 1967, 1968, 1972,1973, 1979, 1985, 1986, 1988, 1998, 2000 and 2001.

Until the construction of the Ashford Flood Alleviation Scheme, the confluence of the two principal river, the Great Stour and East Stour, used to flood regularly - on average twice a year - to a depth of about 0.3 metres in the car park of the Stour Centre. Other flooding 'hotspots' included:

- the railway sidings and sports ground at Hythe Road;
- Beaver Road;
- South Stour Avenue;
- the area around Sevington Bridge;
- Flood Street, Mersham
- Victoria Park;

As a result of heavy rainfall flooding has occurred in Sevington and South Willesborough on several occasions, most notably in 1967 and 1972. An improvement scheme was designed to protect against flooding under rainfall conditions having a statistical frequency of once in 100 years. The scheme consists of channel improvements to the Aylesford Stream, including concrete banks, and the reconstruction of five over-river crossings.

Table 4 Flood History

Date	Details
Feb 2001	The 3 months following Nov 2000 were very wet, thus the catchment was saturated when heavy rain caused the Aldington reservoir to overtop on 7/8th February. Although overtopping only just occurred, the resulting flood was much worse than in the previous November, with about 30 dwellings flooded internally in South Stour Avenue, Eastmead Avenue and Riversdale Road, all from the East Stour.
Autumn 2000	Around 300 properties in Ashford are protected from flooding from the Great Stour by means of on-line storage reservoirs at Aldington and Hothfield. Excess floodwater is retained in the reservoirs by hydro-brakes, which automatically restrict the discharge to $4m^3/s$. They had been built as a result of floods in December 1985, January 1986 and November 1986. The standard of protection achieved by this is that floods up to a 1% probability (1 in 100 years) can be accommodated. In 2000, there were three main flood events: "Great Flood": 9^{th} – 14^{th} October; "Halloween Flood": 29^{th} – 31^{st} October; "Bonfire Night Flood": 5^{th} – 8^{th} November. For the first two flood events in October, the reservoirs performed their tasks satisfactorily. However, Aldington over-topped during the "Bonfire Night" event with an estimated additional $12m^3/s$ being discharged over the designed spillway. In the Agency's Kent Area, an estimated 2,400 properties were flooded by main river, non main river, surface water, groundwater and urban drainage systems during the autumn floods (15 September – 15 November). Flood defences and prevention of development in the flood plain prevented this from being higher. Following a month when there were two significant rainfall events but with no flooding downstream of the Aldington and Hothfield reservoirs, the storm which started on 5th Nov, resulted in the Aldington reservoir overtopping, discharging an estimated 12cumecs over the spillway (in addition to the "normal" outflow of 4 cumecs). As a result, three dwellings flooded in Mersham, but there was no flooding recorded to dwellings in Ashford.
12 Aug 1996	Very intense and moving local storm that passed through the Ashford area downstream of the Aldington and Hothfield reservoirs. Caused some flooding form

Date	Details
	the Great Stour at the entrance to the IRS multi story car park, and to isolated locations in the Ashford Urban area. Some commentators suggest the storm had a 500 year return period! This storm continued in a roughly south east direction to cause flooding at the Black Bull lane area of Folkestone.
30 Mar 1988	Damage not recorded
29 Jan 1988	Damage not recorded
Feb 1987	Similar flooding to 1972 and 1973 events, but less extensive.
21 Nov 1986	Damage not recorded
26/27 Dec 1985	Significant flood at North end of Beaver Road, similar to 1909 event. Believed to have peaked at 37.2mAOD, may have reached 37.3mAOD. Many houses in Beaver Road and South Stour Avenue area flooded internally. Most flood water believed to have come from Great Stour. This event prompted the construction of the on line storage reservoirs at Aldington and Hothfield. Excess water is retained in the reservoirs by flow control devices, and they were designed to keep the rivers within banks through the developed areas downstream to and including Ashford in 100 year return period events. Henwood Road flooding is significant since although dwellings are not affected, sole access to the industrial estate is precluded to other than high ground clearance vehicles.
28/29 Dec 1979	South Stour Avenue area (at least) flooded.
20-21 Sep 1973	Between September 1973, a major summer storm over Kent deposited 190mm of rain (almost a third of the average annual rainfall). This caused extensive flooding above and below Canterbury and on the Aylesford Stream in Ashford. Flooding was similar to the July 1972 event.
19 July 1972	On, a localised storm in the Aylesford Stream catchment (flowing into the east of Ashford) received 20-60mm of rain. It caused extensive flooding that in places was higher than the major floods of 1968. About 40 properties flooded
November 1967	Heavy rainfall at the end of October and the beginning of November gave rise to extensive flooding on virtually all rivers in the area
Dec 1960	There was flooding on the Stour above and below Ashford
Feb 1950	Concentrated rainfall in the early part of the month gave rise to minor flooding on the Darent and Stour.
Feb/Mar 1947	Heavy snow melt combined with effects of the frozen ground gave rise to intense run-offs in early February and early March resulting in floods in many parts of the area including the Darent, Medway and Stour valleys.
Jan 1943	Saturated ground conditions and concentrated subsequent rainfall on the night of 13th-14th Jnuary gave rise to considerable flooding… On the Stour, there was considerable flooding between Ashford and Canterbury.
Jan 1939	Heavy rainfall combined with rapid snow melt which occurred between 14th and 21st January and on 25th and 26th January, gave rise to flooding. There was flooding at Ashford and Canterbury
1909	Old photoghraphs show flooding of North end of Beaver Road, and Great Stour at North end of Jemmett Road.
1892	1892 October 1/6 Rainfall observer at Tenterden noted p[27] "Rain 3.58 in.; floods out in river flats at Maytham and Ashford."
1883	1883 June 14 Rainfall observer at Ashford (Westwell), Kent, noted ([15]) "A violent storm burst over here at 0.55 p.m.[sic]; at 2.25 p.m., when it had ceased, the quantity in the gauge was 2.65 in.; soon after, rain again fell, but not so violently, and the total fall was 2.85 in.; some damage was done to roads, fields, and gardens, but the storm did not extend more than three-quarters of a mile."

5.5 SURFACE WATER DRAINAGE IN THE URBAN AREAS

Existing surface water drainage in the town of Ashford is partially separate. The older central parts of the town have combined sewerage so that surface water runoff generally drains to the sewer system. Development areas constructed more recently within and around the periphery of the town have separate sewer and surface water drainage systems. In the adjacent villages, drainage has generally been constructed on a separate basis but (as is commonplace) over time some surface water drainage has been connected to the foul sewerage in the villages.

6 THE IMPACT OF FLOODING

Flooding from rivers and coastal waters is a natural process that plays an important role in shaping the natural environment. The damage that results to people and property is a consequence of previous human decisions about the location and nature of settlement and land use.

Flooding can cause substantial damage to property and threaten human life. For example, in England and Wales, the Easter 1998 floods caused 5 deaths, £400M damage and resulted in 1,500 people being evacuated from their homes. Such damage cannot be prevented entirely, although its effects can be reduced.

6.1 ECONOMIC IMPACT AND INSURANCE[2]

Insurance costs form only part of the total economic costs arising from inappropriate development or insufficiently protected development on the floodplain. Nevertheless, since 1990, weather related (flood and storm damage) insurance claims have cost an average of £825 million per annum in the UK, and have risen to levels in excess of £1billion in four out of the last 15 years.

The sustainability and affordability of insurance cover for flood risk will only be ensured by the avoidance of development in high-risk areas, adequate alleviation and mitigation measure where development goes ahead in medium risk areas, and the proper provision and maintenance of drainage systems in areas outside the floodplain.

Insurers believe that further development in high flood risk areas should be curtailed, except in exceptional circumstances, and that developers will cover all alleviation, mitigation and additional construction costs where such development is permitted.

The minimum level of protection which would enable insurers to offer cover at normal terms for residential properties is at least a 0.5% probability (1 in 200 year return period) up to the Year 2050, after taking climate change into account.

It should be remembered that floods are not confined to flood plains. ABI research suggests that a significant proportion of insurance claims are from non-riverine flooding, for example, because intense rainfall overwhelms drainage systems.

The vulnerability of a property to flood damage is determined by its design and materials it is built of. Modern housing is much more vulnerable to flood damage due to the greater use of chipboard floors, dry wall plasterboard, cavity insulation etc. and certain design features, such as lower thresholds to improve access for the disabled.

[2] from "Development Planning and Flood Risk (PPG25), Association of British Insurers' Guidance on Insurance Issues", ABI (2002?), http://www.abi.org.uk/

A study done by the University of Dundee examined claims data from all major floods in Britain between 1993 and 1998. Their report was published in July 1999 and showed, for example, that only half a metre of water in a modern semi detached house will cost and average of £20,000 for buildings damage and £10,000 for damage to contents.

6.2 IMPACT ON HEALTH[3]

In the 2000 floods, the town of Lewes, in East Sussex was hit badly and 258 houses were flooded. No deaths from drowning or trauma were reported and a survey of infectious diseases showed no discernible upward trend in the immediate aftermath of the floods.

A study was done nine months later to examine the longer-term impact on those residents who had been flooded. When compared to residents who were not flooded they found much higher levels of physical disorders, such as earache, gastroenteritis, skin rash and respiratory problems. The most striking result was the scale of psychological distress experienced by flooded adults: 48% were judged to be suffering from such problems, compared to 12% of non-flooded adults in the same area. It appears that most of the physical health problems are directly related to the psychological trauma. The depth of flooding in the property is also related to risk of physical ill health and was often caused by sewage spillage and water supply interruption.

The psychological distress and depression can be attributed to loss of money and personal property, and the very slow resolution of insurance payments, if they were insured at all. 173 of the 227 residents interviewed were displaced from their homes for more than 10 days. The burden of psychological distress from being flooded suggests that prevention of such distress should be a major objective when considering flood risk management, infrastructure, development and emergency services.

[3] from "Health impacts of flooding in Lewes: a comparison of reported gastrointestinal and other illness and mental health in flooded and non-flooded households", M Reacher et al., *Communicable Disease and Public Health*, Vol. 7 No.1 (Mar 2004), http://www.hpa.org.uk/cdph/issues/CDPHvol7/No1/7(1)p56-63.pdf

7 FLOOD PLAIN DEVELOPMENT & FLOOD RISK MINIMISATION

PPG25 is one of a series of Planning Policy Guidance notes (PPGs) issued by government to advise local planning authorities and developers. While PPGs are not statutory, planning authorities are obliged to consider them in preparing plans and determining planning applications. PPG25, issued in July 2001, raises the profile of flood risk, which should be considered at all stages of the planning and development process and on a catchment-wide basis. It emphasises the need to act on a precautionary basis and to take account of climate change. It provides advice on future urban development in areas subject to flood risk, subjecting proposals to a sequential response (dependent on the degree of risk) and promotes the concept of Sustainable Drainage Systems (SuDS) in new development or re-development.

7.1 DEVELOPMENT & FLOOD RISK

Development should not be permitted in areas at direct risk from flooding, or where it would be likely, individually or cumulatively, to increase the number or extent of people, land or properties at risk of flooding elsewhere. The only exception is if adequate measures are taken to mitigate the effects, however the need for engineering is generally due to a failure of planning. The Ashford Local Development Framework should seek to achieve development that provides an overall reduction of existing flood risk levels.

7.2 SEQUENTIAL TEST

The sequential test is the process for planners and developers to allocate and develop land in lower risk areas before considering those areas at greater risk. The level is risk is categorised by Flood Zones, as defined in PPG25:

7.2.1 Development Outside The 1% Flood Plain (Zone 1 & 2)

Development should not be permitted if it would materially increase the risk of flooding elsewhere unless the development includes measures to prevent this occurring.

7.2.2 Development Within The 1% Flood Plain (Zone 3)

The main conflict in Ashford is where development has already occurred, or is desired by planners and developers, within the 1% Flood Plain. Inappropriate development should not be permitted where existing river defences, which are properly maintained, would not provide an acceptable standard of safety over the lifetime of the development. Such land would be extremely vulnerable should a flood defence embankment be breached, in particular because of the speed of flooding in such circumstances.

Proposals for development (including the extension and intensification of existing uses or land raising) and development which generates surface water run-off or water discharge should not be permitted where it could:

- Itself be at risk from flooding;
- Require protection from flooding;
- Reduce the capacity of the floodplain;
- Increase the risk of flooding elsewhere;
- Impede the flow of flood waters;
- Affect the integrity of flood defences;
- Raise the water table;
- Increase river channel instability;
- Damage wildlife habitats;
- Cause unacceptable silt deposition;
- Increase the burden on emergency services;
- Prevent maintenance of the watercourse.

Within PPG25 there are three types of zone within this flood risk category:

7.2.3 Zone 3A - Developed areas

These areas may already be defended to a standard that is suitable for residential, commercial and industrial development. The appropriate minimum standard of flood defence (including suitable warning and evacuation procedures) must be maintained for the lifetime of the development.

In allocating or permitting sites for development, authorities should seek to avoid areas that will be needed, or have significant potential, for washland creation as part of the overall flood defence strategy for river catchments.

7.2.4 Zone 3B - Undeveloped & sparsely developed areas

These areas are generally not suitable for residential, commercial and industrial development unless a particular location is essential, eg for navigation and water-based recreation uses, agriculture and essential transport and utilities infrastructure, and an alternative lower-risk location is not available.

General-purpose housing or other development comprising residential or institutional accommodation should not normally be permitted. Residential uses should be limited to job-related accommodation (eg caretakers and operational staff). Where, exceptionally, development is permitted, it should be provided with the appropriate minimum standard of flood defence and should not impede flood flows or result in a net loss of flood-plain storage.

7.2.5 Zone 3C - Functional flood plains

These areas may be suitable for some recreation, sport, amenity and conservation uses (provided adequate warning and evacuation procedures are

in place). Built development should be wholly exceptional and limited to essential transport and utilities infrastructure that has to be there. Such infrastructure should be designed and constructed so as to remain operational even at times of flood, to result in no net loss of flood-plain storage, not to impede water flows and not to increase flood risk elsewhere. There should be a presumption against the provision of camping and caravan sites.

7.3 PREVIOUSLY DEVELOPED LAND

PPG3 requires priority to be given to re-using previously developed land within urban areas, bringing empty homes back into use and converting existing buildings in preference to the development of green-field sites. Nothing in PPG 25 should be taken as departing from this guidance.

Much of this former development occurred by rivers and on flat flood plain. Redevelopment may provide the opportunity to improve flood storage and conveyance to reduce risks at that site or elsewhere. Loss or interference with storage or conveyance must be avoided. Ground floor levels of buildings within the 'Undefended' flood plain must not be residential and should not be commercial. There must be escape routes to higher ground.

7.4 EMERGENCY SERVICES

Civil emergency infrastructure (such as hospitals, fire stations, police stations and emergency vehicle depots) needs to be operational, including access, in all circumstances. Location in even low-risk areas subject to extreme events could lead to lack of availability should such an event occur. Even if buildings are not within the flood plain, escape routes and emergency services access should be confirmed.

7.5 WATERCOURSE MARGINS AND RIVER CORRIDORS

Ideally, all development must leave an 8-metre margin alongside all watercourses.

The Agency will seek to ensure that this margin is protected on designated Main River and IDB watercourses. This is for river maintenance and is to allow heavy machinery and depositing weed cuttings and dredged material. This work is essential to prevent an increase in flood risk. The margin is often an important habitat and wildlife corridor, and public space for riverside walks. Although footpaths and cycle paths may be acceptable within this margin, associated infrastructure, such as lampposts and benches should be away from the river to prevent damage from machinery.

7.6 CLIMATE CHANGE

Current policy is based on the latest recommendations of the UK Climate Impact Programme (UKCIP). The prediction is for an increase in rainfall intensities that is likely to increase the frequency and intensity of flooding. As a precautionary approach, a 20% increase in peak flows by 2050 is used. The effect on flood extents in Ashford is currently being reviewed. Ashford Borough

will not be impacted directly by changes in sea level within the current planning horizon.

7.7 CONDITIONS FOR DEVELOPMENT WITHIN ZONE 3

The Agency will object to inappropriate development within Zone 3A unless:

- it would not increase the risk of flooding:
    - by reducing the capacity of a flood plain
    - by increasing flows within a flood plain; or
    - through the discharge of additional surface water;
- it would not be at risk itself from flooding and if there is adequate provision for access to watercourses for maintenance.

The Council will not allow inappropriate development within Zones 3B and 3C.

7.8 FLOOD RISK MINIMISATION

7.8.1 Design of Defence and Mitigation Measures

Elsewhere in this report mention has been made of the range of measures available to mitigate flood risk, particularly residual risk in defended areas with otherwise high probability of flooding. These included land raising, non-habitable ground floors, secondary defences, temporary barriers, flood resilient design and flood warning procedures.

7.8.2 Urban Design

Confining habitable rooms to upper floors can reduce the risk of loss of life in a flood event, however, this measure can have adverse consequences for the appearance of the property and the streetscape. Ground floors with garages and utility areas, or flatted residential development with car parks at ground level can present inactive frontages at street level, resulting in inactive frontages of austere appearance. This is undesirable in aesthetic terms and can have adverse consequences for perceptions of safety and security for residents.

Solutions such as mixed-use development with commercial uses on the ground floor provide a more acceptable design solution, but are limited by the market for such property. Small offices and workshops in predominantly residential districts can provide active frontages but also have a limited market and there is a similarly limited capacity for local convenience retailing.

7.8.3 Recreation, Amenity and Ecology

Elsewhere we have referred to various 'green' solutions for flood mitigation, such as green grids, polders, canals and ponds, as well as sustainable urban drainage systems, for flood storage and the conveyance of rain water away from impermeable areas.

The desirability of creating new green space in developments is already acknowledged. Features with flood storage capacity (such as bunded open space and water features with freeboard) have the potential to double as local amenities, providing attractive features, space for recreation and wildlife habitats subject to an to an appropriate assessment if necessary.

7.8.4 Flood Resilience

Flood resilient construction certainly has potential for wider adoption in areas of high flood risk. Reference has been made elsewhere to BRE Guidance, and the Department for Communities and Local Government (DCLG) have published guidance on improving flood the flood resistance of residential property and small business premises which is of potential use to local authority officers. It should be noted that the DCLG guidance draws attention to the limitations of the Building Regulations in the control of flood risk:

"The Building Regulations are made to secure reasonable standards of health and safety,welfare and convenience of people in and around buildings. The Building Regulations cannot be made for purposes of property protection. However, where flooding may have implications for health and safety, appropriate guidance may be given in supporting documents."

Hence, within the scope of current guidance, local authorities will have to rely on the planning and development control system rather than the building control system to regulate the design of buildings with regard to flood resilience.

7.8.5 Vulnerable Uses

Certain types of development should be directed away from areas of high residual flood risk wherever possible and be subject to detailed FRA and special defence measures if other factors dictate it must be located there. PPG25 explicitly advises against locating certain functions in higher risk areas:

"Subject to operational requirements in terms of response times, these (Zone 2) and the higher risk zones … are generally not suitable for essential civil infrastructure, such as hospitals, fire stations, emergency depots etc. Where such infrastructure has to be, or is already, located in these areas, access must be guaranteed and they must be capable of remaining operational in times of emergency due to extreme flooding."

Clearly, there are issues relating to the present location of some such functions within high risk areas, however, future provision needs to be more carefully planned. This is especially the case for large-scale developments where it may be proposed that such facilities are provided on-site through

developer contributions. Certain elements of transport infrastructure, properly designed, can provide secondary defence against flooding. Raised highways and railway embankments have been used successfully elsewhere for this purpose, providing a secondary barrier against the spread of flooding. This function is specifically mentioned in 'Making Space for Water' in relation to protection from coastal and inland tidal and fluvial flooding.

In addition, caution should be exercised over the location of development accommodating vulnerable people, such as schools and homes for elderly people. Areas subject to risk of rapid inundation should be avoided altogether for these types of development. Special consideration also needs to be given to development attracting large numbers of people, which would present problems of safe evacuation and dispersion in a flood event, such as sports arenas and public transport termini.

7.8.6 Sewers and Surface Water Drainage[4]

Rainfall on undeveloped areas either evaporates, is absorbed by plants or drains naturally into streams and rivers over a period of time by infiltrating into the ground or running overland. Flooding can and does occur naturally but human development can exacerbate this. Areas developed for residential, commercial and other human uses are typically formed of impermeable materials such as concrete. No water is intercepted by plants and trees, nor is it able to infiltrate into the ground. Runoff from hard surfaces such as concrete is more rapid than from natural surfaces and because there is no infiltration or ponding of water, runoff volumes are larger.

Developed areas need to be drained to remove this incident rainfall. Traditionally this has been done using underground pipe systems designed to prevent flooding locally by conveying the water away as quickly as possible. However, the alteration of natural flow patterns can lead to flooding problems elsewhere in the catchment. Water quality can also be a problem due to pollutants from urban areas being washed into rivers or groundwater. (Adapted from CIRIA, 2005).

Drainage systems can be developed in line with the ideals of sustainable development, by balancing the different issues that should be influencing the design. Surface water drainage methods that take account of quantity, quality and amenity issues are collectively referred to as Sustainable Drainage Systems (SUDS). These systems are more sustainable than conventional drainage methods because they:

- Manage runoff flow rates, reducing the impact of urbanisation on flooding;
- Protect or enhance water quality;
- Are sympathetic to the environmental setting and the needs of the local community;
- Provide a habitat for wildlife in urban watercourses; and
- Encourage natural groundwater recharge (where appropriate).

[4] Ashford SUDS Scoping Report , Atkins 2006

They do this by:

- Dealing with runoff close to where the rain falls (i.e. at source);
- Managing potential pollution at its source now and in the future; and
- Protecting water resources from point pollution (such as accidental spills) and diffuse sources.

They may also allow new development in areas where existing sewerage systems are close to full capacity, thereby enabling development within existing urban areas.

Urban drainage is moving away from the conventional thinking of designing for flooding to balancing the impact of urban drainage on flood control, quality management and amenity (CIRIA, 2005)

8 APPLICATION OF SEQUENTIAL FLOOD RISK TEST TO ASHFORD

The previous sections provided the planning framework under which potential development sites need to be tested. This section defines the methodology for carrying out the PPG25 sequential test, gives an assessment of flood risk for the main development sites and draws the main conclusions.

8.1 METHODOLOGY FOR THE STRATEGIC FLOOD RISK ASSESSMENT

8.1.1 SFRA Process - The PPG25 Sequential Flood Risk Test (SFRT)

A Strategic Flood Risk Assessment (SFRA) is a planning tool. It is an assessment of flood risk that is designed to inform the spatial planning process of relevant issues of flood risk.The degree of detail in the assessment must therefore be commensurate with this objective.

The methodology sets out a robust approach to a Sequential Flood Risk Test or SFRT that is core to the SFRA process. An overview of the SFRT process is provided in Figure 5. It shows an iterative process of identifying zones, breaking down Zone 3, and determining where the quantification of actual risk is required to resolve the scale of the risk from purely an extent based assessment primarily dependent on the Zone map.

The sequential test is undertaken a number of times, using greater resolution and understanding of the flood risks, and after testing how effective any mitigation works may be. At each step, sites of lower flood risk are identified and should be prioritised for consideration within the planning tests required in the allocation process.

The first pass of the sequential test can be based on the published Flood Zone maps. Where alternative sites cannot be found in the lower risk areas, further examination of the risks are undertaken.

The High Risk Zone 3 can then be further divided into 'developed areas' (3a), 'undeveloped and sparsely developed areas' (3b), and functional floodplains' (3c). The definition of 3a and 3b is based on land use from OS mapping and delineation of land use within the Local Plan. The definition of 3c is subjective and open to debate, but in PPG25 it is described as "the unobstructed or active areas where water regularly flows in time of flood". This could be extended to include areas which could form part of the land drainage infrastructure.

A further level of analysis maybe required where development is planned behind and/or adjacent to defences, and the sustainability and robustness of the mitigation measures need to be tested once an allocation has been passed through the planning filters.

8.2 THE FUTURE GROWTH OF ASHFORD

8.2.1 The Greater Ashford Development Framework (GADF)

The Office of the Deputy Prime Minister (ODPM) has determined that Ashford, Kent shall be one of the prime locations in the southeast for major development under its Sustainable Communities Plan, and that by 2031, 31,000 new homes will be built and 28,000 new jobs created there.

Early studies into Ashford's growth identified significant concerns about the capacity of water infrastructure to support the intended level of development. The proposed major expansion of Ashford (representing a 92% increase on the 2001 urban population) requires careful planning if the quality of life and local environment are not to be sacrificed. Such development will put severe strains on the local water environment. The River Stour, which flows through the middle of Ashford, suffers from low flows in summer months; yet large areas around the town, including areas under consideration for the proposed development, are prone to flooding.

The Ashford Integrated Water Management Study (AIWMS) was therefore commissioned to assess the constraints to growth that might arise in relation to meeting the demand for potable water; the provision of wastewater services and the impact of treated effluent on the receiving waters; and the management of flood risk. Black & Veatch was appointed by the Environment Agency on 1 December 2003 to undertake this study.

The Greater Ashford Development Framework (GADF) sets out how Ashford will grow up to 2031. The Masterplan sets out the key components necessary to make Ashford a successful and sustainable town, in particular how it can accommodate the required 31,000 homes and necessary infrastructure to support them. The GADF was published in June2005 and has been taken forward in the emerging Local Development Framework (which only looks to the period 2021). The current indicative map (see Figure 1) shows the culmination of these studies and masterplanning process.

8.2.2 The Local Development Framework (LDF) – Core Strategy

A fundamental objective of the Council's planning strategy for Ashford is to ensure that the town's growth brings improvements to the quality of life within the existing urban area. The Halcrow Overarching Report on Ashford's growth set out a number of guiding principles5 including, amongst others, to make optimum use of the existing urban area including development and redevelopment opportunities, both to meet the needs of the growing population and to minimise the quantity of greenfield land needed for development; and to centre growth on the existing town, encouraging high quality urban design, making use of the infrastructure and investment that is already in place and the opportunity sites within the town centre

Under the Local Development Framework, which looks up to 2021, Policy CS2 – The Borough Wide Strategy indicates that Land for 16,770 new dwellings and

[5] Halcrow (2002) *Overarching Report*, paragraph 1.3.1

related uses, and 16,700 additional jobs will be developed within the Ashford Growth Area between 2006-21. It states :

Large scale development proposals will be located in the Ashford Growth Area in line with a compact growth model consisting of significant development within an expanded Ashford town centre; the use of appropriate brownfield sites within the Ashford urban area; allocated greenfield sites on the edge of Ashford and two major new peripheral urban extensions as shown on the Core Strategy diagram.

This Core Strategy diagram is reproduced below (Figure 2). Please see Appendix A for a summary of the Core Strategy policy approach to flood risk and sustainable drainage.

8.3 STRATEGIC APPROACH FOR ASHFORD

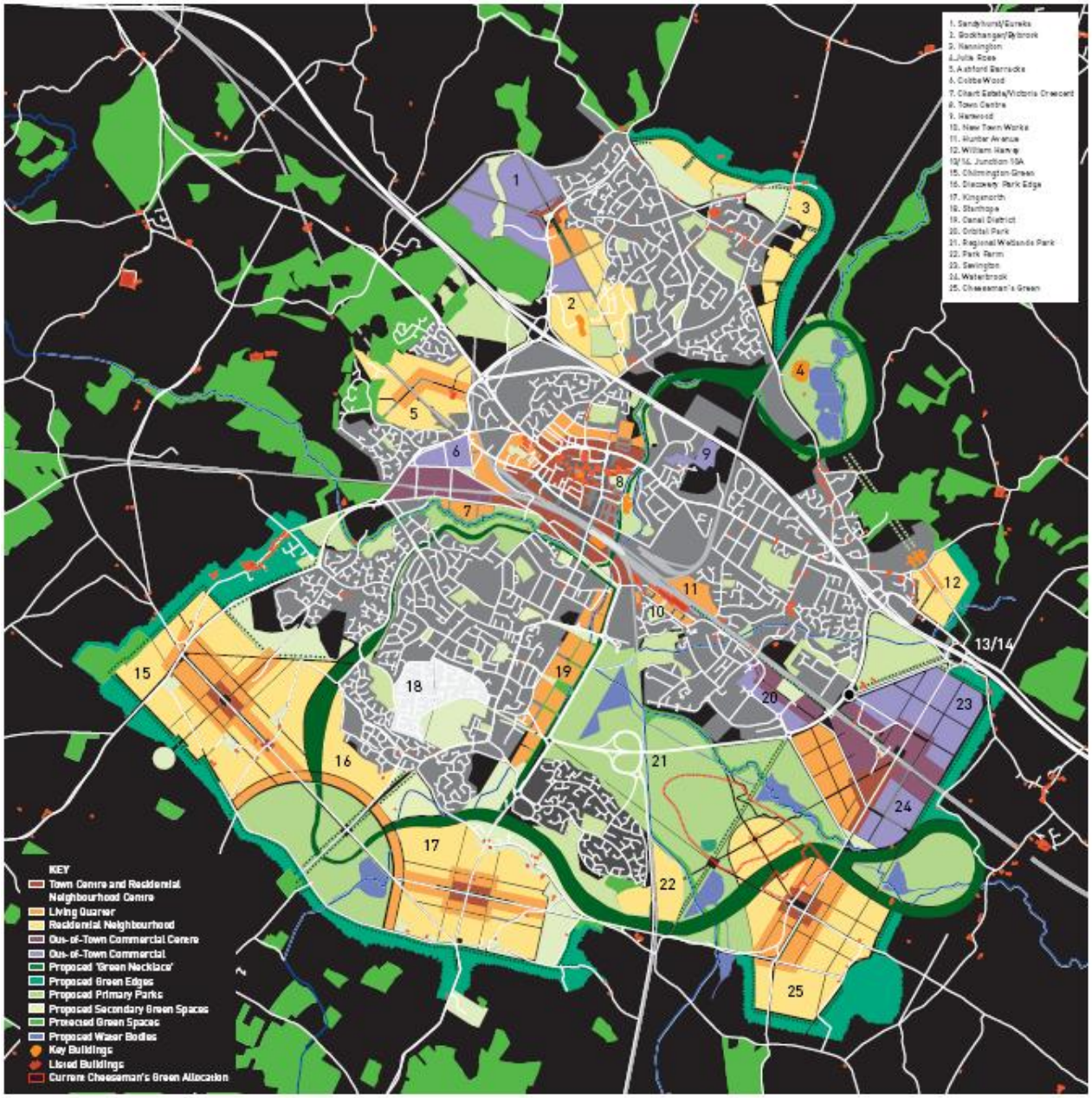
This section of the report describes the strategic approach that has been taken in assessing the flood risk in three distinct areas of Ashford. These areas have been chosen as they have been informed by the development of the Greater Ashford Development Framework (GADF). A large proportion of this approach has been provided through the comprehensive Integrated Water Management Study (IWMS). The locations of potential development emerged within the Greater Ashford Development Framework masterplanning process and Figure 3 gives an indicative illustration of these proposals. They have been confided to the geographical extent of those water catchments that might be impacted by the anticipated areas of future development. The flood risk assessment is therefore divided up into the following areas:-

i. Greater Ashford Growth Area
   ii. Town Centre Riverside
   iii. International Station
   iv. 'Canal District' in Willesborough Dykes
   v. Rest of Ashford Growth Area
vi. The rest of the Borough

Figure 3 below shows the indicative masterplan for the Greater Ashford Development Framework (GADF) within the Greater Ashford Growth Area. Figure 5 shows application of the SFRA to the greater Ashford growth area. It must be noted that the allocations of land for development in this map are indicative and have been amended since the the Core Strategy submission document; in light of consultation responses (see Figure 4). These minor changes are considered to have no affect on the Zone 3 flood plain as they are located in Zone 1.

The three areas detailed below are those which are more sensitive to flood risk impacts and therefore a more detailed assessment was carried out at this stage in the LDF.

Figure 3 – Greater Ashford Development Framework – Indicative Working Masterplan

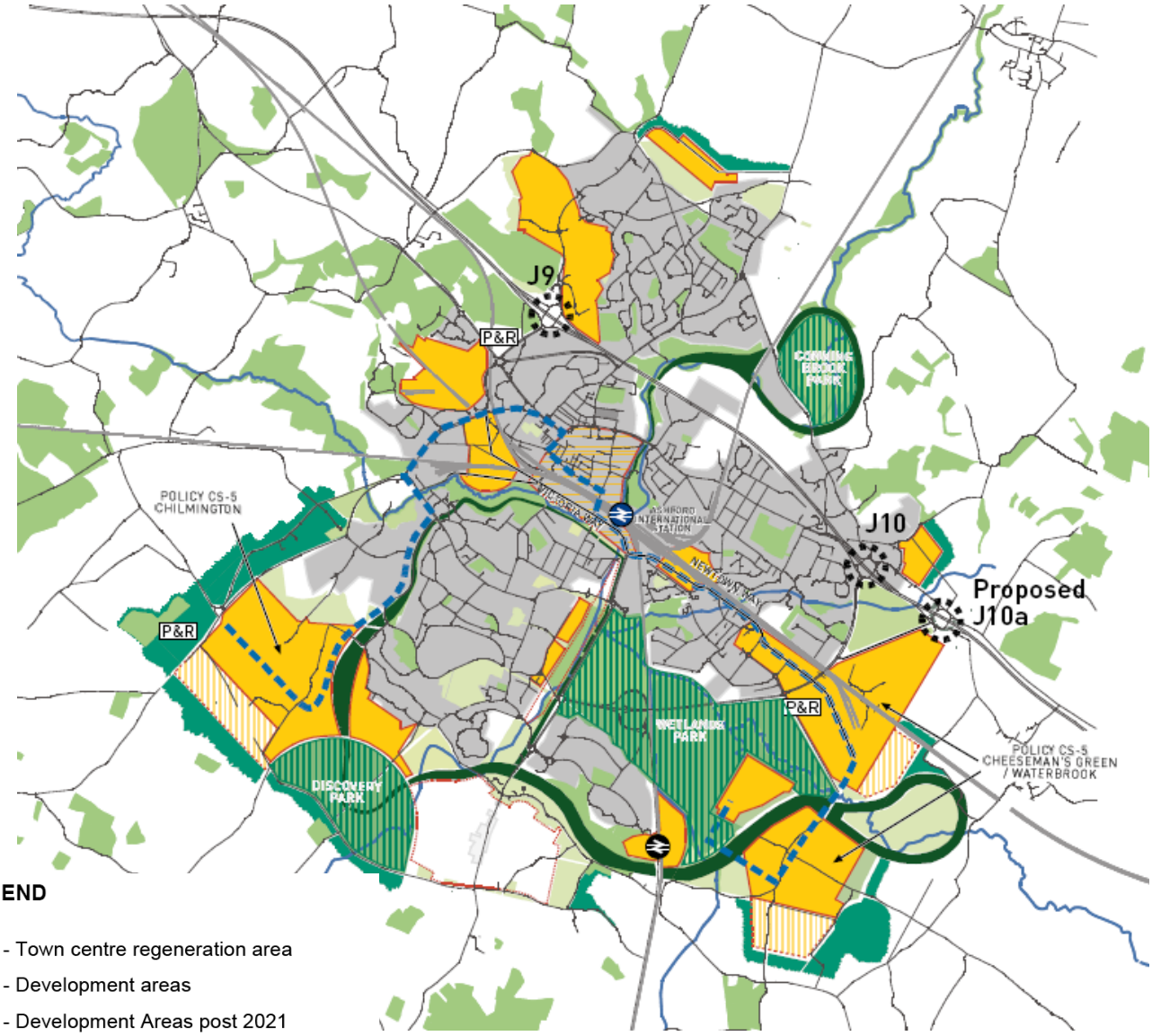


The Working Plan

GREATER ASHFORD DEVELOPMENT FRAMEWORK | 143

Source: Greater Ashford Development Framework (GADF), June 2005

Figure 4. Ashford Local Development Framework – Core Strategy Diagram



LEGEND

- Town centre regeneration area
- Development areas
- Development Areas post 2021
- Potential post 2021 growth area at Kingsnorth and the Canal District
- Smartlink
- J10a - Proposed junction 10A on the M20
- P&R - Proposed park and ride locations
- Proposed Park Farm rail halt
- Proposed open space
- The green urban edges to growth areas
- Proposed District parks
- Green Necklace

Source: Ashford Borough Council, 2006

Figure 5. Indicative floodplain of Ashford

Flood Zones by permission of the Environment Agency, 2006
Map Stiles copyright Ordnance Survey, licensed to Ashford Borough Council (No: X100026380)

Figure 6 Principal FRM Infrastructure

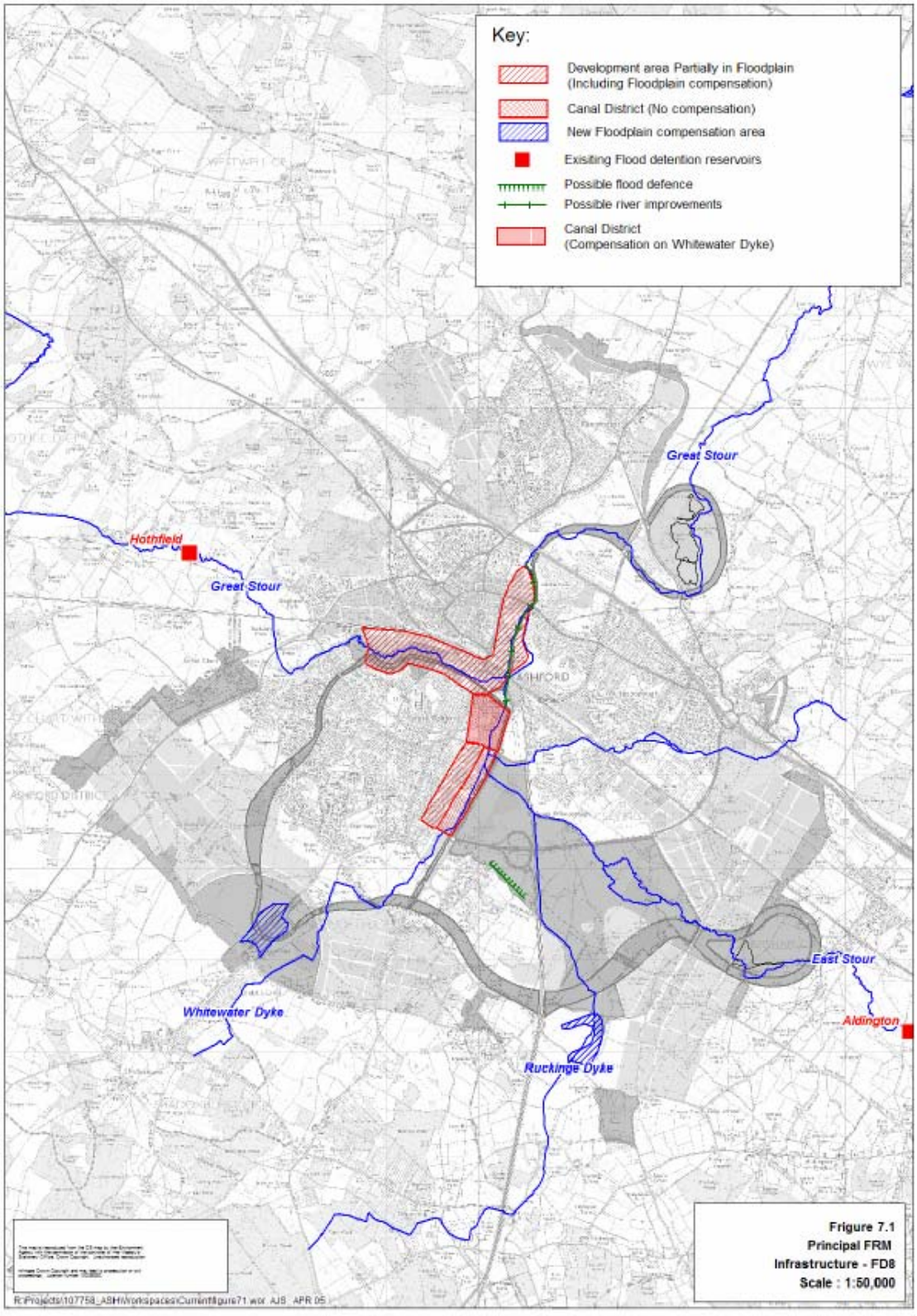


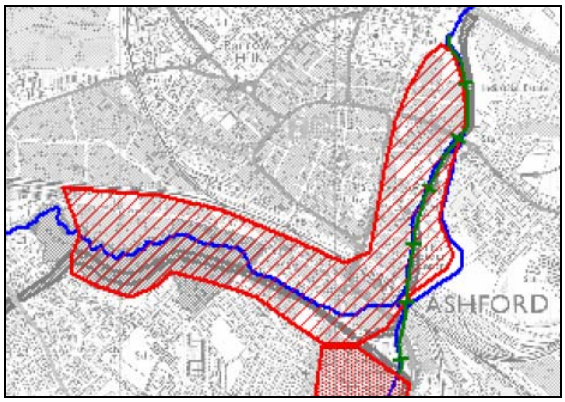
Figure 6.4 : Principal FRM Infrastructure

Source: Integrated Water Management Study (IWMS) August 2005

8.4 TOWN CENTRE RIVERSIDE

The GADF process identified the need to re-develop previously used ('Brownfield') land along the Upper Great Stour. The diagonally hatched area below is indicative of the area where such development may be identified. On the Upper Great Stour (Victoria Way corridor) local like-for-like floodplain compensation is appropriate so that overall flood storage and conveyance remains the same. Because this area benefits from Hothfield flood storage reservoir, development between the 'defended' and 'undefended' 1 in 100 year outlines may be permissible as long as there is good emergency access routes and appropriate ground floor uses (e.g. car parking rather than residential).

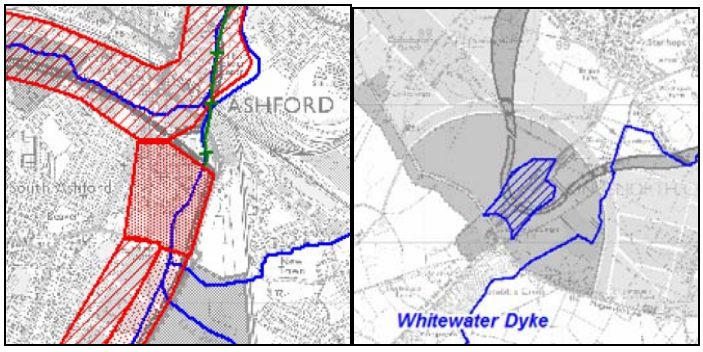
Figure 7 Town Centre Riverside



8.5 INTERNATIONAL STATION

The GADF identifies the need for intensive development around the International Station in order to maximise its economic benefit to the town. IWMS flood modelling indicated that this can effectively be compensated for by increased flood storage on the Whitewater Dyke in the Discovery Park. Hence, this mitigation should be a precondition of development in this area.

Figure 8 International Station

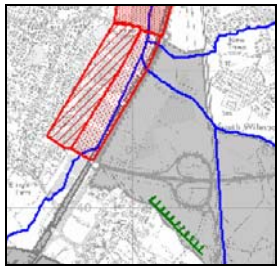


8.6 'CANAL DISTRICT' IN WILLESBOROUGH DYKES

The Canal District area is in Zone 3c "Functional" floodplain. It is therefore unsuitable for any built development, as defined in PPG25. The only exception that can be made is if a proposal demonstrates a reduction in flood risk to existing properties and an over-riding sustainability benefit that justifies development in this area and not in an area of lower risk

Loss of floodplain from development of the remaining Canal District (shown below) would need to be compensated for by storage provided at Cheesemans Green. Should this not be available, compensation by the raising of Hothfield and, primarily, Aldington flood storage reservoirs has been shown by modelling not be a sound option since, due to the small size of the upstream catchments, the existing dams may have already been optimised for location, height and capacity. Further investigation, based on a full cost-benefit assessment would be necessary to confirm this view. Raised flood banks to protect Park Farm may also be necessary.

Figure 9 'Canal District' in Willesbourgh Dykes



8.7 REST OF ASHFORD GROWTH AREA

Those areas which are shown in Figure 5 that are within Zone 2 & Zone 3 that have not been discussed in 8.4, 8.5 and 8.6 above are areas in which the sequential test will be applied as detailed Local Development Documents (LDDS) come forward. Those three areas identified above have a higher sensitivity to the impact of flood risk due to their location within the town centre, the opportunities for mitigation and the phasing for development as part of the GADF to focus on the Town Centre as part of the compact urban model. As such as detailed assessment was carried out at this stage in the Local Development Framework.

The remaining areas of identified in the GADF/LDF should all be in Flood Zone 1. Though a wide range of flood mitigation measures are proposed in the FRM strategy, modelling has confirmed that development within the catchment will inevitably lead to a small increase in flood design levels (e.g. 35mm at the confluence of the East and Great Stour). The GADF masterplan (Option 6) includes an element of development within the flood plain, the assumed corresponding compensation storage for which may not be available. This would lead to a further increase in flood levels of the order of 100mm. Finally, should climate change occur to the extent suggested by Defra it will result in a 20% increase in flood flows. Modelling suggests that this would have the effect of increasing flood levels of the order of an additional 130mm.

Thus, urban (and under climate change conditions, rural) runoff can be expected to increase, which would exacerbate flooding through Ashford.

Therefore it is necessary for all 'Greenfield' development to have runoff less than the greenfield rate. This has been set at 4l/s/ha in impermeable areas and 2 l/s/ha in permeable areas.

On major town centre, brownfield, sites there may not be the space to implement such low runoff rates. In such a case, the planning authority will be looking for significantly reduced runoff from the site after development than there was before, to be agreed in discussion with the Council and the Environment Agency during pre-planning discussions.

8.8 REST OF THE BOROUGH

The Local Development Framework (Policy CS2) has indicated that in the rest of the Borough, land for 1,180 new dwellings will be developed by 2021, alongside appropriately scaled employment opportunities where justified. It also states (Policy CS6) that in the Borough outside the Ashford Growth Area, housing site allocations will be made through the Tenterden and Rural Sites DPD. Land will be also be allocated within the Tenterden and Rural Sites DPD for additional small-scale employment proposals within or adjoining Tenterden and, subject to an assessment of demand, within or adjoining the larger villages.

Due to the nature of the Core Strategy policy the approach to assessing the flood risk of these land allocations will come forward and form part of the Tenterden and Rural Sites SPD.

9 IMPLICATIONS OF ASHFORD'S PROJECTED GROWTH

9.1 EXISTING FLOOD DEFENCES FOR ASHFORD

It is generally considered that Aldington and Hothfield flood storage reservoirs currently provide a high standard of flood protection to downstream areas along the East Stour and Great Stour rivers through Ashford.

Although these reservoirs were intended to protect areas downstream from flooding during all events with a severity less than 1 in 100 years, all the flood storage available within Aldington reservoir was utilised during the floods of 5-8 November 2000 and 7/8 February 2001. The former event was considered to have been less severe than a 1 in 50 year-return period storm. Flows over the spillway of Aldington reservoir, which peaked at about 11m3/s, caused local flooding downstream.

In the 2001 flood event, internal flooding of some 50 properties in south Ashford was recorded. It is unclear whether the unexpected spills from Aldington reservoir were caused primarily by inflows that were more severe than the 1 in 100 year flows used in the design of the structure, or by the partial blockage of the low level outlet from the reservoir.

9.2 APPLICATION OF SUDS TO ASHFORD

The Agency and Ashford Borough Council have carefully managed drainage from recent developments in Ashford, requiring detention storage in many areas, but allowing direct connection to the watercourses in locations where this is appropriate. By their very nature, such developments require piecemeal consideration of catchment changes.

However, the proposed intensive development around Ashford will require a co-ordinated approach to drainage that will consider the interaction of run-off from these future developments and preferably joint mitigation measures. In Ashford, flood volume may be as important as flood flow in determining flood patterns, due to the large volume of flood plain storage that is available.

Source control is likely to be the only way to mitigate increases in run-off volume, even if peak flows in the rivers can be maintained. The application of SUDS will be important in these developments to maximise source control.

In the permeable, chalk soil areas in the north of Ashford, soakaways will be an effective approach. Elsewhere, where there are mostly impermeable soils, infiltration will not be effective and alternative systems will need to be considered. Here, drainage may use SUDS devices such as swales to slow run-off, but flood detention lakes will also be needed to limit the flow entering the Stour.

The interaction of numerous small detention ponds is difficult to predict, and certain combinations of pond may actually increase peak flows in the receiving waters rather than reduce them. It would be preferable for Ashford to develop a series of larger flood detention lakes, each serving a number of

developments. Such an approach raises issues as to land purchase and developers' contributions, but technically, with more reliable maintenance regimes, could represent an effective contribution to flood mitigation.

As part of the second phase of the Integrated Water Management Study (IWMS) Ashford Borough Council is working with the Environment Agency to prepare a Sustainable Drainage Supplementary Planning Document. This will set out the key SUDs features which could be employed within the Borough and the subsequent management and maintenance requirements. The Core Strategy (DPD) also includes a policy on Sustainable Drainage (SUDS).

9.3 CLIMATE CHANGE

Although there is still considerable doubt as to the exact extent and impact of climate change, interim guidance has been given based on current research. Defra, in its Flood and Coastal Defence Project Appraisal Guidance Document 4, gives guidance on dealing with climate change from the point of view of uncertainty and using sensitivity analysis to assess the impact of potential changes. It recommends that sensitivity analysis for river flood alleviation schemes should take account of potential increases of up to 20% in peak flows over the next 50 years. This generalised advice, applicable throughout the United Kingdom, will undoubtedly be modified in coming years as ongoing research provides better definition of regional trends. Nevertheless investigating the impact of a 20% increase in flow provides an important indicator as to the sensitivity of flood risk to future change.

Emerging policy in the LDF Core Strategy has highlighted the need for new developments to mitigate and adapt to the changes in climate and ensure that developments are resilient to flooding. Additionally policies are being prepared that will reduce the causes of climate change by limiting the amount of carbon dioxide emissions from new developments.

9.4 DEVELOPMENT PRESSURES AND CONSTRUCTION LIMITS

The 100-year flood extent has to date been taken as the limit of development for Ashford, and it is apparent that any changes to this extent may have some impact on existing and new development just outside of the flood extent.

If developers have maintained some kind of buffer zone at the edge of the flood plain, it is likely that minor changes to the flood extent may only flood gardens and perhaps roads. However, a 20% increase in flow due to climate change could significantly increase the flooded area. It may then be necessary to construct new flood defences for these areas.

Within Ashford, new defences will be difficult to construct in the future, due to the scale of the planned developments and the narrow corridors left for the rivers between such developments. Further, although the town is already protected by Aldington and Hothfield reservoirs, increased flows due to climate change may significantly reduce the standard of service provided.

In essence, the scale of proposed development is such that there will be limited opportunity to retro-fit flood defences.

9.5 PPG25 AND THE PRECAUTIONARY PRINCIPLE

PPG25 introduced the precautionary principle to planning. Essentially this is a "no-regrets" approach that requires the planner and designer to consider and avoid possible increases in flood risk. The following extracts from PPG25 set out the precautionary principle with respect to climate change:

- "It emphasises…. the need to adopt a precautionary approach to the issue of flood risk, avoiding it where possible and managing it elsewhere."

- "The uncertainties inherent in flood prediction are recognised, together with the likely increase in flood risk due to climate change, which introduces even greater uncertainty."

- "giving appropriate weight to information on flood-risk and how it might be affected by climate change in preparing development plans and considering individual proposals for development."

- "They should also consider how a changing climate is expected to affect the risk of flooding over the lifetime of developments. This will vary depending on the type of development."

- "It should also be recognised that climate change is expected to increase flood risk and some existing development in more exposed locations may not be sustainable in the longer term and may need to be replaced in safer locations."

In terms of Ashford, it would be prudent and consistent with the precautionary principle to exclude development from the flood extent arising from the 100-year flood + 20% case. It is further noted that the report "Ashford's Capacity for Change" (Halcrow Group, 2003) states that:

"The Environment Agency and the Borough Council have set the guidelines for the interpretation of floodplain extent as the "undefended" condition with an increase of peak inflows by 20%. The "undefended" condition is similar to the no maintenance case used in benefit cost analysis, in which it is assumed that all existing defences stop working. The "undefended" condition for Ashford assumes the full deterioration of the a common Environment Agency policy and it is the consequence of climate change studies and the investigation of recent rainfall patterns.

However, it is also important to identify the flood extent for the "defended" condition assuming that the two storage reservoirs perform in accordance with their design specifications. This approach will provide additional information about the possible 1 in 100 year Flood Alleviation Scheme in place and has implications for brownfield sites in the town centre."

These comments were strongly endorsed in the IWMS.

9.6 KEY ISSUES

F1 The current Section 105 flood risk mapping of, and to the south of, Ashford may not provide the most accurate forecast of areas at risk of flooding

Flood risk management is critical to the development of Ashford, as the flood risk mapping provided by the Agency provides essential guidance to planning authorities in land use planning, and in the determination of planning applications.

There are no measured flood flows on the Whitewater Dyke and Rucking Dyke. Instrumentation was installed on these watercourses after the 2000 floods but no significant flooding has occurred since installation, at the time of writing.

F2 The design and operation of Aldington and Hothfield reservoirs

In addition, as part of a review of flood risk mapping for Ashford, recent flooding events indicate that a review is required of the design and operation of Aldington and Hothfield reservoirs.

F3 Increased urban runoff will exacerbate flooding through Ashford town centre

It is an inescapable fact that if significant areas of countryside are developed in the river catchments upstream of Ashford, then unless appropriate measures are taken to deal with storm runoff, increased urban runoff will exacerbate flooding through Ashford town centre.

10 IDENTIFICATION OF INTERVENTION OPTIONS

10.1 FLOOD MITIGATION MEASURES

Measures to mitigate the risk of flooding may be considered as falling into three categories:

- Maintenance and management measures. These are generally non-structural measures, such as maintenance dredging, and operational changes. They may, however, include lowcost structural measures that can be implemented by, say, a term contractor. They can be implemented in the short term.

- Reactive measures. These are generally non-structural measures that can be implemented in the short- to mid-term. They may include legislative and institutional changes, flood warning, flood proofing and the like. They generally mitigate rather than eliminate a problem.

- Proactive measures. These are long-term structural measures, such as channel improvements that will take a number of years to implement, due to consultation, financing, design, land acquisition, tender processes and construction.

The use of such categories encourages the incremental implementation of options, thereby providing continuous improvement in flood risk mitigation towards a goal. A catchment FRM plan is likely to contain measures from all three categories, unless of course the problems can be solved by a single short-term option. Table 5 sets out a range of possible mitigation measures, including, for reference, "doing nothing". It can be seen that many of the "do something" measures, in particular those involving management and maintenance, are already actively promoted by the Environment Agency.

Table 5: Flood Mitigation Measures

"Do nothing" • Do nothing option • Reduce service levels	**Reactive** • Flood warning • Flood proofing • Evacuation • Emergency drainage measures
Maintenance and management • Preserve flood plain • Land use designation • Development controls • River maintenance • Catchment runoff modification • Public information and education • Flood relief	**Proactive** • River training • Embankments and pumping • Reprovision of floodplain • Improved maintenance • Diversion between catchments • Storage

10.2 SELECTION OF POTENTIAL INTERVENTION OPTIONS

This section briefly considers each measure listed in Table 4.6, eliminates those not appropriate for Ashford, and sets out a range of combinations of measures that may be considered as generic intervention options, for further consideration.

The 'Do nothing' option forms a base case for flood risk management studies. Similarly, the 'Do minimum' (maintain current defences) option is a base case for modelling, that would result in a 'reduction of service levels'.

A number of measures are best practice but are currently undertaken to mitigate frequent flooding and to enable people to live with floods. However, they cannot manage extreme floods. These include 'River maintenance', 'Public information and education', 'Flood relief (compensation)', 'Flood warning', 'Flood proofing', 'Evacuation', 'Emergency drainage measures' and 'Improved maintenance'. Most are currently undertaken by the Environment Agency and will continue to form a part of the overall flood risk management in the Stour catchment.

'Land use designation' and 'Development controls' form the spatial planning and statutory backgrounds to Ashford's expansion. As such they may be integrated into, say, preservation or expansion of the floodplain, and are therefore critical to the management of flood risk.

The 'Embankments and pumping' intervention implies provision of levees around flood-prone areas. Such measures are to be avoided whenever possible since embankment failure, overtopping of an embankment by a flood greater than design flood, or failure of the flood pumps, may create an extremely hazardous situation for the local population. Levees may be required locally as a minor contribution to an overall scheme, but should not be considered as an option for overall flood risk management within Ashford.

'Catchment runoff modification' is an attractive measure in theory, and land use management of the catchments upstream of Ashford has been promoted throughout the Study as an option for flood risk management. There has been wide-ranging research work indicating that there is some potential for runoff control through measures such as changes from crops to set-aside, directional ploughing on slopes, changes to cropping patterns and afforestation. However, no work has as yet presented a numerical approach robust enough for engineering design. It has been concluded that there is potential in land-use management, but further research is recommended.

In summary, it seems that land use management:

- probably shows good returns for local areas and low return period events; but

- is not proven on a catchment-wide scale and for extreme, design, events.

There are multiple benefits that undoubtedly derive from improved land use management, and it may well become a future option for FRM as on-going research work delivers design information. However, at this juncture it is not prudent to rely on such an un-proven technique for FRM of a major urban area.

The measure will not be considered in options for flood risk management within Ashford. An overview of research on catchment runoff modification, further justifying the above decision, is included in IWMS Appendix 4.2.

The remaining interventions fall into two types: storage-based and conveyance (channel improvement)-based. Storage-based measures include 'flood storage', 'Preservation of flood plain' and 'Re-provision of floodplain'. In all these, floodwater will be held in some kind of storage area, be it the floodplain or a flood detention reservoir. Measures that might be considered further include:

- Enlargement of the current Stour floodplain.
- Provision of new floodplain areas to allow development of the floodplain within Ashford.
- New or enlarged flood detention storage upstream of Ashford.
- New flood detention lakes within Ashford (but not in the floodplain) as part of the overall planning concept.

Conveyance measures require engineered (although environmentally acceptable) interventions, changing existing channels, and include 'River training' and 'Diversion between catchments'.

Wholesale river training, and the increase of river channel size through Ashford to pass the floods downstream is unlikely to be acceptable in planning and environmental terms, and more fundamentally, may simply pass Ashford's flooding downstream to Canterbury.

Nevertheless, elements of river training are likely to be required in any overall flood risk management strategy for Ashford. Its introduction is simple to analyse and may be considered in flood modelling to assess the negative impact of such an approach.

Diversion between catchments would require diversion of flood peaks south-east into the Royal Military Canal or south-west into the Beult. This can be an attractive option if the adjacent catchments have different flood mechanisms. However, there are problems with such an approach from a number of standpoints:

- From a conceptual point of it may be preferable for each river basin to manage its own flood risk, and not pass flow from one catchment to another.
- From an environmental point of view, there may be objections to the transfer of water between catchments of differing geology and hence water chemistry.
- From a hydrological and practical point of view, diversion of flow into the Beult may require study of the Medway catchment to establish flooding impacts further downstream.

Nevertheless, flow diversion remains an attractive intervention measure if it is viable.

12.3 SUMMARY OF OPTIONS FOR APPRAISAL

In summary, the following generic intervention options are therefore proposed for consideration:

Fa 'Do nothing'

Fb 'Do minimum'

Planning intervention

Fc Land use designation and development control

Conveyance interventions:

Fd Channel improvements to the existing rivers

Fe Diversion of flood flows to adjacent catchments

Storage interventions

Ff Enlargement or reprovision of the current Stour floodplain

Fg New or enlarged flood detention storage upstream of Ashford

Fh New flood detention lakes within Ashford

Combinations of interventions

Fi One or more conveyance options in combination with one or more storage options

Referring to the Key Issues related to flood risk management, Table 6 indicates where each is addressed, partially or fully, by at least one intervention option identified above.

Table 6: Addressing Key Issues for flood risk management

	Fa	Fb	Fc	Fd	Fe	Ff	Fg	Fh	Fi
F1			✓		✓	✓	✓	✓	✓
F2					✓		✓		
F3					✓	✓	✓	✓	✓

Table 7: Option Appraisal Objectives

Topic	Objective	Source(s)/Driver(s)
3.0 Flood Risk Management	3.1 To ensure that new development does not increase flood risk and to protect the capacity and integrity of existing flood storage areas unless acceptable alternative areas are agreed	Ashford area SEA
	3.2 To ensure that the standard of service for flood defence is maintained at a level appropriate for the current and future land use.	FCDPAG 3 indicative standards
	3.3 To limit / reduce run-off effects of development for all zones and control where possible, through the use of sustainable drainage systems	ODPM PPG25 - Development and Flood Risk
	3.4 To provide economically, technically and environmentally sound and sustainable flood defence measures.	DEFRA – Flood Management – High Level Targets

Table 8: Appraisal of generic options against Objectives

	Appraisal Objective			
INTERVENTION OPTIONS	**3.1**	**3.2**	**3.3**	**3.4**
Fa 'Do nothing'	1	1	2	3
Fb 'Do minimum'	4	4	2	3
Fc Land use designation and development control	5	1		1
Fd Channel improvements to the existing river	6	6		6
Fe Diversion of flood flows to adjacent catchments	7	8		9
Ff Enlargement or reprovision of the current Stour floodplain	10	8		11
Fg New or enlarged flood detention storage upstream of Ashford	12	8	13	14
Fh New flood detention lakes within Ashford	12	8	13	14
Fi One or more conveyance options in combination with one or more storage options	12	8	13	14

Key:

Indicated compliance	Indication
Option contravenes objective / targets	
Option partially meets objective / targets	
Option meets objective / targets	
Option has no relevance to objective / targets	

Notes:

1	Do Nothing - Standard of service will not be maintained and will not ensure that new development does not increase flood risk.
2	Do Nothing / Minimum does not incorporate SUDS.
3	Economically unsustainable.
4	Do Minimum – Reduction in service level: standard of service unlikely to be adequate for scale of development.
5	Recognising land use designations and development controls will offer protection to current floodplain and biodiversity interests.
6	It is likely that some improvements will be required to the river channels for flood risk management, at which time there will be opportunities to create sustainable flood defence measures. Significant alterations to channels would not be environmentally sustainable.
7	Water transfer is a viable option although its sustainability across catchments may be an issue.
8	Any alterations to the character of water channels, flows and discharges within the catchment will be dependent upon location of development sites.
9	Transferring water via channels to other catchments may be technically challenging (depending on topography). Possible cost issues associated with pumping (if needed).
10	Enlarging / re-provision of the floodplain will be necessary if development is permitted on existing floodplain.
11	Possible option impacts on floodplain should be noted as should the time taken to establish a new floodplain environment.
12	Some form of conveyance and/or storage option has the potential to reduce runoff (possibly via

	wetland habitat) with potential beneficial impact on water quality. It would also reduce pressures on floodplain.
13	Some form of storage in upper catchment or Ashford area will be favoured due to associated reduction in flow rates and flood risk.
14	Storage and conveyance options are likely to be required. Scale dependent on development sites.

11 THE PREFERRED ASHFORD INTEGRATED WATER MANAGEMENT STRATEGY

11.1 FLOOD RISK MANAGEMENT (FRM) INFRASTRUCTURE

Physical measures to manage flood risk resulting from the development of Ashford principally comprise, in decreasing order of effectiveness to control general flood risk:

- Large-scale incorporation of SUDS throughout new development areas
- SUDS's incorporated to the greatest extent possible in redevelopment • Construction of off-line storage; and, to a limited extent
- Provision of some flood walls to protect properties otherwise at risk.
- Some local channel improvements will also be necessary.

The opportunity to provide infiltration-based SUDS in most of the new development areas is denied, due to the underlying geology. Strict limits on runoff from developments, to less than that which currently occurs on these sites, need to be enforced if flood risk is to be adequately managed. Centralised detention ponds in each sub-catchment need to be provided in order to achieve this goal.

Potential offline storage areas associated with Whitewater Dyke and Ruckinge Dyke have been identified. A third area, identified at Cheeseman's Green to provide compensation storage for limited encroachment into the floodplain of the so-called Canal District, may not be available. No suitable alternative site has been identified, and it has been demonstrated through modelling that without this compensation, design flood water levels in the vicinity may be expected to rise of the order of 100mm. From an FRM perspective, the Canal District is in Ashford's primary flood plain area and if flood compensation cannot be found, its construction would go against planning guidance, and cannot be justified from the point of view of drainage and sustainability.

Despite the implementation of above measures, some minor increase in design flood water levels may be expected, particularly if the anticipated effect of climate change are realised. As a result, some limited provision of low flood walls or embankments to protect properties will be needed, for instance in the vicinity of Park Farm.

11.2 POLICIES RELATED TO FRM

The flood risk management strategy, especially components such as SUDS that operate at a development level, will be implemented through planning policy and documents, viz:

- An overview is given by the Greater Ashford Development Framework.

- Local Development Frameworks will direct the development of neighbourhood areas.

- Planning conditions will define allowable runoff from individual development plots.

It will be important for common planning conditions to be established at an early stage, which can be applied universally across Ashford. It will be equally as important to ensure continued maintenance of any SUDS infrastructure provided. There are a number of mechanisms proposed in PPG25. The most effective control is likely to be through a planning obligation under Section 106 of the TCPA 1990. This would allow the planning authority to ensure that:

- SUDS is properly designed and maintenance issues have been considered;

- Long-term maintenance is planned for; and

- Revenue can be raised to support long-term maintenance.

Three options for SUDS maintenance exist:

- SUDS maintained by Local Authority;

- SUDS vested in Local Authority; and

- SUDS maintained by a third party.

Further, it is hoped that these planning documents will include a rigorous application of PPG25 (See Appendix A for the policy approach in the LDF]. Much of Ashford's development will take place under the new guidance and its successors, that are expected to remove many of the planning loopholes as to floodplain development found in the original document.

All these activities will take place under the overview of the Environment Agency, as a statutory consultee for planning. The Agency's approach has recently changed from one of defending to managing floods. This means reducing both the likelihood and the impact of flooding when it occurs. Such an approach recognises the fact that flooding is a natural hazard and society must accept that flood risk cannot be eliminated: only reduced.

This policy also recognises that climate change may play an increasing role in the level and location of floods, and that a longer term view may be needed before planning and building flood defences. The Agency has stated that it will look at the changing use of land and object to new developments which are likely to be at high risk of flooding. The development of Ashford must take this policy into account.

11.3 PROGRAMME FOR FRM INTERVENTIONS

FRM interventions will generally be carried out at the start, or in parallel with development in each area. Expected timings are therefore:

- SUDS – design integral with development plot design (any sub-catchment detention area needs to be designed and in place in advance of the first development it serves).

- Central Town Centre (TC) development areas – design of compensation areas integral with development plot design – 2011.

- TC development areas TC2 and TC3 - compensated for by a new floodplain/wetlands area in the Discovery Park on Whitewater Dyke – 2016

- Remaining Canal District – 2016-2021 Effective compensation at Cheesemans Green or elsewhere will be required in advance if any development is to be permitted in the flood plain

- Climate Change interventions – as required when climate change parameters are confirmed.

12 APPENDIX A : POLICY FRAMEWORK

12.1 NATIONAL PLANNING POLICY

12.1.1 Planning and Compulsory Purchase Act

The preparation of this SFRA has taken place in a period during which Ashford Borough Council has been implementing the provisions of the Planning and Compulsory Purchase Act 2004.

As part of this process Planning Policy Guidance (PPG) is being reviewed by Government and will be updated and replaced by Planning Policy Statements (PPS). Government has indicated that PPGs will be reviewed and replaced as and when considered necessary in the light of their policy and strategic significance.

PPS1 (Delivering Sustainable Communities) and PPS12 (Local Development Frameworks) have already been implemented. PPS 25 (Development and Flood Risk) is anticipated late in 2006. This is likely to impact on this SFRA which will be reviewed once PPS 25 is adopted.

Regional Planning Guidance has now been transformed into Regional Spatial Strategy (RSS) and the South East Regional Spatial Strategy – the South East Plan – is currently being consulted on. Work has also commenced on a number of sub Regional Studies, including one for East Kent and Ashford.

At a Borough Council level, Local Plans are to be phased out and replaced by a Local Development Frameworks (LDF), which is a folder of planning documents (Local Development Documents (LDDs)) that will guide decisions on the development and use of land. This SFRA forms a background document to Ashford Borough Council's Core Strategy Development Plan Document (DPD).

Local planning authorities were required to produce a Local Development Scheme (LDS) by March 2005, setting out their programme for the production of the new development plan and summarising the documents that will, collectively, make up the Local Development Framework.

Ashford produced its first Local Development Scheme (LDS) in December 2005, and will be submitting their Core Strategy to government in October 2006. The Strategic Flood Risk Assessment (SFRA) serves as a background document to the Core Strategy Submission Document (DPD).

The existing Local Plan and proposals map is being saved until 2007.

12.1.2 PPG25 Development and Flood Risk

Planning Policy Guidance Note 25 "Development and Flood Risk" (PPG25) was adopted in July 2001, replacing Circular 30/92. PPG 25 reinforced the responsibility that Local Planning Authorities (LPAs) have to ensure that flood risk is understood and managed effectively using a risk-based approach as an

integral part of the planning process. PPG 25 represents a sea-change from the reactive resolution of flooding problems as a result of development to the effective management of flood risk within the planning system.

However, flood risk is one of a whole raft of policy constraints placed upon the local planning system. Development must facilitate the socio-economic needs of a community, and spatially must sit within an existing framework of landscape and infrastructure. For this reason, a balance must be sought between development need, and the risk it may pose upon existing and future dwellers of the area as a result of flooding.

The Government has set an objective for the Environment Agency to reduce the flood risk to people and to the developed and natural environment. In response to this the Agency has set a target to seek to influence planning activities to prevent 100% of inappropriate development in flood risk areas. The achievement of this is reliant on the robust application of PPG25, including public reporting, via Defra High Level Target 5 (formerly HLT 12) of local authority's acceptance of PPG25 based advice from the Agency. Ashford Borough Council has an excellent track record in applying PPG25 and resisting development in flood risk areas. This SFRA will ensure this good practice continues.

The role of the Environment Agency is to provide advice to LPAs to ensure the management of flood risk in an effective manner as part of the planning process. To facilitate the delivery of this role, and to inform the planning process, the Office of the Deputy Prime Minister (ODPM) is encouraging LPAs to undertake a sequential flood risk test to meet the requirements of PPG25 (Table 1 and Paragraph 30). This test is intended to provide a rigorous understanding of flood risk within the LPA area, delineating the extent and nature of flooding in accordance with the flood risk zones set out within PPG25. This must consider the planning context, and provide the framework for robust and sustainable flood risk management solutions within those areas within which a balance is required between susceptibility to flooding and wider spatial planning pressures.

Catchment boundaries rarely coincide with political ones. Ashford Borough Council seek to ensure that policies adopted within the SFRA are consistent with the longer term vision for the wider catchment, and take adequate account of the impacts that the decisions made may have upon adjoining districts.

12.1.3 Other Planning Policy Statements

Planning Policy Statement 1 (PPS1) published in February 2005, sets out the overarching planning policies for the delivery of sustainable development across the planning system and sets the tone for other planning policy statements that will follow. PPS1 explicitly states that development plan policies should take account of flooding, including flood risk. It proposes that new development in areas at risk from flooding should be avoided. Planning authorities are also advised to ensure that developments are "sustainable, durable and adaptable" including taking into account natural hazards such as flooding.

PPS1 also places an emphasis on 'spatial planning' in contrast to the more rigid 'land use planning' approach which it supersedes. Planning authorities will still produce site specific allocations and a proposals map as local development documents, but their core strategy will be more strategic and visionary in content and will take into account the desirability of achieving integrated and mixed use development and will consider a broader range of community needs than in the past. With regard to flood risk, it will be important for the Local Development Framework recognise the contribution that non-structural measures can make to flood management.

Whilst not directly relevant to the development of a SFRA, it is important to recognise that the exercise takes place within the context of other planning policy statements, some of which also require sequential testing of site allocations and development proposals. PPG3 (Housing), PPG4 (Industrial and Commercial Development and Small Firms) and PPS6 (Planning for Town Centres) are intrinsic within the planning process, and therefore an understanding of the constraints faced as a result of this additional policy guidance is imperative.

As an example, whilst the PPG3 sequential test recognises flood risk as a material consideration, its main emphasis is to seek the re-use of previously developed sites and empty or under-used buildings for housing. PPG25 attempts to reconcile the emphasis that Government places on development of previously developed (brownfield land) for housing with the reality that a significant proportion of this land is located alongside rivers and vulnerable to flooding.

Paragraph 35 of PPG25 states:

"A balanced flexible approach is required which addresses the risks of flooding whilst recognising the benefits of recycling previously developed land and the damage to urban regeneration caused by under-investment and urban blight…

Planning guidance on housing already advises local planning authorities to take account of physical and environmental constraints on the development of land for housing, including flood risk. The principles in this guidance compliment that advice. PPG 3 requires priority to be given to re-using previously developed land within urban areas, bringing empty homes back into use and converting existing buildings in preference to greenfield sites. Nothing in PPG25 should be taken as departing from this guidance."

PPG 25 also recommends in Para 52 that local authorities should consider combining the sequential test for flood risk assessment with reviews of housing land allocations under PPG3. There is some cause for concern as to whether challenging housing targets can be met, after both, these potentially conflicting sequential tests have been satisfied. One possible solution has been put forward by the Association of British Insurers:

"…when developing on higher-elevation greenfield sites… leaving an equivalent area of low lying brownfield land for flood storage could be the most effective way to minimise flood risk"

This solution will require developers and urban designers to seek innovative design solutions to accommodate the necessary levels of development, whilst

ensuring practical and manageable solutions are designed to address the issue of flood risk.

12.1.4 The Sustainable Communities Plan

The overall policy context for the SFRA in Ashford is provided, on the one hand by PPG 25 and on the other by the Sustainable Communities Plan.

The challenge for Ashford's Local Development Framework will be to reconcile the Sustainable Communities Plan's requirement to identify sufficient land for large volumes of new homes to be built, whilst ensuring that the sites allocated satisfy sustainability criteria specifically with regard to avoidance or management of flood risk.

The Sustainable Communities Plan headline target for housing provision is 30,000 new homes up to 2030. This will be backed by investment for land assembly, site preparation and subsidy for affordable and key worker housing.

12.1.5 Making Space for Water

During 2004, Defra undertook a consultation exercise, the object of which was to engage a wide range of stakeholders in a debate about the future direction of flooding strategy. The consultation document "Making Space for Water" sets out the following vision:

"…we want to make space for water so that we can manage the adverse human and economic consequences of flooding and coastal erosion while achieving environmental and social benefits in line with wider government objectives."

The aim of the strategy is to balance the three pillars of sustainability, managing flood risk and ensuring that the social and economic benefits, which accrue from growth and development, are attained. This balanced approach integrating sustainable development with responsible risk management has underpinned the current study.

Section 7 of the consultation document deals with measures to reduce flood risk through land use planning. This section emphasises the Government' s commitment to ensuring that the planning system aims to reduce flood risk wherever possible and, in any event, should not add to it. However, it is acknowledged that 10 per cent of England is already within mapped areas of flood risk and that contained within these areas are the brownfield sites which other areas of Government policy has identified as a priority for future housing provision. The document asserts that over the past five years, 11 per cent of new houses were in flood-risk areas. The document identifies three sets of measures that may be undertaken to manage flood risk when development is sited in such areas:

- Protection measures to provide, at minimum, the standards of protection specified in PPG25;

- Provision of features such as sacrificial areas and compartmentalisation to reduce the consequences of a flood event should one occur; and

- Use of construction techniques that increase the flood resistance and resilience of buildings.

The document proposes that Regional Spatial Strategies and Local Development Frameworks should take full account of flood risk and incorporate the sequential approach set out in PPG25. Moreover, the document encourages integration with other planning systems, in particular Catchment Flood Management Plans.

At the development control level, the document encourages local authorities to give full weight to the advice issued by the Environment Agency in response to consultations on planning applications, implying that only in exceptional cases should permission should be granted against the Agency' s advice. In addition, the use of Flood Risk Assessments as supporting documents to planning applications in areas of flood risk is encouraged. The document proposes that if mitigating measures are shown to be required, they should be fully funded as part of the development.

12.2 REGIONAL/COUNTY PLANNING POLICY

12.2.1 RPG9

Regional Planning Guidance for the South East (RPG9) was published by the Secretary of State for the Environment, Transport and the Regions in March 2001. It covers the period up to 2016 and provides a regional framework for the preparation of local authority development plans in the South East. The guidance has a vision of encouraging economic success throughout the Region, while ensuring a higher quality of environment. Its focus is on enabling urban renaissance, promoting regeneration and renewal, concentrating development in urban areas, promoting a prosperous countryside and wider travel choices.

It has sustainable development as its core principle and seeks to focus new development on existing urban areas to reduce travel, and seeks to restrict the use of greenfield sites to those circumstances where no other alternatives exist. It also makes reference to climate change and the potential impacts this could have upon built form. RPG9 makes several references to flooding in its objectives, supporting text and policies. RPG9 recognises that there are considerable pressures arising out of the demand for development on areas of flood plain. Policy INF1 states:

"Development should be guided away from areas at risk or likely to be at risk in future from flooding, or where it would increase the risk of flood damage elsewhere. Existing flood defences should be protected where they continue to be relevant."

12.2.2 South East Plan - Draft

The South East Plan, currently in preparation, will replace existing RPG9, RPG9a and RPG9b and like existing RPGs, will provide a strategic regional framework that forms the context within which LDDs need to be prepared. Structure Plans will be phased out.

Part 1 of the Draft South East Plan was submitted to the Government on the 29th July 2005, following a period of public consultation. The plan seeks to take a longer-term view of the development needs, but in a manner that is consistent with the principles of sustainable development.

With regard to flooding issues, Policy NRM3, Sustainable Flood Risk Management relates. It states:

"The sequential approach to development in flood risk areas set out in PPG25 will be followed. Inappropriate development should not be allocated or permitted in zones 2 and 3 of the floodplain (Map NRM2) or areas with a history of groundwater flooding, or where it would increase flood risk elsewhere, unless there is over-riding need and absence of suitable alternatives.

Where development is proposed for parts of zones 2 and 3, local authorities (in the case of plan allocations) and developers (in the case of specific proposals) with advice from the Environment Agency should undertake a Strategic Flood Risk Assessment (SFRA) to provide a comprehensive understanding of the flood risk and options for managing that risk in a cost effective manner. This should have regard to climate change and identify appropriate types of development and suitable mitigation and adaptation measures in scheme design and layout.

Existing flood defences will be protected from development. Where development is permitted in appropriately defended floodplains it must be designed to be resilient to flooding (to minimise potential damage) and to allow for the future maintenance, realignment or management of the defences to be undertaken.

In the preparation of Local Development Documents and considering planning applications, local authorities in conjunction with the Environment Agency, should also:

"Take account of River Basin Management Plans, Catchment Flood Management Plans and Shoreline Management Plans in developing Local Development Documents and other strategies. Where locationally specific flood risk and land management options such as flood storage, managed realignment and set back from coastal defences are identified, land should be

safeguarded for these purposes and appropriate land management practices should be encouraged.

Require incorporation and management of Sustainable Drainage Systems (SuDS), other water retention and flood storage measures to minimise direct surface run–off, unless there are practical or environmental reasons for not doing so.

Take account of increased sewage effluent flows on fluvial flood risk."

The Draft South East Plan envisages strong and sustained economic growth over the plan period, acknowledging that this will entail significant levels of new development. it has presented a range of development options based on three levels of growth and two options for distributing the growth in the region.

It will be apparent from the above that Ashford is expected to make a substantial contribution to meeting Kent's housing targets over the Plan period.

12.2.3 Kent and Medway Structure Plan

The role of the Structure Plan is to provide the strategic planning framework that will guide decisions on development, transport and environmental matters in Kent and Medway over the next 20 years. This Plan covers the period 2001-2021. It will shape the scale, location and form of private and public investment in Kent over that period and in doing so must interpret national and regional policies as they apply to Kent and Medway.

These are currently aimed at fostering sustainable communities, promoting an "urban renaissance" by regenerating our towns and their centres and revitalising rural communities.

The re-use of previously developed land will be a priority, particularly within the central parts of our towns and through many of the strategic locations for development identified by this Plan.

Developments should aim to encourage a mix of uses with new housing provided at a higher density than has been the case in recent years and supported by public transport facilities. New releases of greenfield land will be kept to a minimum and be at a reduced level in comparison with recent years although there will be a continuing need for some additional greenfield land, particularly to support the growth of Ashford. Overall the strategy will serve to resist pressure on the urban fringe and avoid suburbanisation of the countryside.

The Structure Plan indicates that, in cases where development proposals raise flooding or runoff issues, whether proposed in a local development document or a planning application, local authorities should consult the Environment Agency and other relevant bodies such as internal drainage boards, parish councils, sewerage undertakers and navigation authorities. In accordance with PPG25, local planning authorities are required to apply a risk-based, sequential approach to flood risk when preparing development plans and taking development control decisions.

The Structure Plan states that where it is essential that development takes place in an area which is at risk of flooding it is important to minimise the impact of that risk. This can be done through detailed design measures such as raising ground levels or building on stilts. Planning conditions can also help to reduce the impact of flooding by controlling occupation, removing permitted development rights or ensuring that prospective occupiers are given information about flood risk.

Policy NR9 refers to Development and Flood Risk. It states:

"Development will be planned to avoid the risk of flooding and will not be permitted:

if it would be subject to an unacceptable risk of flooding or where it would increase the risk of flooding elsewhere or require the construction of new defences;

Where it would prejudice the capacity and integrity of flood plains or planned flood protection or coastal defence measures;

Where it will hinder the implementation of future flood protection or coastal defence measures;

if it would adversely affect the ability of the land to drain.

Where development is necessary in areas at risk of flooding it should be designed and controlled to mitigate the impact of flood risk. Local Development Documents will include policies to:

(a) ensure that a risk based sequential approach, reflecting degrees of flood risk, is adopted in guiding specified categories of development away from flood risk areas;

(b) secure the provision and maintenance of appropriate drainage systems in new developments to alleviate flood risk;

(c) ensure that proposals for development are accompanied by flood risk assessments appropriate to the scale and nature of the development and the risk."

Policy NR10 refers to flood protection.

"The development of new or replacement flood protection or coastal defence measures that are in accordance with a Catchment Management Plan, Shoreline Management Plans or Coastal Defence Strategies will be supported. Where these are required to service a development their provision and maintenance should be funded as part of that development."

12.3 LOCAL PLANNING POLICY

12.3.1 Ashford Borough Local Plan 2000

The current Local Plan is being superseded by the emerging Local Development Framework.

12.3.2 Ashford Local Development Framework

The Ashford Local Development (LDF) is a suite of documents setting out the development of Ashford for the period until 2021. The preparation of this document has been supplemented by a number of studies these are highlighted below.

12.3.3 Greater Ashford Development Framework

The Greater Ashford Development Framework (GADF) as highlighted above concluded with a masterplan for the proposed 31,000 new homes and 28,000 jobs until the period 2031.

12.3.4 Integrated Water Management Study (IWMS)

To determine whether the Ashford area is able to provide for the proposed growth in a sustainable manner a capacity report was commission by ABC in August 2001. This report (Ashford's Capacity: A Handbook for Change, Halcrow, 2001) identified two of the key constraints to sustainable growth in the Ashford growth area as water quality and flooding. The ODPM provided funding for the Ashford Integrated Water Management Study. The findings of the study were published in August 2005. The study made a wide range of recommendations which have fed into the GADF and emerging Local Development Framework.

12.3.5 Ashford Water Cycle Strategy

Implementation of the IWMS recommendations is being taken forward through a partnership document, the 'Ashford Water Cycle Strategy 2006-2031' (Ashford's Future, 2006). It includes four policies relating to flood risk:

Table 9 : Ashford Water Cycle Strategy

	Policy Statement	**Rationale**
F1	Ensure that new homes are not at risk when the River Stour floods, nor increase risk to existing homes and businesses.	No more homes at risk of being flooded by the River Stour in floods up to 1 in 100 year probability
F2	Take further action to reduce flood risk to existing properties in Ashford	2088 properties at risk in Ashford from a 1 in 200 year flood £3.2 million estimated average annual flood damage
F3	Work towards an integrated urban drainage system to minimise increases in flood risk from urbanisation and climate change.	More built hard surfaces increases flood risk Controlling runoff near source is better than expensive river flood defences
F4	Design surface drainage systems to reduce pollution, water demand and discharges from Combined Sewer Overflows (CSO)	Storm runoff from urban areas can short and long term pollution of rivers and watercourses

12.3.6 Core Strategy Development Plan Document

The submitted Core Strategy (DPD) included a number of policies which have an impact on flood risk, these are:-

CS1 – Guiding principles

Within this policy a number of guiding principles relate directly to flood risk in the Borough, these area:-

Development that works within the environmental limits that protect the high quality built and natural environment of the Borough, minimise flood risk, provide for adequate water supply, and protect water and air quality standards;

E. New buildings and places designed to meet challenging sustainable design and construction standards that work towards achieving zero carbon developments, including minimising the use of resources and waste, and to enhance biodiversity;

M. Developments that are designed to mitigate and adapt to the effects of climate change.

CS10 Sustainable Design and Construction

This highlights the role that sustainable drainage can make to ensuring that new developments contribute to the wider sustainable agenda and reduces the causes of climate change.

CS20 Flood Risk

POLICY CS19 - DEVELOPMENT AND FLOOD RISK

Proposals for new development within the 100 year undefended floodplain (plus an appropriate allowance for climate change) will not be permitted unless:

i) it would not be at an unacceptable risk of flooding itself, or

ii) the development would not result in any increased risk of flooding elsewhere.

In exceptional circumstances, where the tests above cannot be met, essential transport or utility infrastructure, or other development on a brownfield site may be allowed if:

a) the development is designed to be compatible with potential flood conditions, and,

b) there are no alternative sites in a lower flood risk zone, and,

c) the development would make a significant contribution to the sustainable development objectives of the LDF, and,

d) it can be demonstrated to the satisfaction of the Council and the Environment Agency that any residual flood risks are adequately mitigated to avoid an increased risk of flooding either on the site or elsewhere.

CS20 Sustainable Drainage

POLICY CS20 - SUSTAINABLE DRAINAGE

All development should include appropriate sustainable drainage systems (SUDS) for the disposal of surface water, in order to ensure there is no net loss of flood storage capacity or impact on water quality.

For greenfield developments in the Ashford Growth Area, SUDS features shall be required so as to achieve a reduction in the relevant net runoff rate. On all other sites in the Borough, developments should aim to achieve a reduction from the existing runoff rate but must at least, result in no net additional increase in runoff rates.

SUDS features should normally be provided on-site. In the Ashford Growth Area if this cannot be achieved, then more strategic forms of SUDS may be appropriate. In such circumstances, developers will need to contribute towards the costs of provision via Section 106 Agreements or the strategic tariff. In all cases, applicants will need to demonstrate that acceptable management arrangements are funded and in place so that these areas are well maintained in future.

SUDS should be sensitively designed and located to promote improved biodiversity, an enhanced landscape and good quality spaces that improve public amenities in the area.

12.3.7 Ashford Town Centre Area Action Plan (DPD)

The Preferred options for the Ashford Town Centre Area Action plan was published and consulted on in June 2006. The vision for the town centre was :

"A thriving , high quality mixed use town centre : distinctive and accessible; capable of serving the current and future needs of Ashford and its wider catchment area."

It stated;

2.3.9 The river corridors that flow through the town centre are an important factor in the current and future planning of Ashford. The rivers and their floodplains are a constraint to town centre expansion and will act as a limoiting factor on the scale,type and location of development. They do however provide excellent opportunities to link the town to the surrounding countryside along these corridors, a link which has been a key characteristic

12.3.8 Sustainable Drainage Supplementary Planning Document (SPD)

As part pf Phase II of the Integrated Water Management Study (IWMS) Ashford Borough Council and the Environment Agency commissioned Atkins to develop a sustainable drainage strategy for the Ashford area and to prepare a Supplementary Planning Document (SPD). The SPD will provide further guidance to implement the Core Strategy policy and the recommendations of the IWMS. It will also provide guidance to ensure that SUDS are designed and located to promote improved biodiversity, an enhanced landscape and good quality spaces that improve public amenities.

13 APPENDIX B : DRAFT STOUR CATCHMENT FLOOD MANAGEMENT PLAN

13.1 INTRODUCTION

The draft Stour Catchment Flood Management Plan (CFMP) was released on the Environment Agency website (www.environment-agency.gov.uk) on Tuesday 12th September 2006. This appendix summarises the important facts and policies that are relevant to Ashford. The document is a public consultation draft so is subject to change.

13.2 ABOUT THE CATCHEMENT FLOOD MANAGEMENT PLAN (CFMP)

The Environment Agency will use the CFMP to work with their partners and members of the public to agree how they will manage flood risk in the future. When they look at flood risk management, it is important to consider the catchment as a whole, as changes in an upstream part of a catchment can have a considerable effect downstream. Policies and actions in this plan will help them to decide how best to manage the risk of flooding in our catchment.

Note: for Ashford, the CFMP only covers flooding from the rivers, it does not cover sewer flooding, localised surface flooding or localised groundwater flooding etc.

13.3 CURRENT FLOOD RISKS

Within the Stour CFMP area there are approximately 50,000 people at risk of being affected by flooding. The risk to property is also high, with an estimated £12 million in annual average damages in the whole catchment.

Summary of current flood risk (2005)

Policy Unit	Properties currently at risk of flooding from a 0.5% annual probability flood	Annual Average Damages
Ashford	2088	£3.2 million
Canterbury	1565	£5.9 million

(Note: Canterbury is given for comparison, other areas omitted)

The key infrastructure at risk from flooding includes parts of the A28 between Ashford and Canterbury, the A299 from Whitstable to Herne Bay and the Ashford to Canterbury railway.

The Agency maintain and improve Main River sections in this catchment. The budget for river maintenance in the Stour catchment for 06/07 is £530,000. Parts of Ashford are protected by flood storage reservoirs at Aldington and Hothfield.

13.4 FLOOD RISK IN THE FUTURE

We have investigated future changes within the catchments and looked at the impact of changes in land use (such as more intensive agriculture), climate change and urban development. Climate change and changes in land use had the biggest effect, causing deeper and more frequent flooding and decreasing the current level of flood protection. Across the catchment this will mean more people, land and property will be at risk of flooding.

Urban development increases flood risk locally but on a catchment-wide scale we found that it will not significantly change flood risk in the future. (Note: the IWMS conclusions about increased flood risk mainly related to increase risk within Ashford, and to a much less extent downstream)

Summary of current flood risk (2005)

Policy Unit	Properties currently at risk of flooding from a 0.5% annual probability flood	Annual Average Damages
Ashford	3133	£5 million
Canterbury	1627	£7.5 million

13.5 PREFERRED POLICIES

With our partners we have developed policies to meet the aims and objectives of the Stour CFMP.

These policies set out our vision for a more sustainable, cost effective and natural approach to managing flood risk in our catchments. The policies are:

1. No active intervention (including flood warning and maintenance). Continue to monitor and advise.

2. Reduce existing flood risk management actions (accepting that flood risk will increase over time).

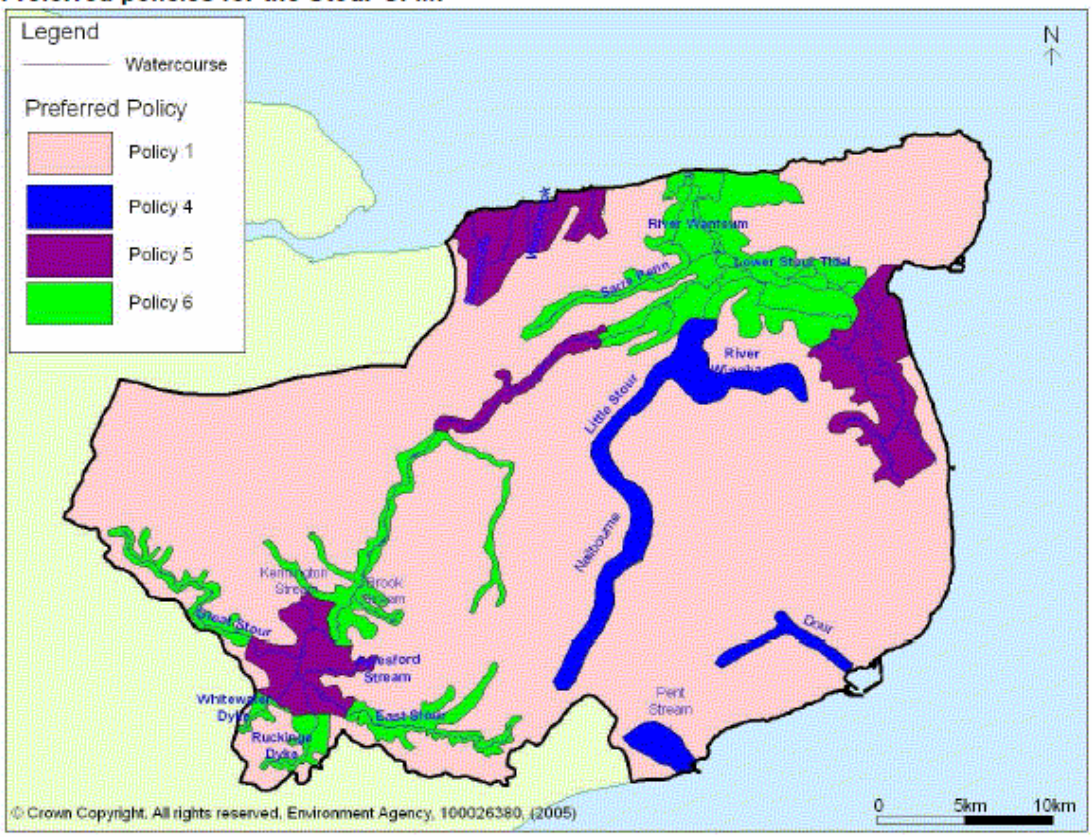
3. Continue with existing or alternative actions to manage flood risk at the current level (accepting that flood risk will increase over time from this baseline).

4. Take further action to sustain current scale of flood risk into the future (responding to the potential increases in flood risk from urban development, changes in land use, or climate change).

5. Take further action to reduce flood risk (now and/or in the future).

6. Take action to increase the frequency of flooding to bring benefits locally or elsewhere, (which may mean an overall reduction in flood risk).

Preferred policies for the Stour CFMP



Policy Descriptions

Ashford	
The policy unit	The Ashford policy unit covers the urban area of Ashford, including the downstream areas of East Stour, Ruckinge Dyke, Whitewater Dyke and Aylesford stream, as well as the confluence of these tributaries with the Great Stour. The policy selected will be confined to this area.
Problem/risk	Ashford is at the confluence of the five rivers and streams with approximately 2,000 properties and businesses at risk of flooding. This will increase substantially with climate change. The existing flood storage reservoirs at Hothfield and Aldington provide important flood protection to residential areas in Ashford. This level of protection will reduce with climate change, increasing the risk to Ashford. This risk will also increase due to the significant amount of growth that is planned for Ashford. This will put more people and property at risk of flooding. Flooding has occurred in South Willesborough and this area is still at risk of flooding. The areas at Park Farm, around Singleton Lake and South Ashford are at particular risk of flooding, especially when looking at the future climate change scenarios. When flooding occurs, there are large volumes of water but it is slow moving where properties are flooded. Flood depths vary but are generally approximately 0.5m during an extreme event. Areas of South Ashford and South Willesborough flood up to 1m deep. Of the properties at risk, 200 are of high social vulnerability.
Policy	**5 - Take further action to reduce flood risk.**
Reasons why	The level of flood risk within Ashford is already high, with the current population at risk of flooding in several areas. The risk to people is set to increase by as much as 61 per cent with climate change. Annual average damages to property are currently approximately £3million and this will rise by over 50 per cent with climate change by

Ashford	
	2050. This increase in risk is due to a 35 per cent rise in flows. Overtopping will become more common, flooding not only properties and businesses, but recreational areas along the riverside. This will create a substantial hazard as fast flowing and deep water endangers life. Economic flood damages by annual probability flood event: £12 million for 20 per cent £18 million for 10 per cent £28 million for 2.5 per cent £55 million for 1 per cent £100 million for 0.5 per cent With the increased development planned for Ashford and the expected increase due to climate change, the risk and impact of flooding is expected to increase. We need to work together with Ashford Borough Council to make sure that the planned development does not have any negative effects. We need to do more work to analyse the potential for flood mitigation to make sure floodplains are protected from future developments. This policy makes sure that we investigate the potential to reduce and minimise flooding and build the results from AIWMS into future plans for Ashford.
Catchment-wide opportunities & constraints	**Opportunities** To influence development of the Ashford growth area and make sure sustainable urban drainage systems are built into the development. Development of "blue" space through Ashford. Development of flood management measures in the Upper Stour to benefit the environment and reduce flood risk.
	Constraints Ashford has been identified as a growth area. The areas of development will need to be near the existing town and transport links. The Ashford area is at the confluence of five major streams and flood risk is high. Key infrastructures such as the Channel Tunnel rail link and M20 cannot be relocated.
Actions	Undertake a Flood Risk Management Strategy to identify and explore a range of flood risk management options in Ashford. The strategy will inform the Ashford's Future Development Framework. Develop a System Asset Management Plan to set out all details of how current flood management system and assets are operated and how they should be managed. Develop and integrate urban drainage project, a collaborative plan between stakeholders to deliver an integrated approach to urban drainage management on a strategic, regional and local level.
Risks, uncertainties & dependencies	Development is already underway within Ashford. It is assumed that any development will not increase the flood risk. Other major concerns, such as transport and the layout of the town, may still change the risk of flooding in Ashford.

13.6 MAKING THE CFMP HAPPEN

The Agency will implement the policies and actions of this CFMP with their partners. They will review the Stour CFMP every six years using the indicators and targets to challenge the objectives and measure their success. They will incorporate parts of the Stour CFMP into the forthcoming river basin management plans as part of the Water Framework Directive.

Every policy unit has specific actions so it can implement the chosen policy. The previous section gave an overview of the selected policies for each of the policy units. The main actions from these policies can be summarised as:

- **Flood Risk Management (FRM) River Strategy**

To identify and explore a range of flood risk management options including Habitat Creation Plans and identifying additional flood storage and wetland restoration and creation.

- **System Asset Management Plans and Integrated Urban Drainage Projects**

In urban areas we need to set out all the information relating to the management of the asset system and, at a high level, how the assets within it should be managed. We also need to work with stakeholders to produce a collaborative plan to deliver an integrated approach to urban drainage management on a strategic, regional and local level.

Implementation

Policy unit	Policy	Action	Lead organisation	Priority	Timescale
Ashford	Policy 5 Take further action to reduce flood risk	FRM River Strategy To identify and explore a range of flood risk management options in Ashford. The Strategy will inform the Ashford's Future Development Framework.	Environment Agency with Ashford Borough Council	High	2007/08 start
		System Asset Management Plan Setting out all the information relating to the management of the system and, at a high level, how the assets within it should be managed.	Environment Agency	High	2007 start (pending guidance)
		Integrated Urban Drainage Project A collaborative plan between stakeholders to deliver an integrated approach to urban drainage management on a strategic, regional and local level.	Ashford Borough Council with Environment Agency	Medium	2008/09 start

14 APPENDIX C : PROCEDURE FOR PLANNING WITH FLOOD PLAINS

14.1 DEVELOPER RESPONSIBILITIES

Those proposing particular developments are responsible for undertaking a Flood Risk Assessment to determine if the proposed development is likely to:

- be affected by flooding.
- whether it will increase flood risk elsewhere;
- the measures proposed to deal with these effects and risks.

Developers must satisfy the local planning authority that any flood risk to the development or additional risk arising from the proposal will be successfully managed with the minimum environmental effect, to ensure that the site can be developed and occupied safely.

It is in the developer's interests to deal with these matters, since they may well affect the value of land and the cost of developing it. It is then for the local planning authority, advised as necessary by the Environment Agency and other relevant organisations, to determine an application for planning permission taking account of all material considerations, including the issue of flood risk and how it might be managed or mitigated.

In these functional flood plains, the Government considers that built development should be wholly exceptional and limited to essential transport and utilities infrastructure that has to be there. Such infrastructure should be designed and constructed to remain operational even at times of flood, to result in no net loss of flood-plain storage, not to impede water flows and not to increase flood risk elsewhere. Local planning authorities should give due weight to the need to avoid adding to the risk of flooding or restricting the ability of an operating authority to construct, operate and maintain flood control works. Access to emergency services is also vital.

14.2 LOCAL AUTHORITY RESPONSIBILITIES

Local planning authorities should adopt a risk-based approach to proposals for development in or affecting flood-risk areas. The assessment of risk should take account of:

- the area liable to flooding;
- the probability of it occurring, both now and over time;
- the extent and standard of existing flood defences and their effectiveness over time;

- the likely depth of flooding;
- the rates of flow likely to be involved;
- the likelihood of impacts to other areas, properties and habitats;
- the effects of climate change; and
- the nature and currently expected lifetime of the development proposed and the extent to which it is designed to deal with flood risk

14.3 APPLICATIONS RELEVANT TO FLOOD RISK

Applications likely to require particular consideration of flood risk issues include those for development:

- within a river flood plain or washland shown on the indicative flood plain map prepared by the Environment Agency;
- within or adjacent to any watercourse, particularly where there might be potential for flash flooding;
- adjacent to or including any flood bank or other flood control structure;
- situated in an area where the Agency have indicated that there may be drainage problems;
- likely to involve the culverting or diverting of any watercourse; or
- of such a size or nature relative to the receiving watercourse/drainage system that there could be a significant increase in the rate of surface water run-off from the area.

15 APPENDIX D : RESPONSIBILITIES

15.1 LANDOWNERS AND RIPARIAN OWNERS

Landowners are responsible for managing the drainage of their land in such a way as to prevent, as far as is reasonably practicable, adverse impacts on neighbouring land.

Riparian owners are responsible for the maintenance of watercourses passing through, or on the boundary of, their properties. This includes a duty to keep the watercourse free of obstructions that could cause or exacerbate flooding.

15.2 GOVERNMENT

There is no statutory duty on the government to protect land or property against flooding but it has recognised the need for action to be taken to safeguard the wider social and economic well being of the country.

15.3 THE ENVIRONMENT AGENCY

The Environment Agency has:

- the lead role in providing advice on flood issues, at a strategic level and in relation to planning applications;
- conducting surveys of flood risk areas;
- a supervisory duty for all matters relating to flood defence. It is the principal operating authority, with responsibility for main rivers[6] and sea defence;
- the lead role for managing the dissemination of flood warnings;
- a role in educating the public on flood risk and the measures they should take;
- As part of its pollution control duties, the Agency is also responsible for drainage consents from premises under Part II of the Environmental Protection Act 1990.
- a duty to protect and enhance environment, including biodiversity and habitats.

[6] Watercourses designated as such on main river maps.

15.4 INTERNAL DRAINAGE BOARDS

The Internal Drainage Boards (IDB), such as that for the River Stour, are responsible for the maintenance and water level management of watercourses within their defined district. The membership usually comprises land and riparian owners within the district, mainly farmers.

15.5 LOCAL AUTHORITIES (ASHFORD BOROUGH COUNCIL)

The Local Authority is responsible for:

- recognising that the susceptibility of land to flooding is a material planning consideration;
- giving appropriate weight to information on flood-risk and how it might be affected by climate change in preparing development plans and considering individual proposals for development;
- consulting the Environment Agency, which has the lead role in providing advice on flood issues at a strategic level and in relation to planning applications, and other relevant organisations;
- applying the precautionary principle to decision-making so that risk is avoided where possible and managed elsewhere;
- improving the information available to the public about the risks of locating human activities in areas susceptible to flooding;
- taking into account the responsibility of owners for safeguarding their own property as far as is reasonably practicable;
- recognising that flood plains and washlands have a natural role as a form of flood defence as well as providing important wildlife habitats and adding to landscape value; and
- recognising that engineered flood reduction measures may not always be the appropriate solution, since they can have economic and environmental costs and impacts on the natural and built environment, need maintenance and replacement and cannot eliminate all risk of flooding.
- taking a lead role in maintaining ordinary watercourses.

15.6 HIGHWAYS AUTHORITIES (KENT COUNTY COUNCIL, HIGHWAYS AGENCY)

Highway authorities are responsible for road drainage.

15.7 SEWERAGE UNDERTAKERS (SOUTHERN WATER)

The private-sector sewerage undertakers are generally responsible for surface-water drainage from development, where this is via adopted sewers.

15.8 DEVELOPERS

Developers should fund the provision and maintenance of flood defences that are required because of the development

16 APPENDIX E : DEFINITIONS

16.1 DEFENDED AND UNDEFENDED AREAS

The Defended outline is the land covered in a 1% (1 in 100 year flood) with the current flood defences in place. The Undefended outline is the same flood as if the flood defences were not in place, or had suffered a catastrophic failure. In Ashford, computer modelling has derived both of these outlines.

16.2 FLOOD PLAIN

Flood plains are generally flat-lying areas adjacent to a watercourse, tidal lengths of a river or the sea where water flows in times of flood or would flow but for the presence of flood defences where they exist. Functional flood plains are the unobstructed or active areas where water regularly flows in time of flood. They are generally accepted to be the area that floods on average at least once every 10 years. Areas of flood plain that are defended are passive until the occurrence of a flood greater than that for which the defences were designed.

16.3 FLOOD PLAIN DEVELOPMENT

Flood plain development in its widest sense is any human intervention that changes the characteristics of the flood plain. A tighter definition is any building or infrastructure that is itself at flood risk or increases flood risk elsewhere by either:

- reducing flood storage of the floodplain, thus causing flood waters to rise further; or

- impedes the conveyance of flood flows, for example: a road embankment, with inadequate culverts, across the flood plain can act as a dam, increasing flood risk upstream.

16.4 FLOOD RISK

Flood risk involves both the statistical probability of a flood occurring and the scale of the potential consequences. The impacts vary in their nature, scale and extent. The risk is usually expressed in terms of annual probability, either as a percentage or as a return period. Therefore, a 1% flood means that there is a probability of a flood event of the magnitude shown on the flood risk maps occurring in 1% of years, which means on average once in every century.

A return period figure is more commonly used but often misunderstood: if a 1 in 100 year flood occurs this year, it does not mean another will not occur for another 100 years or even that it will not occur again within that year.

It is important to recognise that a 1% flood has a 26% probability of being equalled or exceeded at least once in 30 years (the duration of a typical

mortgage) and a 49% probability of being equalled or exceeded at least once in 70 years (a typical human lifetime).

In 2000, the problems were not caused by one rare event, but by a wet spring and summer followed by three uncommon events in close succession that had the impact of one large flood.

16.5 FLUVIAL FLOODING

Flooding from designated Main River. Other types of flooding include tidal, ordinary watercourses, sewage, site/land drainage and groundwater flooding.

16.6 INAPPROPRIATE DEVELOPMENT

Inappropriate development, in a flood plain context, is generally any building that would increase risk to life (residential), to property (residential and commercial) or includes strategic facilities that are required in times of flood (e.g. hospitals, emergency services and control centres, electricity supplies, telephone exchanges, mobile telephone and broadcasting)

Development would also be inappropriate if it increases flood risk elsewhere by affecting the conveyance of flood flows or reducing flood plain storage.

16.7 INDICATIVE FLOOD MAPS

The limits of the flood plain shown are indicative of the area that could be affected by flood events that overtop or breach flood defence structures. They are based on the approximate extent of floods with a 1% (1 in 100 year) annual probability of occurrence for rivers and a 0.5% (1 in 200 year) annual probability of occurrence for coastal areas. This is under present expectations or the extent of the highest known flood, where this is greater.

Where a flood defence exists that protects to a higher standard than those defined, the flood plain is the area that is defended to that standard. However, these maps do not differentiate between defended and undefended areas or take account of the likelihood that flood risk will be increased by climate change.

The maps represent the best available current information on the extent of flood risk. They will be revised and updated over time. However, it should be noted that these maps are indicative only, to be used as a basis for consultation and not as the sole basis for decisions on where planning policies apply. Authorities and others involved in the planning process should ensure that they are using the latest available version.

16.8 MAIN RIVER AND ORDINARY WATERCOURSES

Watercourses designated as such on main river maps. The Environment Agency has responsibility for flooding from Main River. Local authorities are the

operating authorities for Ordinary Watercourses7, except in internal drainage districts8, where the powers rest with Internal Drainage Boards (IDBs).

16.9 PPG3 (HOUSING)

This PPG note provides guidance on a range of issues relating to the provision of housing. In deciding which sites to allocate for housing in local plans and UDPs, local planning authorities should assess their potential and suitability for development against each of the following criteria:

- the physical and environmental constraints on development of land, including, for example, the level of contamination, stability and flood risk, taking into account that such risk may increase as a result of climate change.

16.10 PPG25 (DEVELOPMENT & FLOOD RISK)

This guidance explains 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. It sets out the importance the Government attaches to the management and reduction of flood risk in the land-use planning process, to acting on a precautionary basis and to taking account of climate change. It summarises the responsibilities of various parties in the development process. The planning system should ensure that new development is safe and not exposed unnecessarily to flooding by considering flood risk on a catchment-wide basis and, where necessary, across administrative boundaries. It should seek where possible to reduce and certainly not to increase flood risk. It should help ensure that flood plains are used for their natural purposes, continue to function effectively and are protected from inappropriate development. The guidance also outlines how flood risk issues should be addressed in regional planning guidance, development plans and in the consideration of planning applications.

16.11 SECTION 105

Under Section 105 of the Water Resources Act 1991, the Agency has a duty to survey matters relating to flooding, including the identification of areas where flood defence problems are likely. Section 105 surveys should help to identify the extent of flood plains, washlands and other land liable to flood.

16.12 WASHLAND

An area of flood plain where water is stored in time of flood. Such an area may have its effectiveness enhanced by the provision of structures to control the amount of water stored and the timing of its release to alleviate peak flood flows downstream.

[7] All those watercourses not designated as main river.
[8] Statutory areas of lowland Britain with special drainage needs.