Eastbourne Borough Council and Wealden District Council

Strategic Flood Risk Assessment

Level 1: Final

September 2008

Prepared for:

Wealden District Council
www.wealden.gov.uk

EASTBOURNE Borough Council

ERRATA

The Eastbourne Borough Council and Wealden District Council Level 1 Strategic Flood Risk Assessment (SFRA) contains references to the circumstances when a Flood Risk Assessment is required, which exceed the guidance contained in Planning Policy Statement 25: *Development and Flood Risk*. In response to the letter from the Environment Agency dated 23rd June 2008, Eastbourne Borough Council and Wealden District Council amend the text of the SFRA as follows:

Paragraph 3.2.2 (page 8)

3. Flood Risk Assessments are required for all development proposals of 1 ha or greater in Flood Zone 1.

Paragraph 11.1 (page 70)

11.1 When are Flood Risk Assessments Required?

When informing developers of the requirements of a flood risk assessment for a development site, consideration should be given to the position of the development relative to flood sources, the vulnerability of the proposed development and its scale. In the following situations a Flood Risk Assessment should always be provided with a planning application:

- The development site is located in Flood Zone 2 or 3;
- The proposed development is greater than 1 hectare;
- The development site is located in an area known to have experienced flooding problems from any flood source; and
- The development is located within 20m of any watercourse regardless of Flood Zone classification.

Table 11-1 (page 74) 1st column 7th row

Sites greater than 1 hectare

Table 11-1 (page 74) 1st column 8th Row

The Environment Agency are statutory consultees for all major developments in Flood Zones 1.

Any developer proposing development greater than 1 hectare in Flood Zone 1 should contact the Environment Agency to determine the precise requirements of a FRA.

The FRA should be prepared in accordance with Annex E of PPS25 and the Practice Guide Companion and should include but not limited to the minimum requirements set out in column 2.

The FRA should be prepared through consultation with the Environment Agency and the Local Planning Authority.

4th November 2008

Revision Schedule

Eastbourne and Wealden Strategic Flood Risk Assessment
September 2008

Rev	Date	Details	Prepared by	Reviewed by	Approved by
01	22/02/2007	Draft D114040	**Anna Samuel** Hydrology Specialist	**Stephen Riley** Senior Consultant	**Damon O'Brien** Technical Director
02	24/05/2007	Eastbourne and Wealden Final Level 1 SFRA 1.0	**Anna Samuel** Hydrology Specialist	**Stephen Riley** Senior Consultant	**David Dales** Director
03	26/09/2007	EBC WDC Level 1 SFRA FINAL Rev03	**Anna Samuel** Hydrology Specialist	**Michael Timmins** Principal Consultant	**Damon O'Brien** Technical Director
04	22/04/2008	EBC WDC Level 1 SFRA FINAL Rev 4.1	**Anna Samuel** Hydrology specialist	**Stephen Riley** Senior Consultant	**Jon Robinson** Associate Director
05	15/09/2008	EBC WDC Level 1 SFRA FINAL Rev 4.2.doc	**Stephen Riley** Senior Consultant	**Jon Robinson** Associate Director	**Jon Robinson** Associate Director

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Abbreviations

ACRONYM	DEFINITION
AONB	Area of Outstanding Natural Beauty
AOD	Above Ordnance Datum
BREEAM2	BRE Environmental Assessment Method 2
CFMP	Catchment Flood Management Plan
DEM	Digital Elevation Model
DPD	Development Plan Documents
EA	Environment Agency
EBC	Eastbourne Borough Council
EP	English Partnerships
FRA	Flood Risk Assessment
GIS	Geographical Information Systems
IDB	Internal Drainage Board
LDDs	Local Development Documents
LDF	Local Development Framework
LDS	Local Development Scheme
LiDAR	Light Detection and Ranging
LPA	Local Planning Authority
MDSF	Modelling and Decision Support Framework
ODPM	Office of the Deputy Prime Minister
PCPA	Planning and Compulsory Purchase Act 2004
PPG25	Planning Policy Guidance Note 25: Development and Flood Risk
PPS25	Planning Policy Statement 25: Development and Flood Risk
RFRA	Regional Flood Risk Assessment
RPG	Regional Planning Guidance
RSS	Regional Spatial Strategy
SAR	Synthetic Aperture Radar
SA	Sustainability Assessment
SFRA	Strategic Flood Risk Assessment
SPG	Supplementary Planning Guidance

RAMSAR	Location where the Convention on Wetlands was signed in 1971. This is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
WDC	Wealden District Council

Glossary

TERM	DEFINITION
Aquifer	A source of groundwater comprising water-bearing rock, sand or gravel capable of yielding significant quantities of water.
Catchment Flood Management Plan	A high-level planning strategy through which the Environment Agency works with their key decision makers within a river catchment to identify and agree policies to secure the long-term sustainable management of flood risk.
Climate Change	Both natural and human actions causing long term variations in global temperature and weather patterns.
Culvert	A channel or pipe that carries water below the level of the ground.
Flood defence	Infrastructure used to protect an area against floods as floodwalls and embankments; they are designed to a specific standard of protection (design standard).
Flood plain	Area adjacent to river, coast or estuary that is naturally susceptible to flooding.
Flood storage	A temporary area that stores excess runoff or river flow often ponds or reservoirs.
Fluvial flooding	Flooding by a river or a watercourse.
Groundwater	Water that is in the ground, this is usually referring to water in the saturated zone below the water table.
Indicative flood plain map	A map that delineates the areas that have been predicted to be at risk of being flooded during an event of specified probability.
Internal Drainage Board	Independent bodies with responsibility of ordinary watercourses within a specified district.
Inundation	Flooding.
Local Development Framework (LDF)	The core of the updated planning system (introduced by the Planning and Compulsory Purchase Act 2004). The LDF comprises the Local Development Documents, including the development plan documents that expand on policies and provide greater detail. The development plan includes a core strategy, site allocations and a proposals map.
Local Planning Authority	Body that is responsible for controlling planning and development through the planning system.
Mitigation measure	An element of development design which may be used to manage flood risk or avoid an increase in flood risk elsewhere.
Risk	The probability or likelihood of an event occurring.
Scour	Degenerative weathering process often caused by wave action.
Sequential Test	A risk based approach in to assessing flood risk, which gives priority in ascending order of flood risk, i.e. lowest risk first.
Sewer flooding	Flooding caused by a blockage or overflowing in a sewer or urban drainage system.
Stakeholder	A person or organisation that has an interest in, or affected by the decisions made within a site.
Sustainability Appraisal	A process used to identify if policies, strategies or plans promote sustainable development and further used for improving policies. It is a requirement for Regional Spatial Strategies under the *Planning and Compulsory Purchase Act 2004.*
Sustainable drainage system	Methods of management practices and control structures that are designed to drain surface water in a more sustainable manner than some conventional

TERM	DEFINITION
	techniques.
Sustainable development	Development that meets the needs of the present without compromising the ability of future generations meeting their own needs.
Tuflow	A 1D and 2D hydrodynamic modelling package
1 in 100 year event	Event that on average will occur once every 100 years. Also expressed as an event, which has a 1% probability of occurring in any one year.
1 in 100 year design standard	Flood defence that is designed for an event, which has an annual probability of 1%. In events more severe than this the defence would be expected to fail or to allow flooding.

1 Introduction

The Planning and Compulsory Purchase Act 2004 (PCPA) (Reference 1) requires Local Planning Authorities to produce Local Development Frameworks (LDFs) to replace the system of Local, Structure and Unitary Development Plans. Local Development Frameworks are a portfolio of documents (Local Development Documents (LDDs)) that collectively deliver the spatial planning strategy for the authority area. The PCPA 2004 requires LDDs to undergo a Sustainability Appraisal (SA) which assists Planning Authorities in ensuring their policies fulfil the principles of sustainability. Strategic Flood Risk Assessments (SFRAs) are one of the documents to be used as the evidence base for planning decisions; they are also a component of the SA process and should be used in the review of LDDs or in their production.

The release of Planning Policy Guidance Note 25: Development and Flood Risk in July 2001 (PPG25)(DTLR, 2001) introduced the responsibility that Local Authorities have to ensure that flood risk is understood and managed effectively using a risk-based approach as an integral part of the planning process.

PPG25 was superseded by Planning Policy Statement 25: Development and Flood Risk (PPS25) in December 2006 (Reference 2). PPS25 re-emphasises the active role Local Authorities should have in ensuring flood risk is considered in strategic land use planning. PPS25 encourages Local Planning Authorities to undertake SFRAs and to use their findings to inform land use planning.

To assist local Authorities in their strategic land use planning SFRAs should present sufficient information to enable Local Authorities to apply the Sequential Test to their proposed development sites. The Sequential Test seeks to guide development to areas of low flood risk or where necessary to ensure development vulnerability is appropriate to the flooding probability of an area. To achieve this, the SFRA should have regard to river catchment wide flood issues and also involve a process which allows the Local Planning Authority to determine the variations in flood risk across and from their area as the basis for preparing appropriate policies for flood risk management for these areas.

In addition where, the Sequential Test identifies that it is necessary to undertake the Exception Test then the scope of the SFRA should be increased to provide the necessary information for the application of the Exception Test.

1.1 The Eastbourne and Wealden SFRA

The Non Statutory Wealden Local Plan (Reference 3) and the emerging Eastbourne Local Development Framework (Reference 4) have identified several growth areas in the area administered by Eastbourne Borough Council (EBC) and Wealden District Council (WDC). The growth areas are principally focused on the towns of Eastbourne, Hailsham, Hellingly, Polegate and Heathfield.

The spatial planning of these growth areas must be considered with regard to the current and future risk of flooding from a number of sources, including fluvial, tidal, stormwater management and groundwater. It is therefore vitally important that flood risk is considered at a strategic scale to inform land allocations and future developments proposed by the emerging Local Development Frameworks.

1.2 Aim of SFRA

A suitable SFRA should present sufficient information to enable the Local Planning Authority to apply the Sequential Test (Section 6) to potential development sites and to assist in identifying if application of the Exception Test (Section 7) will be necessary and can be satisfied. Where the Exception Test is required the SFRA should present sufficient information to demonstrate that development will be safe from the risks of flooding for the lifetime of the development.

1.3 SFRA Objectives

To achieve the aim of the SFRA, a staged approach is proposed, in keeping with guidance presented in the Practice Guide companion to PPS25 (Reference 5). The objectives of the EBC and WDC SFRA are:

- Identify the extent of all PPS25 Flood Zones but focus on areas within Flood Zone 3 and areas where new development is likely to be concentrated;
- Provide evidence-based reports to inform each Authority's Local Development Framework and other Development Plan Documents about managing potential flood risk and suitable to inform the Sustainability Appraisal of related documents;
- Advise Eastbourne and Wealden Councils on suitable polices to address flood risk management in a consistent manner across both their administrative areas;
- Advise the Councils on the requirements of site specific flood risk assessments based on local conditions and policy recommendations;
- Advise the Councils on the applicability of Sustainable Drainage Systems (SuDS) throughout the study area;
- Present sufficient information to inform the Councils of the flood considerations necessary in emergency planning; and
- Produce sub-area profiles on flood risk and development sites.

1.4 SFRA Structure

Since this study was commissioned, the Department of Communities and Local Government has released a "Living Draft" of the Practice Guide Companion to accompany PPS25 (Reference 5). The Practice Guide Companion to PPS25 recommends SFRA's are completed in two consecutive stages. This provides local planning authorities with tools throughout the LDF and SFRA process sufficient to inform decisions regarding development sites. The two stages are:

- Level 1 SFRA – Study Area Flood Source Review & Data Review
- Level 2 SFRA – Main SFRA and development sites assessments.

The results of the Level 1 SFRA will enable a prompt start to the commencement of Level 2 (where required). The data review element of Level 1 also enables a robust specification and program to be developed for Level 2.

In addition, the Level 1 SFRA provides background information and a preliminary review of available data, sufficient to scope the type of assessments necessary should a Level 2 SFRA be required. The Level 1 assessment should be used by the local planning authority to apply the Sequential Test (as defined in PPS25). This will identify sites that cannot be located in Flood Zone 1 and therefore require further investigation through a Level 2 SFRA. This report presents the information generated during Level 1 of the SFRA.

Due to the absence of the Practice Guide Companion, the commission of this SFRA did not originally include a Level 1 assessment procedure, however, this document has been created to conform to the recently released guidance.

1.4.1 Level 1 - Area Flood Source Review & Sequential Test

A Level 1 SFRA should present sufficient information to enable the Local Planning Authorities to apply the Sequential Test to potential development sites and to assist in identifying if application of the Exception Test will be necessary. The Level 1 SFRA also provides background information and a review of local policies and the potential for application of Sustainable Drainage Systems (SuDS). The review of polices is allied to guidance on the requirements for site-specific flood risk assessments throughout the study area. In addition, a preliminary review of the available data has also been undertaken to inform Eastbourne BC and Wealden DC of the works necessary under the Level 2 SFRA.

The deliverables from Level 1 should be used by the local planning authority to identify the most suitable locations for development (in-line with PPS25 and other relevant planning policy). Where sites cannot be located in line with the principles of PPS25 further investigation may be required through a Level 2 SFRA. This report presents the information generated during Level 1 of the SFRA.

One of the objectives of the Level 1 SFRA is to collate and review available information on flood risk for the study area. The information has been sourced from a variety of stakeholders including the Environment Agency, Eastbourne Borough Council, Wealden District Council, East Sussex County Council, and Southern Water.

The information presented in this Level 1 report should not be considered as an exhaustive list of all available flood related data for the study area. The Level 1 report is a presentation of the data collected following consultation with and input from the partnering Local Authorities and agencies within the timeframe available. It is hoped that throughout Level 2, the contacts and relationships developed in Level 1 will continue to assist in providing data and information for the SFRA.

1.4.2 Level 2 - Development Site Assessments for Exception Testing

The objective of Stage 2 is to use information obtained in Stage 1, where suitable, (and additional works where necessary) to reduce uncertainty regarding flood risk to those developments/development sites that could not be located in a lower flood risk zone (therefore requiring application of the Exception test). The information presented for each development site should be sufficient to demonstrate a development site is ‘safe’, in line with the requirements of the Exception Test.

Due to the challenging growth targets faced by Eastbourne and Wealden Councils some of the growth will potentially need to be accommodated in flood risk areas. The Level 2 SFRA should present sufficient information to guide development in these areas away from flood risk areas.

2 The Eastbourne Borough Council and Wealden District Council SFRA Study Area

The SFRA study area lies within the administrative boundaries of EBC and WDC and the Cuckmere River catchment (Figure 1). This results in a study area of 365km².

2.1.1 Eastbourne Borough Council

The EBC administrative area is predominantly urban, and includes the town of Eastbourne, the majority of the Willingdon Levels and the southeast section of the Cuckmere catchment (excluding the river channel itself) (Figure 1). Under the Draft South East Plan (Reference 6) EBC are required to make provision for 4800 dwellings between 2006 and 2026, this works out on average as 240 dwellings per year. The development within Eastbourne is constrained by physical factors such as the coast to the south, Pevensey Levels to the East and the South Downs Area of Outstanding Natural Beauty (ANOB) to the West (Figure 1).

2.1.2 Wealden District Council

The area administered by WDC covers the majority of the study area including the Pevensey Levels, Cuckmere River and Wallers Haven. (Figure 1) It contains the urban centres of Hailsham, Heathfield, Pevensey Bay, Polegate and East Dean but is primarily rural incorporating Sites of Special Scientific Interest (SSSIs), Areas of Outstanding Natural Beauty (AONB), National Nature Reserves (NNRs) and a RAMSAR site (Figure 2). Under the Draft South East Plan (Reference 6) WDC has to make provision for 8000 dwellings between 2006 and 2026, which equates to on average 400 dwellings per year.

2.1.3 Local Watercourses

The main river catchments within the study area are:

- The Cuckmere River;
- Watercourses on the Pevensey Levels;
- Watercourses on the Willingdon Levels; and,
- Wallers Haven.

The locations of the watercourses and their river catchments are illustrated in Figure 3.

2.1.3.1 Cuckmere River

The Cuckmere River rises from tributaries around Heathfield in the north of the study area, and flows south through the chalk landscape of the South Downs to its outfall into the English Channel west of Eastbourne. It has an approximate catchment area of 134.7km^2, which for administrative purposes, is often split into two catchments, the lower being tidal and the upper being fluvial. The river has many tributaries in the fluvial section, whereas the lower section (south of Exceat) has no tributaries. The tidal section was straightened in 1846 to allow fluvial flows to discharge quickly to the sea, and prevent natural meandering. The catchment is predominately rural with only a few urban areas within the study area namely Heathfield, Hailsham and Alfriston (Reference 7).

2.1.3.2 Watercourses on the Pevensey Levels

The Pevensey Levels covers an area of approximately 40km² and consists of a network of artificially drained channels to reclaim land from salt marshes in the early Middle Ages. There are a number of Levels within the Pevensey Levels: Glynleigh Level; Down Level; and Horse Eye Level that constitute some of the most low-lying topography in the study area. They are bounded to the north by the foothills of the Weald and to the south by the Crumbles shingle ridge which separates the Levels from the sea. Water levels throughout the Pevensey Levels are managed by the use of weirs, sluices and pumps. This system was installed in the 1960s and 1970s. The Pevensey Levels also contain a National Nature Reserve (NNR) as well as a RAMSAR site, owing to it being an important habitat for wetland flora and fauna. Pevensey, Pevensey Bay and a part of Hailsham are the only urban areas within Pevensey Levels (Reference 7).

2.1.3.3 Watercourses on the Willingdon Levels

Willingdon Levels is the flat area between the South Downs (Cuckmere River catchment) to the west and Pevensey Levels to the east. This catchment is heavily urbanised and includes Eastbourne, Willingdon and Polegate.

2.1.3.4 Wallers Haven

Wallers Haven is the eastern most catchment within the SFRA study area. It drains an upland catchment of 6km² and 3.2km² of grazing marsh into the Pevensey Levels.

2.1.4 Geology

The geology of the study area is varied. The High Weald to the north of the study area consists of sandstones and mudstones whilst the Low Weald to the south is comprised of softer sandstones and mudstones. This geology is present under the majority of the study area and also underlies the majority of Pevensey Levels and the middle section of the Cuckmere River. The South Downs are located to the south-western boundary of the study area and is comprised mainly of chalk. The drift deposit in the study areas varies greatly and comprises of deposits such as Terrace deposits, Greensands, Alluvium and clays.

2.1.5 Hydrogeology

The Ashdown Formation, Wadhurst Clay Formation and Tunbridge Wells Sands Formation that comprise the Lower Weald are classified as minor aquifers by the Environment Agency. The chalk of the South Downs is classed as a major aquifer and is a significant water resource for the surrounding towns and villages (Reference 7). The study area incorporates a range of aquifer types, ranging from non-aquifers to highly vulnerable major aquifers. Consideration should be given to the aquifer types during site assessments as not all areas would be deemed appropriate for certain types of SuDS techniques.

2.1.6 Tidal Areas

The southern extent of the study area is bounded by the English Channel. This presents a tidal flood risk to the town of Eastbourne, the Pevensey Levels and the Cuckmere Estuary. The Cuckmere River has the only Estuary in the study area. All the other watercourses are “closed” to the sea and

discharge river water through a series of tide flaps and pumps. These watercourses will therefore become tide locked during periods of high tide, which could result in fluvial flooding if channel capacity is exceeded. The areas identified as at risk from tidal flooding in the Catchment Flood Management Plan include the Cuckmere Estuary, the eastern half of Eastbourne and the section of the Pevensey Levels that borders the sea.

2.1.7 Sewers

The majority of sewers built in the last 30 years are designed to the guidelines within "sewers for adoption" (Reference 8). These sewers have a design standard of the 1 in 30 year flood event and therefore it is likely that the majority of sewer systems will surcharge during rainstorm events with a return period greater than 30 years (e.g. 100 years). Any sewers built before 1977 are likely to be of an unknown size, condition and capacity. Southern Water has provided point locations of sewer flooding incidents that have occurred in the last 10 years.

2.1.8 Groundwater

There are several dry valleys located on the chalk outcrop between Eastbourne and the Cuckmere River which would have the potential for spring resurgence if groundwater levels rise. There is one record of groundwater flooding within the study area, located in Langney.

2.1.9 Pluvial

Overland flow can occur on any slope once the top layers of soil or ground have become fully saturated. Overland flow is also likely to occur at the base of an escarpment. Locations have been identified that have a historical record of flooding in the Willingdon area. Recorded incidents are located at the base of the South Downs Escarpment and could therefore have resulted through overland flow during a pluvial event.

2.1.10 Artificial Sources

Artificial sources include any water bodies not covered by the previous categories. This typically includes canals, lakes, reservoirs etc. There are relatively few artificial sources in the study area, however those present include:

- Alfriston Reservoir;
- Eastbourne Park Compensatory Flood Storage Scheme;
- Folkington Service; and
- Possingworth Park Lake.

3 Policy Context

This section provides an overview of the planning policy framework relevant to the Strategic Flood Risk Assessment for EBC and WDC. Information contained in the SFRA on flooding and flood risk will enable the preparation of sustainable policies for flood risk management. The SFRA should be used to inform the Sustainability Appraisal of Local Development Documents (LDDs) and will facilitate informed decision-making relating to land use and development allocation within the respective Development Plan Documents (DPDs).

Under the draft South East Plan (Reference 6) EBC and WDC must accommodate 4800 and 8000 new homes respectively by 2026. Although developments are encouraged to be located in and around urban centres, the challenging growth targets will require a review of local greenbelt areas.

In satisfying these growth targets, EBC and WDC must consider a raft of planning policies (of which flooding is one) to ensure developments are sustainable. In consideration of these polices the Councils must decide on the 'weight' to attribute to each policy in determining the suitability of development in their areas.

3.1 European Policies

3.1.1 EU Water Framework Directive

The EU Water Framework Directive (WFD) followed a review of EU water policy. It seeks to restore and improve water quality in rivers, coastal water and groundwater in an integrated way. It seeks to achieve good ecological status of water bodies through integrated river basin management. This is a method of ensuring all requirements and pressures on the water environment are taken into account within a river basin. River Basin Management Plans are required to be undertaken for each river basin district. These plans are required to include information on both surface waters and groundwater.

3.2 National Policies

3.2.1 Making Space for Water (Reference 9)

Making Space for Water was released after consultation in March 2005. Its intention is to inform the development of a new strategy on the management of issues surrounding flood risk and coastal erosion for the next 20 years. It does not state specific policies but presents the Governments objectives on:-

1. Land use planning – strongly encourages Flood Risk Assessments to be prepared at all levels of the planning process;
2. Rural Issues – promote the environmental pillar of sustainable development through the use of wetlands and washlands, and managed realignment of coasts and rivers;
3. Integrated urban drainage management – committed to ensuring that SuDS techniques are incorporated in new developments;

4. Coastal issues – seeks to develop a more strategic and integrated approach to managing coastal flooding and erosion risks; and,
5. Living with flood risk – identified that there is a need to raise awareness and preparation in local communities for the changing flood and erosion risks resulting from climate change.

3.2.2 Planning Policy Statement 25: Development & Flood Risk (Reference 2)

PPS25 requires that local Councils must when preparing the Local Development Framework:

1. Allocate all sites in accordance with the Sequential Test to reduce the flood risk and ensure that the vulnerability classification of the proposed development is appropriate to the flood zone classification;
2. Flood Risk Assessments (FRAs) should be undertaken for all developments within Flood Zones 2 and 3 and sites with identified flood sources to assess the risk of flooding to the development and identify options to mitigate the flood risk to the development, site users and surrounding area;
3. Flood Risk Assessments are required for all major developments in Flood Zone 1. These are residential developments consisting of sites greater than 1 ha or greater than 10 dwellings and commercial developments that are greater than 1 ha or have a floor area greater than 1000 m^2.
4. Flood Risk to development should be assessed for all forms of flooding;
5. Where floodplain storage is removed, the development should provide compensatory storage on a level for level and volume for volume basis to ensure that there is no loss in flood storage capacity; and,
6. The promotion of SuDS as the preferred option for the surface water disposal.

3.3 Regional Policies

3.3.1 Regional Spatial Strategies (RSS)

3.3.1.1 Regional Planning Guidance for the South East (RPG9) (Reference 10)

Policy INF1

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 flooding damage elsewhere. Existing flood defences should be protected where they continue to be relevant.

(a) Development plans should:

i. include policies to protect flood plains and to protect land liable to tidal or coastal flooding from development, based on Environment Agency's indicative maps, supplemented where

necessary by historical and modelled flood data and indications as to other areas that could be at risk in the future;

ii. *provide criteria for redevelopment proposals in river flood plains, in order to minimise their cumulative adverse impact and secure enhancements of the flood water storage and ecological role of flood plains;*

iii. *take account of emerging thinking on the need for 'managed retreat' from selected coastal defence; and*

iv. *encourage the adoption of sustainable urban drainage practices*

(b) In addition:

i. *the Environment Agency plays an important role in identifying the nature and extent of flood risk and in determining priorities for flood studies and the need for flood management measures. Measures may be identified in Local Environment Agency Plans (LEAPs); and*

ii. *collaboration between a range of organisations in the preparation and implementation of Biodiversity Actions Plans (BAPs) can also make a contribution, for example, in enhancing the role of rivers and flood plains as important wetland habitats for wildlife.*

Policy INF2

New development should be located and its implementation planned in such a way as to allow for sustainable provision of water services and enable timely investment in sewage treatment and discharge systems to maintain the appropriate standard of water quality. Techniques which improve water efficiency and minimise adverse impacts on water resources, on the quality, regime, and ecology of rivers, and on groundwater, should be encouraged. Redevelopment should identify and make provision for rectification of any legacy of contamination and drainage problems.

(a) Development plans should:

i. *take water related issues into account from an early stage in the process of identifying land for development and redevelopment, to encourage the use of sites where past problems can be solved and seek to avoid sites where water supply and/or drainage provision is likely to be unsustainable;*

ii. *co-ordinate the timing of new development with the provision of sustainable water supplies, sewage treatment and discharge systems in accordance with advice in PPG12 (Development Plans); and*

iii. *promote the introduction of water conservation measures and sustainable urban drainage solutions. Detailed supplementary planning guidance or site specific development briefs can help to facilitate the adoption of these measures.*

(b) In addition:

i. *local authorities should establish or maintain ongoing liaisons with the Environment Agency, water companies and sewage statutory undertakers in order to ensure timely and sustainable provision of infrastructure for the supply of water and sewage treatment and discharge systems, particularly in connection with major new development; and*

ii. *all relevant agencies and developers should encourage the incorporation of water conservation measures in new development, and promote public awareness of the need to reduce consumption.*

3.3.2 Draft South East Plan (2006) (Reference 6)

POLICY NRM 1: SUSTAINABLE WATER RESOURCES, GROUNDWATER AND RIVER QUALITY MANAGEMENT

Water supply, ground water and river water quality will be maintained and enhanced through avoiding adverse effects of development on the water environment. A twin-track approach of demand management and water resource development will be pursued, together with development of sewerage and waste water treatment infrastructure.

In preparing Local Development Documents, and determining planning applications, local authorities should:

I. *Ensure compatibility with River Basin Management Plans and take account of other plans and strategies including water and sewerage company asset management plans, the Environment Agency's Regional Water Resources Strategy, Catchment Abstraction Management Strategies, groundwater vulnerability maps and groundwater source protection zone maps;*

II. *Ensure that the rate and location of development does not lead to unacceptable deterioration of water quality and is in step with current and planned provision of adequate water supply, sewerage and waste water treatment infrastructure capacity;*

III. *Require development that would use significant quantities of water to incorporate measures to achieve high levels of water efficiency, and reflect current best practice including BREEAM2 (BRE Environmental Assessment Method 2) "very good" and increasingly "excellent" standards and, where appropriate, sustainable drainage solutions where these are consistent with protection of groundwater quality;*

IV. *Work with water and sewerage companies and the Environment Agency to identify infrastructure needs, allocate areas and safeguard these for infrastructure development;*

V. *Encourage winter water storage reservoirs and other sustainable farming practices which reduce summer abstraction, diffuse pollution and runoff, increase flood storage capacity and benefit wildlife and recreation; and*

VI. *Not permit development that presents a risk of pollution or where satisfactory pollution prevention measures are not provided in areas of high groundwater vulnerability (in consultation with the Environment Agency).*

POLICY NRM 3: SUSTAINABLE FLOOD RISK MANAGAMENT

The sequential approach to development in flood risk areas set out in PPG25 (to be superseded by PPS25) 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:

I. *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.*

II. *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.*

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

POLICY NRM 6: COASTAL MANAGEMENT

An integrated approach to coastal zone planning and management should be pursued, where the dynamic nature and character of the coast is managed through enhanced collaboration between organisations and across administrative boundaries.

In the development and implementation of the Local Development Documents and other strategies, local authorities and other agencies should:

I. *Take account of climate change and forecast effects on the costal zone;*
II. *Promote and establish cross-border and cross-sectoral arrangements to facilitate an integrated approach to implementation of Shoreline Management Plans, Estuary Management Plans and Coastal Habitat Management Plans (ChaMPs);*
III. *Ensure that development does not prejudice options for managed realignment, significantly affect sediment inputs and transport, lead to an increase in flood risk or preclude the delivery of sustainable flood risk management solutions in the future;*
IV. *Restrict development on the undeveloped coastline unless it specifically requires a rural coastal location and does not adversely affect environmental, cultural and recreational resources;*
V. *Prevent development on unstable land or areas at risk of erosion, as identified in Shoreline Management Plans; and*
VI. *Realise opportunities for sustainable coastal defences which enhance the region's wildlife, and fisheries, especially where this will contribute to the achievement of regional and national biodiversity targets.*

3.3.3 Regional Flood Risk Appraisal (RFRA)

3.3.3.1 Regional Flood Risk Appraisal for the Draft South East Plan 2006 (Reference 11)

The RFRA identifies areas within the South East where predicted high growth coincides with flood risk, and demonstrates how the South East Plan has considered these risks.

Only broad assessments of growth areas at flood risk have been undertaken with a view to SFRA's providing more detailed information on the risks.

3.4 Local Policies

3.4.1 Local Plans

3.4.1.1 Eastbourne Borough Plan 2001-2011 (Reference 2) (adopted September 2003)

Policy NE3 - Conserving Water Resources

Planning permission will not be granted for development schemes which do not incorporate measures to conserve and make the best use of existing water resources including reducing wastage.

Policy NE4 – Sustainable Drainage Systems

Sustainable drainage systems, for the management of surface water both in terms of quantity and quality of runoff and which ensure that land drainage water does not enter the public sewerage system, will be required where appropriate. Proposals for the long term management of such works must be included in any scheme submitted.

Policy NE14 – Source Protection Zone

Within the Source Protection Zone shown on the Proposals Map planning permission will be refused for developments that pose an unacceptable risk of pollution to the aquifer

Policy US4 – Flood Protection and Surface Water Disposal

All development should make adequate provision for floodplain protection and surface water drainage in order to ensure that:

- *(a) no overall reduction in flood storage capacity and flood waterway area occurs*
- *(b) measures are provided to manage increased surface water runoff to minimise the risk from flooding, whilst not increasing the risk of flooding elsewhere.*

Within the Willingdon Levels planning permission will be contingent upon satisfactorily demonstrating that:

- *(c) appropriate compensatory flood waterway and flood storage measures will be provided on site or a commuted sum will be paid to the Eastbourne Park scheme in lieu of on site provision;*

(d) where a development involves the raising of land, flood storage provision will be made and completed before any development begins on site;
(e) ground floor levels for new buildings are to be a minimum of 2.9 metres AOD with garden levels at 2.3 metres AOD.

Policy US5 – Tidal Flood Risk

Development will not be permitted in areas considered to be in consultation with the Environment Agency, at an unacceptable risk of flooding from the sea.

In areas which are at risk from flooding, where, in consultation with the Environment Agency, planning permission is granted, development will be required to comply with construction standards and minimum floor levels.

Policy US6 – Integrity of Flood Defences

Development which would be detrimental to the integrity of fluvial, tidal and sea defences will not be permitted.

3.4.1.2 Non Statutory Wealden Local Plan (2005) (Reference 3)

Policy NE1 – Water Resources

Development will not be permitted if it would cause an unacceptable risk to:
(a) the quality of groundwater, surface water or coastal water; or
(b) the potential yield of groundwater or surface water resources.

Policy NE2 – Coastal Erosion

Where there are no coastal protection defences in place, or planned by the authority responsible, new development or the intensification of development will not be permitted where:
(a) there would be an increase in risk to life or property from coastal erosion;
(b) new coastal protection defences would be required solely to protect life and property in the proposed development.

Policy CS2 – Water Resources

New development will only be permitted where adequate water resources are available and where it would not present an unacceptable risk to such resources.

Policy CS3 – Flood Risk

Development within areas at risk of flooding will not be permitted unless mitigation and/or alleviation measures are incorporated and constructed prior to development commencing. This is subject to there being:

(a) No increased flood risk elsewhere;
(b) No risk to life in the event of a breach or overtopping of a flood defence;
(c) No requirement for new artificial flood defence in undeveloped high risk areas solely to protect the new development;

(d) No detriment to the conservation and recreation value of the natural environment, including river corridors and wetlands.

Policy CS4 – Integrity of Defences

Development will not be permitted where it would be detrimental to the integrity of flood defences or watercourse channels, or would impede access to and along these for future maintenance and improvement work.

Policy CS5 – Surface Water

Development will only be permitted where the following criteria are met:

(a) adequate means of surface water drainage, including all appropriate alleviation and mitigation works, have been investigated, designed, and will be constructed by the developer prior to the commencement of development;
(b) sustainable drainage systems are utilised, where appropriate;
(c) adequate proposals for the long-term management, of such works are included in any scheme submitted; and
(d) flood risk will not be exacerbated elsewhere.

3.4.2 Water Level Management Plan (WLMP)

3.4.2.1 Draft Eastbourne Park Management Plan (Incorporating Water Level Management Plan) (2006) (Reference 12)

WLMPs are written statements that provide objectives for the water levels in a specific area. They take into consideration the activities that take place in the area such as agriculture as well as the conservation requirements. The Draft Eastbourne Park WLMP was completed in 2006 (Reference 12).

Policy - Flood
Eastbourne Park is designed as a flood storage area. In order to function correctly water levels need to be kept low prior to a significant storm event. If, due to other considerations, the water level in the lakes and washlands was artificially high then flood water levels would exceed the design level. The consequences however are unlikely to be severe, but may exacerbate local flooding around the Park area.

3.4.3 Local Development Framework (LDF)

The respective LDFs for Eastbourne Borough and Wealden District are underway and include Local Development Documents. This document will contribute towards their completion.

3.4.4 South Foreland to Beachy Head Shoreline Management Plan (April 2006) (Reference 13)

- "Present day policy" is broadly representative of the next 20 years;
- "Medium term policy" 20 to 50 years; and
- "Long term policy" 50 to 100 years.

LOCATION REFERENCE: HOOE AND PEVENSEY LEVELS
POLICY UNIT REFERENCE: 4C027
Preferred policies to implement Plan:
From present day: *The present day policy for Hooe and Pevensey Levels is to hold the line and continue protecting the low lying hinterland and shoreline settlements by maintaining the seawall, groynes and shingle recycling. Presently the shoreline is retreating, thus without ongoing beach recharge and maintenance of these defence structures all foreshore sediments would be lost very quickly. This situation will be exacerbated in the future; with sea level rise it will become increasingly probable that hard defences will be required to provide the adequate standard of protection in the long term.*

Medium-term: *The medium term policy for Hooe and Pevensey Levels is to continue to hold the line, although the position at which this is achieved will become increasingly difficult with sea level rise and a continually diminishing sediment supply. To accomplish this, management practices may need to change to a more heavily engineered frontage at some point during this epoch.*

Long-term: *The long-term policy for Hooe and Pevensey Levels is to continue protecting the assets through a hold the line policy which may require substantial engineering structures. With numerous socio-economic, environmental and heritage assets at risk and the need to protect them, the character of this frontage will change, from one that offers a beach and associated amenities to one that does not, due to sea level rise and a lack of contemporary sediment entering the system.*

LOCATION REFERENCE: SOVEREIGN HARBOUR
POLICY UNIT REFERENCE: 4C028
Preferred policies to implement Plan:
From present day: *The present day policy for Sovereign Harbour is to continue to hold the line by maintaining and improving the existing defences (shingle ridges and groynes form the defences to the west, whilst harbour arms and a seawall protect the assets to the east) to protect the significant assets from flooding and coastal erosion. With rates of sediment feed and transportation along this frontage being low, very little change in coastal processes or impacts on evolution are likely to occur within this epoch or indeed the confines of the SMP. In maintaining the defences the release of the Crumbles shingle source is prevented, alongshore coastal processes are interrupted and the shoreline is held seaward of its natural alignment. Despite these impacts there are benefits in holding the line i.e. this frontage and the frontage updrift retains a certain degree of protection. The shingle source at the Crumbles although substantial is not sufficient to truly benefit frontages down drift beyond the long term and once released, would result in increased pressure for this frontage.*

Medium-term: *The medium term policy for Sovereign Harbour is to continue protecting the marina complex and hold the line, by maintaining and upgrading, the existing seawall, harbour arms and groyned shingle beach, to provide adequate protection against sea level rise.*

Long-term: *The long-term plan for Sovereign Harbour is to continue protecting the substantial built assets by holding the shore-line in its current position. The character of Sovereign Harbour is unlikely to change too significantly, as this section of the coast is already heavily defended but retaining a beach in front of the significant defence structures will become increasingly difficult with sea level rise. Thus changes in management approach may need to be sought or an acceptance that amenities along the shoreline will be lost. For the SMP this recommendation is deemed sustainable, for although a 'store' of shingle is being held up, this arrested material provides protection to this frontage and its substantial assets as well as the immediate frontage updrift.*

LOCATION REFERENCE: EASTBOURNE
POLICY UNIT REFERENCE: 4C029
Preferred policies to implement Plan:
From present day: *The present day policy for Eastbourne is to hold the line, continuing to protect the densely populated town and the substantial assets by maintaining and improving the existing seawall, groynes and supplementing this with a recharged shingle beach. With rates of sediment feed and transportation along this frontage being low, very little change in coastal processes or impacts on evolution are likely to occur within this epoch or indeed the confines of the SMP. In maintaining the defences the shoreline is held seaward of its natural alignment and the coast is prevented from functioning freely, whilst the groynes along this frontage interrupt alongshore sediment transport.*

Medium-term: *The medium term policy for Eastbourne is to continue to hold the line. In response to sea level rise it is anticipated that the defence structures will increase at some point during this period.*

Long-term: *Continue to hold the line, which will be achieved by maintaining and upgrading the present defence structures. This will continue to protect assets from predicted sea level rise but will probably induce increased scour. Beaches along this section of the coast are anticipated to denude substantially during this epoch and additional maintenance will be necessary to sustain an amenity driven frontage. If this becomes technically challenging then alternative (hard engineering) options may need to be sought. If this were to be the case then the character of the frontage would change, this recommendation is deemed sustainable over the SMP timescale although this may not be technically viable in the much longer term.*

LOCATION REFERENCE: BEACHY HEAD
POLICY UNIT REFERENCE: 4C030
Preferred policies to implement Plan:
From present day: *The present day policy for Beachy Head is to continue allowing natural processes i.e. erosion of the chalk cliffs, the rock platform and the cliff toe, under a no active intervention policy. This will maintain the landscape, an AONB, the designated biological and geological assets (SSSI), as well as a free functioning shoreline. Although some cliff top agricultural land will be lost, rates of cliff erosion are low and the number of assets at risk is none. Debris from erosion / cliff falls along with the fronting rock platform provides some natural shoreline protection to the cliffs making the implementation of defence works unnecessary*

Medium-term: *The medium term policy for Beachy Head is to continue allowing natural processes to take place i.e. erosion of the chalk cliffs and erosion of the shoreline under a no active intervention scenario. In response to sea level rise and with the continuation of no defences it is anticipated that cliff erosion may increase slightly during this period.*

Long-term: *The long-term policy for Beachy Head is no active intervention; allow natural processes to continue, with the erosion of the chalk cliffs, the rock platform and the shoreline. Despite ongoing sea level rise, erosion and transportation rates along this frontage will remain low. Thus the general character of this frontage i.e. one of outstanding natural beauty, will not alter significantly. The coastal footpath (the South Downs Way) may need re-routing over time, but no built assets are threatened. Narrowing of the intertidal chalk platform will occur due to sea level rise. However, this is a natural process which will be partially offset by the creation of a higher platform as the cliffs retreat. It is recognised that the sustainable shoreline at Beachy Head is the eroding one and as downdrift impacts are nominal this policy is recommended.*

3.4.5 Beachy Head to Selsey Bill Shoreline Management Plan (January 2005) (Reference 14)

- "Immediate policy" is broadly representative of the next 20 years;
- "Medium term policy" 20 to 50 years; and
- "Long term policy" 50 to 100 years.

LOCATION REFERENCE: BEACHY HEAD TO CUCKMERE HAVEN
POLICY UNIT REFERENCE: 4D01
Preferred policies to implement Plan:
Immediate: *The short term policy for Beachy Head is to allow the cliffs to erode and natural processes to take place. There are currently no defences along the frontage, so the cliffs and wave-cut platform will be free to erode at their present rate. This policy is consistent with the medium and long term policies and is not deemed as being detrimental to the long term implementation.*

Medium-term: *The medium term policy is to continue to allow the cliffs and wave-cut platform to erode, which will continue in the long term. It is expected that the rate of cliff erosion will increase as sea levels rise. Sediment released via erosion will be trapped within the local pocket beaches and coves. This policy is consistent with the long-term aim and is not deemed as being detrimental to the long term implementation of the policy.*

Long-term: *The long-term policy is to continue to allow the chalk cliffs to erode, and the wave-cut platform to widen and lower. Sediment supplied via erosion will continue to feed the local pocket beaches and bays, with no unnatural impact on the coastal processes or sections of coastline downdrift.*

This policy is sustainable in the long term, and ensures that this section of coastline will remain free functioning. The coastline position is expected to erode parallel to its present alignment, with little change to the existing character and frontage.

LOCATION REFERENCE: CUCKMERE HAVEN
POLICY UNIT REFERENCE: 4D02
Preferred policies to implement Plan:
Immediate: *The short term policy for this area is to continue managing this frontage, with decreasing investment over the first epoch and begin to realign the coastline in preparation for the medium and long term policy of no active intervention. Recycling of beach material and maintenance of the training walls in the intermediate term (5 years) should be continued whilst further studies for implementing this policy are undertaken.*

Medium-term: *The coastal defences will be allowed to fail and it is expected that during this period, the spits will begin to realign to their pre-trained form. Any intertidal habitat will be opened to inundation by the sea and new habitat will be established. By not intervening with the coastline, the Cuckmere coastline will be free to continually evolve as a self sustaining system.*

During this epoch, it is likely that the shingle spits would continue to roll back and the beaches would widen and lower. The entrance to the inlet would follow a cycle of breaching and resealing; and the river mouth will return to its pre-trained/managed form. The growth and renewal of intertidal habitat would continue through the medium-term.

Long-term: *The long-term policy is to continue to allow natural cyclic processes to take place. The formation of the tidal inlet is expected to change, although this policy is sustainable in the long term. It*

ensures that Cuckmere Haven will be a free functioning system, with a wide distribution of well developed intertidal habitats.

3.5 Environment Agency Policies

3.5.1 Catchment Flood Management Plans (CFMP)

CFMPs are primary Environment Agency documents. They are not classed as policy documents but are becoming increasingly influential in planning policy as they inform River Basin Management Plans and SFRAs.

3.5.1.1 Cuckmere and Sussex Havens Catchment Flood Management Plan (Reference 7)

The CFMP covers the whole of the SFRA study area. The aim of CFMPs is to 'provide a usable, policy-level document that summarises all major catchment wide fluvial flood management issues concerns, opportunities and constraints'. It seeks to influence the flood risk management policies of the catchment for the next one hundred years.

The document infers that the key drivers to future policies will be climate change, land management and urban development. The study area falls entirely within the Cuckmere and Sussex Havens and the following policies are applicable:

- P1 No active intervention (including flood warning and maintenance). Continue to monitor and advise;
- P2 Reduce existing flood risk management actions (accepting that flood risk will increase over time);
- P3 Continue with existing or alternative actions to manage flood risk from the current level (accepting that flood risk will increase over time from this baseline);
- P4 Take further action to sustain the current scale of flood risk into the future (responding to the potential increases in flood risk from urban development, land use change, and climate change);
- P5 Take further action to reduce flood risk (now and/or in the future);
- P6 Take action to increase the frequency of flooding to deliver benefits locally or elsewhere, which may constitute an overall flood risk reduction (e.g. for habitat inundation).

3.5.2 Strategic Flood Risk Mapping (SFRM) (Reference 15)

The Environment Agency (EA) has adopted a strategic approach to flood risk mapping. A report on the Polegate and Willingdon Levels has been produced for SFRM to accompany the modelling that was undertaken. The model has been used to define Flood Risk maps on floodplains with flooding return periods between 1 in 2 year and 1 in 200 year. The blockage analysis demonstrated that blockages in the upper part of the catchment could lead to more extensive flooding. The June 1995 National Rivers

Authority (NRA) flood investigations, suggested a number of areas within Polegate where culvert capacity is an issue and options for improvements. A review of this study is suggested with further blockage analysis at key locations.

3.6 Other Relevant Policies

3.6.1 British Waterways

British Waterways are responsible for the maintenance of some inland waterways. However they are not responsible for any in the Eastbourne and Wealden SFRA study area.

3.6.2 Water Utility Policies

Southern Water treats foul water in EBC and WDC. One of their objectives is to achieve sustainable development through the policy below:

Sustainable Development Policy
Sustainable development at Southern Water means an increasing focus on the balanced consideration of economic, social and environmental aspects in making business decisions. Within and beyond the regulatory framework of the water industry, Southern Water believes adopting Sustainable Development principles will:

- Ensure the continued supply of quality drinking water and the provision of wastewater services in line with European standards;
- Safeguard water supplies and enable the effective management of water resources;
- Ensure the safe recycling of wastewater and sludge to the environment;
- Improve services by providing them in a sustainable and cost-effective way; and,
- Involve our communities and influence our business partners in working towards more sustainable futures.

Table 3-1: Planning document policies by subject area

Policy Document	Policy	Flood Risk	Flood Risk management	Sustainable Drainage	Water Resources & Environment
Regional Planning Guidance for the South East RPG9	INF1 –a1		✓		
	INF1 –a2		✓		
	INF1 –a3		✓		
	INF1 –a4			✓	
	INF1 –b1		✓		
	INF1 –b2	✓			
	INF2 – a1				✓
	INF2 – a2				✓
	INF2 – a3				✓
	INF2 – b1				✓
	INF2 – b2				✓
Draft South East Plan (2006)	Policy NRM1		✓	✓	✓
	Policy NRM2				✓
	Policy NRM3	✓	✓		
Wealden Local Plan (Non-Statutory 2005)	Policy CS2	✓	✓	✓	
	Policy CS3		✓	✓	
	Policy CS4				✓
	Policy NE1				✓
	Policy NE2		✓		
Eastbourne Borough Plan (adopted 2003)	Policy NE3				✓
	Policy NE4		✓	✓	
	Policy NE5				✓
	Policy NE14				✓
	Policy NE15				✓
	Policy NE22				✓
	Policy US2				✓
	Policy US4	✓	✓		
	Policy US5	✓			
	Policy US6		✓		
Cuckmere and Sussex Havens Catchment Flood Management Plan	Objective A (Table 5.2)	✓	✓		
	Objective B(Table 5.2)	✓	✓		
	Objective C (Table 5.2)		✓		

Policy Document	Policy	Flood Risk	Flood Risk management	Sustainable Drainage	Water Resources & Environment
	Objective D (Table 5.2)				✓
	Objective E (Table 5.2)		✓	✓	
	Objective F (Table 5.2)		✓	✓	
	Objective G (Table 5.2)		✓		

4 Data Collection & Review

This section describes the data collection process, presents the available data and discusses its benefits and limitations. A comprehensive record of all the data collected through the production of the Level 1 SFRA is presented in a document register in Appendix C.

One of the objectives of this Level 1 report is to collate and review the information provided relating to flooding in the study area and present this in a manner suitable for EBC and WDC to apply the PPS25 Sequential Test.

4.1 Overview

As outlined in Section 1.3 the objective of the Level 1 SFRA is to collect, collate and review the information available relating to flooding in the study area. This information is then presented in a format to enable the local planning authorities to apply the Sequential Test to their areas. This will determine the suitability of sites for development and identify sites that may need to be justified through successful application of the Exception Test.

The sequence of tasks undertaken in the preparation of the Level 1 SFRA was, in order:

- Inception meeting with the Environment Agency, Eastbourne Borough Council and Wealden District Council on 17th October, 2006 (Appendix D);
- Established the local stakeholders;
- Issued letters to stakeholders requesting data/information;
- Followed-up data requests and arranged stakeholder meetings (where necessary);
- Collated and reviewed data and populated data register;
- Presentation of available salient information on flood sources and flood risk; and
- Reviewed received data against the SFRA objectives.

All tasks were completed between November 2006 and the end of August 2007.

4.1.1 Stakeholder Consultation

The stakeholders that were contacted to provide the data/information for the SFRA were:

- Natural England;
- East Sussex County Council;
- Eastbourne Borough Council;
- Wealden District Council;
- Southern Water;
- Environment Agency; and,
- Highways Agency.

The principal contacts and their associated details for these stakeholders are presented in Appendix B.

An informal meeting was held with Eastbourne Borough Council on the 27th of November to discuss the request for data against the information that was available. No other stakeholder meetings were requested or considered necessary.

4.1.1.1 Environment Agency

The study area falls entirely in the Environment Agency's Southern Region. The Environment Agency has permissive powers only for all Main Rivers and their associated flood defences within the study area.

The Environment Agency also administers the Cuckmere Internal Drainage Board (IDB) and the Pevensey Levels IDB areas. The area covered by the Cuckmere IDB includes ordinary watercourses in the west of the study area. The Pevensey Levels IDB is responsible for ordinary watercourses on the Pevensey Levels.

4.1.1.2 Drainage

Southern Water is responsible for stormwater and foul water sewer systems across the study area.

4.2 Environment Agency Flood Zone Maps

The Environment Agency has provided an extract of their Flood Map for the study area (Figure 4). The Flood Map shows the estimated extent of Flood Zones 2 and 3 (ignoring the presence of flood defences) for all watercourses with a catchment area of 0.5km² or greater and watercourses with identified critical drainage problems. The Flood Map gives a good indication of the areas at risk of flooding in England and Wales, however it does not provide detail on individual properties.

The Flood Map has been developed by the Environment Agency using a combination of detailed information from appropriate hydraulic models (where available) and outputs from the Environment Agency's National Generalised Model. Hydraulic models use detailed topographic data and rigorously derived flow estimates to derive flood extents. The National Generalised Model outputs are derived from less accurate topographic data (SAR data) and national data for river flows.

The Flood Map does not provide information on flood depth, speed or volume of flow. It also doesn't show flooding from other sources, such as groundwater, direct runoff from fields, overflowing sewers or the effect of climate change on these sources.

4.3 Tidal Data

The southern boundary of the study area is delimited by the sea and consequently this area is potentially at risk from tidal flooding. Low lying areas of the coast along the study area and the National Flood and Coastal Defence Database (NFCDD) indicates that those areas are currently defended to a minimum standard of the 1 in 200 year tidal flood event. Extreme Sea Levels were received from the Environment Agency for Kent, Sussex, Hampshire and the Isle of Wight (Reference 16).

4.4 Fluvial Data

Main rivers were provided by the Environment Agency as a GIS layer. The other water features in the study area were identified through a GIS query on the Landline data provided by EBC and WDC. The generated figure results in disjointed data due to the lack of consistency in the use of references used within the Landline data (Appendix C).

4.5 Hydraulic Modelling

Hydraulic models enable the delineation of flood plains and flood depths based on detailed topographic data of river channels including structures (bridges, culverts etc) and flood defences. Detailed hydrological analysis provide a range of flow estimates for use in the models. Hydraulic models have been developed for a number of watercourses within the Eastbourne and Wealden study area. Hydraulic modelling outputs were requested from and provided by the Environment Agency (Table 4-1) for the following water courses and flood scenarios:

4.5.1 Cuckmere River

The hydraulic model for the Cuckmere River has been constructed using MDSF and Tuflow by Capita Symonds as part of the Catchment Flood Management Plan (CFMP). The model has been run for the, 10 year, 10 year + climate change, 100 year and 100 year + climate change return periods. The hydraulic model has not been made available for the Level 1 SFRA, however flood plain outlines from this model have been provided.

4.5.2 Pevensey Levels

The hydraulic model for the Pevensey Levels has been constructed using MDSF by Capita Symonds as part of the Catchment Flood Management Plan (CFMP). The model has been run for the, 10% (1 in 10 year), 10% plus climate change , 1% (1 in 100 year) and 1% plus climate change annual probability storm events. The hydraulic model has not been made available for the Level 1 SFRA, however flood plain outlines from this model have been provided.

4.5.3 Polegate and Willingdon

The draft Polegate and Willingdon model has been provided by the Environment Agency. The model extents have been run for the 0.5% (1 in 200 year) and 0.5% plus climate change annual probability storm events. The hydraulic model has not been made available for the Level 1 SFRA, however flood plain outlines and flood levels from this model have been provided.

Table 4-1: Hydraulic Modelling Summary for the Eastbourne and Wealden SFRA study area

River	Cuckmere River	Pevensey Levels	Polegate and Willingdon Levels	Nunningham Stream	Christian's River
Modelled	✓	✓	✓	×	×
Coverage of model	Figure 6	Figure 6	Figure 6	N/A	N/A
Modelled By	Capita Symonds	Capita Symonds	Capita Symonds	N/A	N/A
Model Reference	Cuckmere and Sussex Havens CFMP	Cuckmere and Sussex Havens CFMP	Cuckmere and Sussex Havens CFMP	N/A	N/A
Modelling software	TUFLOW and MDSF	MDSF	MDSF	N/A	N/A
Model Runs	10, 10+CC, 100, 100+CC	10, 10+CC, 100, 100+CC	200, 200+CC	N/A	N/A
Modelling Runs Including Defences	✓	✓	✓	N/A	N/A
Model Runs Excluding Defences	×	×	×	N/A	N/A

4.6 Historical Flooding Events

A GIS layer indicating locations throughout the study area that have experienced flooding in the past has been produced through discussions with the Environment Agency. The information is largely anecdotal, with no record of the antecedent conditions giving rise to the flooding or reference to frequency or magnitude for the floods. Table 4-2 provides a summary of the anecdotal evidence of historical flooding.

Table 4-2 : Summary of Anecdotal Historical Flood Events

Site Number	National Grid Reference	Approximate Location	Description of Flooding
1	TQ 696 060	Normans Bay	Minor breach of sea defences in 1999 resulting in a blocked highway and flooding of land behind the embankment.
2	TQ 670 048	Beachlands	Overtopping of sea defence embankment in 1999.

SITE NUMBER	NATIONAL GRID REFERENCE	APPROXIMATE LOCATION	DESCRIPTION OF FLOODING
3	TQ 649 025	Beachlands	Property (White Horse) on top of the sea defence suffered severe structural damage in December 2006 from direct attack from sea action during the storm conditions. Property was evacuated and is awaiting repair. Property has been affected during previous events.
4	TQ 658 040	Pevensey Bay	Overtopping of the sea defences has affected the car park plus the property (Fisherman's Cottage) Occurred in the 1960's.
5	TQ 663 044	Between Pevensey Bay and Sovereign Harbour	Overtopping of the sea defence at Environment Agency property (Coast Road) White water flooding from wave action. (Date unclear but within the last 10 years)
6	TQ 623 029	Langney	Groundwater / surface water flooding to the west of Langney Shopping Centre. Date unknown
7	TV 611 990	Eastbourne Town Centre	Flash flooding affecting Eastbourne town centre near Arndale Centre. A number of properties and businesses were affected, however the exact number is unknown. (2006)
8	TQ 546 147	Chiddingly	Flooding problem upstream of existing culvert affecting ponds wood house. Culvert upgrade occurred in 2006.

WDC has provided detailed information of flooding incidents that has been inputted to a database from 1990-2003. Some areas have also been identified in the Cuckmere and Sussex Havens Catchment Flood Management Plan and are stated in Table 4-3.

Table 4-3: Historical Flooding from the Cuckmere and Sussex Havens Catchment Flood Management Plan

EVENT DATE	DETAILS
1836	Records of flooding on the Pevensey Levels date back to 1836, when they were reported flooded along with much of low-lying land in Sussex.
July 1893	A summer storm over Eastbourne resulted in severe flooding of the town, converting manholes into fountains.
November 1973	Roads, property and garden flooding noted in Alfriston, Crowhurst and Hastings
November 1974	Many gardens and low-lying land flooded throughout the catchment. 3-4 acres of caravan park flooded. Flooding of several properties and roads in Lullington, Hastings (7 properties), Alfriston, Berwick, Bexhill (14 properties), Chalvington and Eastbourne.
December 1984	Fluvial flooding caused watercourses to overtop resulting in the flooding of properties and roads in Eastbourne, Bexhill, Crowhurst and Westham.

EVENT DATE	DETAILS
March 1995	Surface water flooding in Polegate, Wannock and Willingdon resulted in 56 properties being inundated as well as flooding of a number of roads causing disruption, particularly through the closure of the A22.
October 2000	Groundwater flooding was noted in East Dean affecting 10 properties. Hellingly experienced its worst event on record with fluvial flooding caused by backing up at the confluence and possible blockages in the watercourses, where 16 properties were flooded. West Dean also has records of flooding from fluvial sources.

The 1995 Polegate flooding is well documented and The Environment Agency has completed a report investigating the incident. The report concluded that the flooding in the Polegate, Wannock and Willingdon areas occurred due to a high intensity rainstorm over saturated catchments. Large volumes of runoff then resulted. The cause of flooding was identified as a lack of capacity within the culverts and channels at points along the Wannock Mill Stream, Mill Stream Ditch and Brook Street Stream. The current policy (P5) from the CFMP for the Polegate area is to "take further action to reduce the flood risk now and into the future".

The CFMP identifies that fluvial flooding from the Cuckmere River occurs fairly frequently to a small number of properties. However, there are no major urban areas at risk. The settlement of Horam floods from the Cuckmere River due to a lack of capacity of road crossings. Hellingly is affected by flooding from the Cuckmere due to houses located on the floodplain. The Cuckmere River has been hydraulically modelled and the modelled scenarios are presented in section 4.5.

The Pevensey Levels are predominantly rural and consist of extensive drainage networks and floodplain. The CFMP notes that this floodplain is pumped into the local drainage network and as such the capacity of this flood storage area is not fully utilised.

The CFMP acknowledges that significant flooding in Eastbourne would have serious affects on developments. Eastbourne Park is the flood alleviation scheme for the area which is discussed further in section 4.12. However Polegate and developments on the margins of the Willingdon Levels are still considered to be at risk of flooding.

There is no identified flood risk to properties from the Wallers Haven according to the CFMP, however some transport links may be exposed to flooding.

Point source locations were also received from the Highways Agency. Again this data consists of point source locations with no record of the antecedent conditions giving rise to the flooding or reference to a return period for the floods.

4.7 Flood Defences

The Environment Agency has provided outputs from the National Flood and Coastal Defence Database (NFCDD) for the study area. This database contains, in electronic format, details of flood defences covering man-made, natural and maintained channels. Further information on each of the defences should be presented that includes the type of structure; asset description; asset location; length; height; width; depth; diameter; design standard; operator responsible; last inspection date; next inspection date; condition and asset comments.

However, as the database is still being populated and constantly being updated, some fields remain blank or contain default values. As a result, the information provided for this SFRA does not have a full set of descriptions in the majority of cases, and the dimensions are not supplied. The flood defences for the study area are presented in Figure 7.

Breach analyses have been undertaken on the defences protecting the Pevensey area by Royal Haskoning.

4.8 Topographic Data

LiDAR data was obtained for the study area from the Environment Agency. LiDAR data is an airborne mapping technique that uses a laser to measure the distance between an aircraft and the ground surface. In this case, the measurements were made at a 2 m resolution and are accurate to between ± 0.3 m. The LiDAR data can then be merged to create a Digital Terrain Model (DTM) of the ground surface that filters out the buildings and trees.

The LiDAR data covers the majority of the study area, but there are some small gaps in the coverage to the west of Eastbourne and the north of the study area (Figure 8). The LiDAR data allows review of flood levels and overland flow paths within the study area, however it does not return data for steep slopes or water bodies and only has a resolution up to a 2 m grid (Appendix C).

Channel survey details from the Polegate and Willingdon Strategc Flood Risk Mapping Survey which were used in the generation of the Polegate and Willingdon models and flood outlines were supplied by the EA. This data is not geo-referenced and the model outputs are only in draft format. Consequently this information has not been used in the production of the Level 1 SFRA.

4.9 Pluvial (Rainfall)

Overland flow data has not been recorded on a regimented basis. Data received from the Environment Agency provides details on historical flood events. These are point sources with no information about the rainfall event or antecedent conditions which may have resulted in the flooding. There is also no severity rating or return period associated with these records of anecdotal evidence (Appendix C).

Overland flow can occur on any slope where the geology/pedology is susceptible to saturation and is also likely to occur at the base of an escarpment. Locations have been identified that have a historical record of flooding in the Willingdon area. Recorded incidents are located at the base of the South Downs Escarpment and could therefore have resulted through overland flow during a pluvial event. In March 1995 flooding in Polegate, Wannock and Willingdon resulted in 56 properties being flooded. (Further details are provided in section 4.6 and Appendix C).

4.10 Groundwater

Groundwater data was provided from the Environment Agency in the format of borehole data, which contains daily records of groundwater levels between 1971 and 2007 (Table 4-4 and Appendix C). The data supplied was confined to a small area to the west of Eastbourne on the chalk outcrop of the South Downs. Consequently it does not provide a study area wide picture of groundwater levels, and cannot be used to predict areas with a trend of rising groundwater.

Table 4-4 : Summary Table of Groundwater Borehole Data

Borehole Location	National Grid Reference	Length of Record (years)
Birling A	TV 557 971	Feb 2003 – Oct 2006 (3)
Birling B	TV 557 971	Feb 2003 – Oct 2006 (3)
Cornish Farm	TV 557 695	Nov 2001 – Oct 2006 (5)
Jevington	TQ 563 014	April 2002 – Jan 2007 (5)
Deep Dean	TQ 539 237	July 1971 – Jan 2007 (36)

The Environment Agency provided one record of historical groundwater flooding within the study area and WDC have provided five records (Appendix C). Dry valleys were also digitised into GIS from the hydrogeological map of the area to identify areas of possible spring head resurgence if groundwater levels were to rise.

4.11 Sewer Flooding

Southern Water provided details and locations of the sewer flooding incidents that have occurred over the last 10 years (Appendix C). The historical records indicate that there have been 98 sources of flooding in WDC and 45 in EBC due to hydraulic problems. (Table 4-5 and Appendix C).

The data provides historical point source data however it does not indicate where a flooding incident is a recurring problem, or what level of flooding occurred. So a return period and severity cannot be assigned to each incident. Details of these flooding incidents are presented in Table 4-5.

Table 4-5 : Sewer Flooding Records in Eastbourne BC and Wealden DC

Location	Number of Properties Affected in Last 10 Years	Sewer Problem	Surface Water/ Storm Sewer	Foul / Combined Sewer
EBC	45	Hydraulic	18	27
WDC	98	Hydraulic	5	93

4.12 Artificial Sources

The Environment Agency is the Statutory Body for Reservoir Safety under the Reservoirs Act 1975 as amended by the Water Act 2003. A reservoir is defined as a body of water that holds greater than 25,000 cubic metres of water for the purposes of the Reservoirs Act.

Artificial sources of flooding include Arlington Reservoir, Folkington Service, Possingworth Park Lake and Eastbourne Park Flood Storage Scheme.

The design standards for Arlington Reservoir, Folkington Service and Possingworth Park Lake are not available and the risk categories (Reference 17) associated with each source are currently being updated as reservoirs are now required to undertake a dam break analysis to assess their risk.

Eastbourne Park is a compensatory flood storage scheme that provides a mechanism by which the effect of new developments on flood levels is compensated for through the construction of additional flood storage (lakes) in Eastbourne Park. The scheme has been running since the early 1990s. The flood storage scheme has not been assigned a risk category and as such has been assessed against its design standard, which is to the 1 in 100 year (Reference 18).

5 SFRA Mapping

This section describes the data used in the production of mapping and GIS deliverables for the project. To facilitate production of the maps and GIS layers, some of the data received from the stakeholders has been standardised and/or combined

5.1 Requirements of PPS25

Planning Policy Statement 25 and its accompanying Practice Guide requires Strategic Flood Risk Assessments to present sufficient information on all flood sources to enable local planning authorities to apply the Sequential Test in their administrative areas. The Sequential Test is explained in more detail in Section 6. In order to apply the Sequential Test, information is required on the probability associated with flooding from the different flood sources. In addition, the assessment of probability should also account for the effects of climate change on a flood source for the lifetime of any development that would be approved through the emerging Local Development Framework.

For all sources of flooding except fluvial and tidal flood sources the current lack of data makes definition of robust classifications of probability unreliable. For example to define high, medium and low probabilities for groundwater flooding within the study area based on one reported incident (with no corresponding record of the severity of that flood) is not robust. Consequently for all flood sources other than fluvial and tidal sources, where only anecdotal evidence of flooding is available subjective assessments of probability have been made where the data allows.

However in some cases, definitions of probability is not practical; in these situations the flood risk from a particular source should be considered as 'medium' until proven otherwise to ensure that the assessment of risk follows the principles of the precautionary principle. The sources of flooding should also be investigated through a site specific assessment of flood risk submitted as part of a planning application. Details of the requirements for flood risk assessments are presented in Section 11.

The following section explains how the available data has been used to achieve the requirements of PPS25 and the Practice Guide.

5.2 GIS Mapping

Geographical data such as flood extents and watercourse routes for use in determining appropriate planning decisions are best presented using Geographical Information Systems (GIS).

GIS acts as an effective management tool for the coordinated capture, storage and analysis of data of a geographical nature. GIS handles data in a hierarchical manner by storing spatial features within various layers, which are allied to an underlying database. GIS is a recognised tool for the efficient collation, storage and analysis of information and is also an increasingly valuable resource for local planning authorities.

The data presented in the GIS layers should be used by EBC and WDC to apply the sequential test to developments in their administrative areas. Guidance on which layers should be used is presented in Section 6.2

Table 5-1 presents the GIS layers generated for the EBC and WDC SFRA. The table also identifies which GIS layers have been used in the production of the maps and figures presented with this Level

1 SFRA report. Table 5-4 provides a summary of the data used, the source of this data and a description of the layers used within the GIS system.

Table 5-1: GIS Layers and Figure Composition

GIS LAYER REFERENCE	GIS DATA	USED IN FIGURE
Fluvial 2007 Flood Zone 2 excluding defences	Fluvial Flood Zone 2 (2007)	Figure 4
Fluvial 2007 Flood Zone 3a excluding defences	Fluvial Flood Zone 3a (2007)	Figure 4
Fluvial 2007 Flood Zone 3b including defences	Fluvial Flood Zone 3b (2007)	
Tidal 2007 Flood Zone 2 excluding defences	Tidal Flood Zone 2 (2007)	Figure 5
Tidal 2007 Flood Zone 3a excluding defences	Tidal Flood Zone 3a (2007)	Figure 5
NB – There is no Flood Zone 3b as defended against 1 in 20 year flood to 2115 (including defences)	Tidal Flood Zone 3b (2007)	Figure 5
Fluvial 2115 Flood Zone 3a excluding defences	Fluvial Flood Zone 3a (2115)	Figure 6b
Tidal 2115 Flood Zone 2 excluding defences	Tidal Flood Zone 2 (2115)	Figure 5b
Tidal 2115 Flood Zone 3a excluding defences	Tidal Flood Zone 3a (2115)	Figure 5b
NB – There is no Flood Zone 3b as defended against 1 in 20 year flood to 2115	Tidal Flood Zone 3b (2115)	Figure 5b
Flood Defence	Flood Defences	Figure 7
Flood Warning Areas	Flood Warning Areas	Figure 13
Historical Flooding	Historical Flooding	
Areas at risk of flooding from groundwater	Groundwater Flooding	Figure 11
Historical Sewer Flooding events	Sewer Flooding	Figure 9
Areas at risk from overland flow	Overland Flow Problem Areas	Figure 10
Artificial Sources	Artificial Sources	Figure 12
Groundwater Vulnerability Zones	Groundwater Vulnerability Zones	Figure 14
Source Protection Zones	Source Protection Zones	Figure 15

5.3 Information Requested by the Environment Agency

Table 5-2 provides a summary of the flood zones that have been provided based on the current available data and a comparison with how this tallies with the Environment Agency's data expectations.

Table 5-2: Eastbourne & Wealden SFRA Level 1 - Flood Zone Mapping

INFORMATION REQUESTED BY THE ENVIRONMENT AGENCY				
Tidal Sources	**2007**	**2115**	**Notes**	**Methodology**
Flood Zone 3b	✓	✓	including presence of defences	Where LiDAR is available, information is based on interrogation of LiDAR data and extrapolation of extreme still water tidal level across ground surface
Flood Zone 3a	✓	✓	excluding presence of defences	
Flood Zone 2	✓	✓	excluding presence of defences	
Fluvial Sources	**2007**	**2115**	**Notes**	**Methodology**
Flood Zone 3b	×	×	excluding presence of defences	Where LiDAR is available, information is based on Environment Agency Generalised Flood map data The EA have requested that FZ3b be mapped excluding defences in addition to the guidance provided in Reference 16
Flood Zone 3a	✓	×	excluding presence of defences	
Flood Zone 2	✓	×	excluding presence of defences	
PROVIDED AS GIS LAYERS AND MAPS				
Tidal Sources	**2007**	**2115**	**Notes**	**Methodology**
Flood Zone 3b	✓	✓	including presence of defences	Where LiDAR is available, based on interrogation of LiDAR data and extrapolation of extreme still water tidal level across ground surface
Flood Zone 3a	✓	✓	excluding presence of defences	
Flood Zone 2	✓	✓	excluding presence of defences	
Fluvial Sources	**2007**	**2115**	**Notes**	**Methodology**
Flood Zone 3b	✓	×	including presence of defences	Where available, based on Cuckmere & Sussex Havens CFMP hydraulic model flood outlines.
Flood Zone 3a	✓	✓	including presence of defences	
Flood Zone 2	×	×	including presence of defences	

5.4 Tidal Flooding

PPS25 requires definition of the following tidal flood zones:

FLOOD ZONE	DEFINITION	PROBABILITY OF FLOODING
Flood Zone 1	At risk from flood event greater than the 1 in 1000 year event	Low Probability
Flood Zone 2	At risk from a flood event between the 1 in 200 year and 1 in 1000 year event	Medium Probability
Flood Zone 3a	At risk from a flood event less and equal to the 1 in 200 year event	High Probability
Flood Zone 3b	At risk from a flood event less than and equal to the 1 in 20 year event	Functional Floodplain

In accordance with paragraph 3.17 of the PPS25 Practice Guide, all areas within Flood Zone 3 should be considered as Flood Zone 3b unless proved otherwise. The Practice Guide Companion notes that Flood Zone 3b should be mapped including the presence of defences.

The South Foreland to Beachy Head SMP has stated that the long term policy is to 'hold the line' for tidal defences. The long term polices look at a 100 year projection which will out live the lifetime of the LDF. Consequently Flood Zone 3a will be defended against for tidal flood sources. Even in the event that the defences are not maintained, the 1 in 20 year tidal flood event will not overtop the current defences even with the effects of climate change. Consequently there is no functional floodplain (FZ3b) associated with the SFRA study area during the next 100 years for tidal flooding.

5.4.1.1 Climate Change

Climate change is predicted to increase still water sea levels in the locality of the study area by 1.165m from 2000 to 2115. The CFMP and SMP policies for Pevensey Bay through to Eastbourne (Section 3.5.1.1 and 3.4.4) with respect to tidal flooding is that of 'hold the line' for the next 100 years. Consequently no reduction in the design standard of tidal defences protecting Eastbourne should occur as a result of climate change as the defences are planned to be maintained to prevent flood risk increasing with the effect of climate change. Consequently there is no Flood Zone 3b or Flood Zone 3a associated with the Eastbourne and Wealden Study Area when accounting for climate change for tidal flooding.

5.4.2 Data Source

The Extreme Tidal Levels for Kent, Sussex, Hampshire and the Isle of Wight were obtained from the Environment Agency (Reference 16). The Environment Agency advised that for future developments they wish the 95% confidence level to be used rather than the published 50% confidence level. The 2007 and 2115 extreme tidal sea levels were then calculated using the climate change guidelines set out in PPS25 (Reference 2.

5.4.3 Mapping

Still water tide levels for the 1 in 200 year, 1 in 200 year + climate change, 1 in 1000 year and 1 in 1000 year plus climate change events were extrapolated across the study area using the topographic data provided by the LiDAR data to generate the tidal flood outlines. These are shown in Figure 5 for the 2007 tidal levels, and Figure 5b for the tidal levels accounting for climate change.

5.5 Fluvial Flooding

5.5.1 Requirements

PPS25 requires definition of the following fluvial flood zones:

FLOOD ZONE	DEFINITION	PROBABILITY OF FLOODING
Flood Zone 1	At risk from flood event greater than the 1 in 1000 year event	Low Probability
Flood Zone 2	At risk from flood event between the 1 in 100 and 1 in 1000 year event	Medium Probability
Flood Zone 3a	At risk from a flood event less and equal to the 1 in 100 year event	High Probability
Flood Zone 3b	At risk from a flood event less than and equal to the 1 in 20 year event	Functional Floodplain

In accordance with paragraph 3.17 of the PPS25 Practice Guide, all areas within Flood Zone 3 should be considered as Flood Zone 3b unless, or until, appropriate assessment shows to the satisfaction of the Environment Agency that the area falls within flood Zone 3a. Therefore in areas where the functional floodplain has not been defined and no suitable surrogate data is available the functional floodplain (Flood Zone 3b) has been defined as the extent of Flood Zone 3a.

5.5.1.1 Climate Change

Climate change is predicted to increase peak river flow by 20% up to 2115 and as a result increase floodplain volume and area, which will present a risk to an increased number of properties. Modelled climate change scenarios are available for the 1 in 100 year event for the Cuckmere River and the Pevensey Levels.

5.5.2 Data Source

Section 4.5 identifies the sources of data used to map the fluvial flood zones required by PPS25. The mapping has been produced through the use of flood outlines generated by hydraulic models or use of the Environment Agency's Flood Map.

In some cases it has been appropriate to use surrogate data for the return periods required. For example where the extent of Flood Zone 3a accounting for the effect of climate change is required but a 100 year plus 20% model run has not been performed, use of the 150 or 200 year model run may be suitable. The suitability of surrogates for use in Flood Zone mapping has been based on a review of peak flood flows (where available) or subjectively based on the available data. Table 5-3 indicates where surrogate flood outlines have been used.

Table 5-3 : Fluvial Flood Zone Mapping Data Sources

River	Current Flood Zones (2007)			Climate Change Flood Zones (2115)		
	Flood Zone 2	Flood Zone 3a	Flood Zone 3b	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
Cuckmere River	Environment Agency Flood Map	Cuckmere Model 1 in 100 year scenario	Cuckmere Model 1 in 10 year + climate change scenario	No Data	Cuckmere Model 1 in 100 year scenario + climate change	No Data
Pevensey Levels	Environment Agency Flood Map	Pevensey Model 1 in 10 year + climate change scenario	Pevensey Model 1 in 10 year + climate change scenario	No Data	Pevensey Model 1 in 100 year scenario + climate change	No Data
Polegate and Willingdon	Environment Agency Flood Map	Environment Agency Flood Map	No Data	No Data	Willingdon Model 1 in 200 year event	No Data

5.5.3 Mapping

Flood outlines have been overlaid on the Ordnance Survey base mapping to provide the Flood Zones as determined by the hydraulic models. Figure 6 shows the extents of the floodplains associated with the hydraulic models in 2007. Figure 6b shows the extents accounting for climate change in 2115.

Where Flood Zone 3b has not been defined, Flood Zone 3a will be defined as functional floodplain in 2007 (Reference 5). Under climate change scenarios where Flood Zone 3b has not been defined for 2115, 2007 Flood Zone 3a will therefore have to be classed as functional floodplain (Flood Zone 3b with climate change). In addition, for climate change scenarios, Flood Zone 2 will be classed as Flood Zone 3a. In order to assess Flood Zone 2 including the effects of climate change it will be necessary to apply a 50m buffer to the existing Flood Zone 2 outline, in line with guidance from the Environment Agency.

5.6 Sewer Flooding

5.6.1 Requirements

Areas at risk from sewer flooding have been determined through a review of records from the DG5 registers provided by Southern Water. The DG5 register records flooding incidents as a result of temporary works as well as ongoing hydraulic incapacity. There is also no information provided with the sewer flooding records of mitigation works that have been undertaken to prevent further flooding at locations.

As per fluvial and tidal flooding, areas with high, medium and low probability should be defined based on the available data. The definition of functional floodplain is not required for flooding from sewers.

Due to the lack of resolution of the data and the relatively short period for which the records are available (≤10 years), definition of flooding probability cannot currently follow the same approach as that used for fluvial flooding. Therefore based on the available data the following criteria have been used:

- High Probability - >15 properties affected within the previous 10 year period within a radius of 50 metres
- Medium Probability – between 6 and 15 properties affected within the previous 10 year period within a radius of 50 metres
- Low Probability - < 6 properties affected within the previous 10 year period within a radius of 50 metres

5.6.1.1 Climate Change

Climate change is predicted to result in an increase of short duration high intensity rainfall and more frequent periods of long duration rainfall, with peak rainfall intensities predicted to increase by 30% by 2115 (Reference 2). Consequently there may be a reduction in the standard of protection that sewers provide against surcharging, as the 1 in 30 year event becomes more frequent. It is therefore likely that flood risk to the study area from sewer flooding will increase with climate change.

5.6.2 Data Source

Data was provided by Southern Water from the DG5 register. It provided details of locations that had experienced flooding in the last 10 years.

5.6.3 Mapping

The point source flood locations have been digitised using the easting and northings supplied with the sewer flooding data. Figure 9 illustrates the locations which have suffered from sewer flooding.

5.7 Pluvial Flooding (Overland Flow)

5.7.1 Requirements

As per fluvial and tidal flooding, areas with high, medium and low probability should be defined based on the available data. The definition of functional floodplain is not required for flooding from pluvial sources.

Due to the paucity of recorded data, definition of flooding probability cannot be defined.

5.7.1.1 Climate Change

With the predicted increase in short duration high intensity rainfall and more frequent periods of long duration rainfall, with peak rainfall intensities predicted to increase by 30% by 2115 (Reference 2). It is predicted that pluvial flooding will increase, therefore posing greater risk to the study area.

5.7.2 Data Source

Anecdotal data recorded by the Highways Agency and Environment Agency has been digitised.

5.7.3 Mapping

The point source flood locations have been digitised using the anecdotal information where possible. Figure 10 illustrates the locations which have suffered from pluvial flooding.

5.8 Groundwater Flooding

5.8.1 Requirements

As per fluvial and tidal flooding, areas with high, medium and low probability should be defined based on the available data. The definition of functional floodplain is not required for flooding from groundwater sources. However, due to the paucity of recorded data, definition of flooding probability cannot be defined.

5.8.1.1 Climate Change

The Catchment Abstraction Management Strategy (CAMS) (Reference 19) for the area indicates that the study area is currently over licensed and that groundwater recharge is unlikely as it is probable that no water will be available within the system for the predicted future. Consequently groundwater flooding through rising groundwater trends is unlikely to occur.

5.8.2 Data Source

Anecdotal information received recorded by the Environment Agency has been digitised.

5.8.3 Mapping

The point source flood locations have been digitised using the anecdotal information where possible. Figure 11 illustrates the locations which have suffered from groundwater flooding.

5.9 Artificial Sources (Infrastructure Failure)

5.9.1 Requirements

As per fluvial and tidal flooding, areas with high, medium and low probability should be defined based on the available data. The definition of functional floodplain is not required for flooding from pluvial sources.

Due to the lack of information regarding the artificial waterbodies in the study area definition of flooding probability cannot be determined.

5.9.1.1 Climate Change

There is no standard of defence associated with the Arlington Reservoir, Folkington Service and Possingworth Park Lake. Consequently the effect on climate change on these sources cannot be assessed effectively.

The draft Water Level Management Plan for Eastbourne Park (2006) notes how the flood water storage capacity of the Park will cope with a worst situation scenario of a 1 in 100 year fluvial event and to ensure that the storage capacity continues to meet the recommendations of PPS25. In relation to global warming and changing weather patterns further storage must be made available to ensure that the 1 in 100 year storm event can be attenuated accounting for the effects of climate change. The draft Water Level Management Plan also notes that in order to function correctly, water levels need to be kept low prior to a significant storm event. If, due to other considerations, the water level in the lakes and washlands was artificially high then flood water levels would exceed the design level. The consequences however are unlikely to be severe, but may exacerbate local flooding around the Park area.

5.9.2 Data Source

Data regarding the artificial waterbodies in the study area was received from the Environment Agency.

5.9.3 Mapping

The locations of these flood sources have been digitised using data from the Environment Agency and are presented in Figure 12.

5.10 Hard Drive

All the data collected and generated during the production of this Level 1 SFRA is collated on an external hard drive which will be returned to EBC and WDC at the end of the project.

Table 5-4 : GIS Master List

Table 5-5 : GIS master list

6 Guidance on Applying the PPS25 Sequential Test

6.1 What is the Sequential Test?

PPS25 requires application of the Sequential Test at all stages of the planning process to ensure that developments are removed from areas with a high probability of flooding where possible. Through application of this risk based approach local planning authorities are encouraged to guide new development towards areas of the lowest flood probability.

In applying the Sequential Test planners should also bear in mind the vulnerability classification of their proposed development. Table D2 of PPS25 describes types of development according to their flood vulnerability. By using this information in tandem with the Sequential Test planners should guide developments to those areas where the flooding probability is appropriate to the vulnerability of the proposed development as presented in Table 6-1.

Table 6-1 : Flood Risk Vulnerability Classification (from PPS25, Appendix D, Table D2)

Essential Infrastructure	▪ Essential transport infrastructure (including mass evacuation routes), which has to cross the area at risk, and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.
Highly Vulnerable	▪ Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required to be operational during flooding. ▪ Emergency dispersal points. ▪ Basement dwellings. ▪ Caravans, mobile homes and park homes intended for permanent residential use. ▪ Installations requiring hazardous substances consent.
More Vulnerable	▪ Hospitals. ▪ Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. ▪ Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels. ▪ Non–residential uses for health services, nurseries and educational establishments. ▪ Landfill and sites used for waste management facilities for hazardous waste. ▪ Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Less Vulnerable	▪ Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non–residential institutions not included in 'more vulnerable'; and assembly and leisure. ▪ Land and buildings used for agriculture and forestry. ▪ Waste treatment (except landfill and hazardous waste facilities). ▪ Minerals working and processing (except for sand and gravel working). ▪ Water treatment plants. ▪ Sewage treatment plants (if adequate pollution control measures are in place).
Water-compatible Development	▪ Flood control infrastructure. ▪ Water transmission infrastructure and pumping stations. ▪ Sewage transmission infrastructure and pumping stations. ▪ Sand and gravel workings. ▪ Docks, marinas and wharves. ▪ Navigation facilities. ▪ MOD defence installations. ▪ Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. ▪ Water-based recreation (excluding sleeping accommodation). ▪ Lifeguard and coastguard stations. ▪ Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. ▪ Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

PPS25 acknowledges that some areas will (also) be at risk of flooding from flood sources other than fluvial or tidal systems. Consequently all sources of flooding must be considered when looking to locate development in one of the flood zones described above. The other sources of flooding requiring consideration when situating new development allocations include:

- Pluvial;
- Groundwater;
- Sewers; and
- Artificial Sources.

These sources (as sources of flooding) are typically less understood than tidal and fluvial sources. Consequently data often only exists as point source data or through interpretation of local conditions. In addition there is no guidance on suitable return periods to associate with floods arising from these sources. For example modern storm water drainage systems are constructed to a 1 in 30 year standard. Any storm event in excess of the 30 year return period storm would be expected to cause flooding. Consequently when assessing these sources through the Sequential Test, if a location is recorded as having experienced repeated flooding from the same source this should be investigated further.

6.2 How should the SFRA be used to apply the Sequential Test?

The Sequential Test should be undertaken by the LPA and accurately documented to ensure decision processes can be transparently communicated and reviewed where necessary. The Sequential Test should be carried out on all development sites, seeking to balance the flood probability and development vulnerability of sites throughout a planning authority area.

The recommended steps required in undertaking the Sequential Test are detailed below. This is based on the various constraints placed on the types of vulnerable development presented in Table D3 of PPS25, reproduced below (Table 6-2).

Table 6-2 :PPS25 Table D3 Flood Risk Vulnerability and Flood Zone 'Compatibility' (DCLG, 2006)

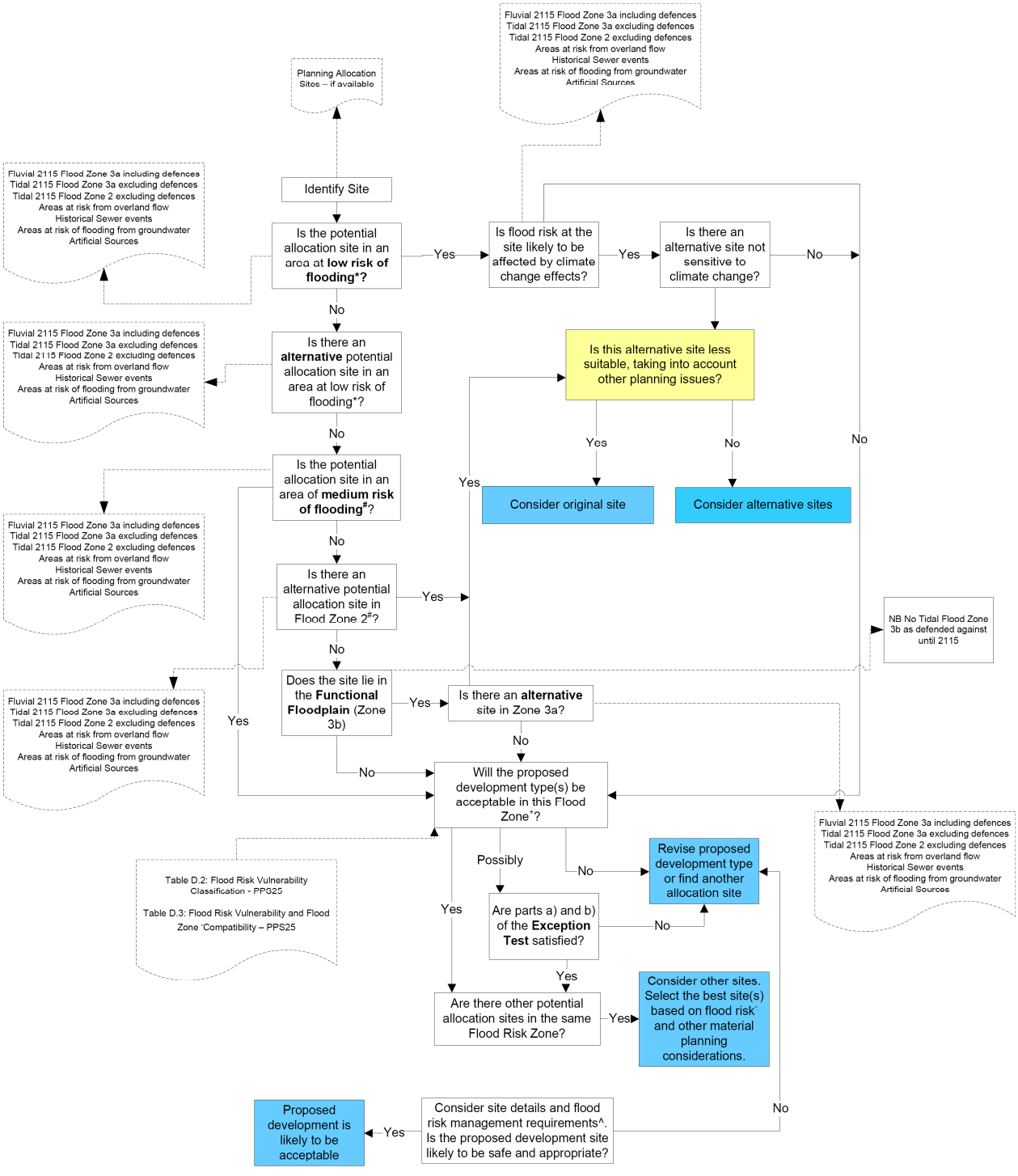
Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	1	✓	✓	✓	✓	✓
	2	✓	✓	Exception Test Required	✓	✓
	3A	Exception Test Required	✓	✗	Exception Test Required	✓
	3B	Exception Test Required	✓	✗	✗	✗

✓ - Development is appropriate

✗ - Development should not be permitted

Diagram 1 should be used to ensure that the correct maps and GIS layers are used to ensure that the correct development vulnerability types are located in the correct flood zones.

Diagram 1 : Application of the Sequential Test (from Figure 3.1 of PPS25: Practice Guide, A 'Living Draft')



NOTES
* Flood Zone 1 for fluvial and tidal flooding and with a low risk of flooding from other sources.
# Flood Zone 2 for fluvial and tidal flooding and with a medium risk of flooding from other sources.
+ As defined by the Sequential Test.
^ Development to be safe and to not increase flood risk elsewhere. Required to pass part c) of the Exception Test, where applicable.
- Including susceptibility to future climate change and residual floor risk.

6.3 Additional Guidance

The sequence of steps presented below in tandem with Diagram 1 is designed to guide EBC, WDC and developers through the Sequential Test. The steps are designed to ensure land allocations are primarily allocated in line with the principles of the Sequential Test or failing this the requirement for application of the Exception Test is clearly identified.

Recommended stages for LPA application of the Sequential Test.

1. The developments (i.e. housing, hospitals, industrial etc) that need to be accommodated by the LPA should be assigned a vulnerability classification in accordance with Table D.2 "Flood Risk Vulnerability Classification" in PPS25;
2. The Flood Zone classification of all development sites should be determined based on a review of the Environment Agency Flood Zones for fluvial sources. This should consider the effects of climate change on flood zone definition for the design life of any development that the site may be suitable for, i.e.:
    - 60- years – up to 2070 for commercial / industrial developments; and
    - 100 years – up to 2110 for residential developments
3. In the first instance the 'highly vulnerable' developments the LPA is required to accommodate should be located in those sites it has identified as being within Flood Zone 1. If the 'highly vulnerable developments' cannot be located in Flood Zone 1, because the identified sites are unsuitable or there are insufficient sites in Flood Zone 1 then sites in Flood Zone 2 can be considered providing successful application of the Exception Test is achieved. If sites in Flood Zones 1 and 2 are inadequate then to accommodate the development then EBC and WDC may have to identify additional sites in Flood Zones 1 or 2.
4. Once all 'highly vulnerable' developments have been allocated to a development site, the LPA can consider those development types defined as 'more vulnerable'. In the first instance 'more vulnerable' development should be located in any unallocated sites in Flood Zone 1. Where these sites are unsuitable or there are insufficient sites, sites in Flood Zone 2 can be considered. If there are insufficient sites in Flood Zone 1 or 2 to accommodate the 'more vulnerable' development types, sites in Flood Zone 3a can be considered. However, any 'more vulnerable' developments in Flood Zone 3a will require application of the Exception Test. Responses to parts 'a' and 'b' of the Exception Test should be prepared and agreed through consultation with the Environment Agency before 'part c' is tackled.
5. Once all 'more vulnerable' developments have been allocated to a development site, the LPA can consider those development types defined as 'less vulnerable'. In the first instance 'less vulnerable' development should be located in any remaining unallocated sites in Flood Zone 1, 2 or 3a. Less vulnerable development types are not appropriate in Flood Zone 3b – Functional Floodplain.
6. 'Essential infrastructure' developments should also be preferentially located in the lowest flood risk zones, however this type of development can be located in Flood Zones 3a and 3b, where necessary, through application of the Exception Test. Where these types of development are located in Flood Zone 3a or 3b responses to parts 'a' and 'b' of the Exception Test will be required before 'part c' is tackled.

7. Finally, it is recommended that 'water compatible' development is allocated to development sites within the study area. As these developments typically have the least flood risk constraints it is considered appropriate to consider them last when allocating development sites.
8. For decisions made through stages 4 to 8 it will also be necessary to consider the risks posed to the site from other flood sources and where comparable development sites in the same flood zone may be more suitable due to:
    - flood risk management measures,
    - the rate of flooding,
    - flood water depth, or,
    - flood water velocity.

Where the development type is highly vulnerable, more vulnerable, less vulnerable or essential infrastructure and a site is found to be impacted by a recurrent flood source (other than fluvial or tidal), the site and flood sources should be investigated further regardless of any requirement for the Exception Test. This should be discussed with the Environment Agency to establish the appropriate time for the assessment to be undertaken, (i.e. Exception Test through a Level 2 SFRA or assessed through a site specific flood risk assessment).

It is recommended that EBC and WDC complete Table 0-1 (Appendix E) to assist in the completion of the Sequential Test to provide a transparent framework and justification of sites that may need to be exception tested.

7 Guidance on Applying the PPS25 Exception Test

7.1 What is the Exception Test?

After application of the sequential test, if it is found to be impossible for a development to be located in a lower flood risk zone, then it may be possible to apply the Exception Test to the allocation, providing the development is consistent with the wider sustainability objectives of the area. Table 6-1(Reference 2) provides guidance on the vulnerability of types of development and in conjunction with Table D1 where various types of development are appropriate with regards to flood risk and where it may be appropriate for the Exception Test to be applied.

7.2 Why is there an Exception Test?

The Exception Test is essential in cases where the Sequential Test is unable to deliver acceptable sites for allocations. In some areas, development is required to ensure social or economic blight does not occur, thus ensuring continued sustainable development. According to PPS25 (Reference 2) *'it may also be appropriate to use it where restrictive national designations such as landscape, heritage and nature conservation designations e.g. Areas of Outstanding Natural Beauty (AONBs); Sites of Special Scientific Interest (SSSIs); and, World Heritage Sites (WHO), prevent the availability of unconstrained sites in lower risk areas.'*

7.3 What is Required to Pass the Exception Test?

The Exception Test consists of three sections which are detailed below. All of these sections are required to be passed before it could be deemed that a development would be appropriate within the flood zone.

7.3.1 Part A – Wider Sustainability to the Community

It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by the SFRA where one has been prepared. If the DPD has reached the 'submission' stage (Figure 4 of PPS12; Local Development Frameworks) the benefits of the development should contribute to the Core Strategy's Sustainability Appraisal.

- The site should be scored against the sustainability criteria of the Sustainability Appraisal.
- Where a development fails to score positively against the SA the LPA could consider planning conditions or Section 106 Agreements.

EBC and WDC's Sustainability Checklists are presented in Appendix F.

7.3.2 Part B – Redevelopment of Previously Developed Land

The development must be on developable previously developed land or, if it is not on previously developed land, that there are no reasonable alternative sites on developable previously developed land.

Planning Policy Statement 3: Housing defines previously developed land as:

'Previously-developed land is that which is or was occupied by a permanent structure, including the curtilage of the developed land and any associated fixed surface infrastructure.'

The definition includes defence buildings, but excludes:

- Land that is or has been occupied by agricultural or forestry buildings.
- Land that has been developed for minerals extraction or waste disposal by landfill purposes where provision for restoration has been made through development control procedures.
- Land in built-up areas such as parks, recreation grounds and allotments, which, although it may feature paths, pavilions and other buildings, has not been previously developed.
- Land that was previously-developed but where the remains of the permanent structure or fixed surface structure have blended into the landscape in the process of time (to the extent that it can reasonably be considered as part of the natural surroundings).

There is no presumption that land that is previously-developed is necessarily suitable for housing development nor that the whole of the curtilage should be developed.

7.3.3 Part C – Safe from Flood Risk

A FRA must demonstrate that the development will be safe, without increasing food risk elsewhere, and, where possible, will reduce flood risk overall. The PPS25 Companion Guide provides details on the definition of 'safe' in Chapter 5 – Risk Management by Design, and Chapter 6 – Residual Risk. Details on possible mitigation measures against different forms of flooding are also provided in Table 11-1.

A minimum requirement of the definition of 'safe' should be:

- Dry access for more and highly vulnerable uses;
- Dry escape for residential dwellings should be up to the 1 in 100 year flood event taking into account climate change; and
- Preferably dry for other uses such as educational establishments and less vulnerable land use classifications.

However the definition of safe should be clarified and agreed between the Local Planning Authority and local Environment Agency Office and may require additional considerations depending on the precise nature of the proposed development and flood risk on a site by site basis.

It is recommended that EBC and WDC complete Table 0-2 (Appendix E) to assist in identification of sites that may require Exception Testing.

8 Flood Risk Management

Flood management measures are those measures put in place to reduce the risk to people and property from the hazard of flooding. These management measures can be divided in to three types:

- Flood Warning
- Flood Defences
- Flood Risk Operational and Water Level Management

8.1 Flood Defences

8.1.1 Current

Flood defences are typically engineered structures designed to limit the impact of flooding. Flood defences take several forms including bunds/embankments, canalised channels, culverts and flood storage areas among others.

Flood defences are typically designed and constructed to protect people and property from a given magnitude of flood. This is referred to as the design standard of protection (SOP) and may vary depending on the age of the structure, the value attributed to the people and property it is designed to serve and the scale of works necessary to construct the defence. For new defences, these issues and others are balanced through a cost benefit analysis to determine if investment in defence schemes can be justified.

Information on defence structures within the study area has been provided by the Environment Agency from their National Flood and Coastal Defence Database (NFCDD). The NFCDD is used as a repository for information relating to flood defences including their location, type, condition and design standard. The NFCDD is still being populated and constantly updated, as a result some fields remain blank or contain default values. Consequently, the information provided for this SFRA does not have a full set of descriptions in the majority of cases, and the dimensions are not supplied. Information from the NFCDD has been used to generate the flood defence layer introduced in Table 5-1.

From a review of the information presented in the NFCDD it is clear there are several defences in the study area. The reported design standard of the tidal defences along the coast by Eastbourne and Pevensey Bay range between 200 years and 400 years. Defences on the Pevensey Levels are raised and have a design standard of 30 years as do the Cuckmere tidal earth embankments.

8.1.2 Future

The CFMP sets out the Environment Agency's preferred plans for sustainable flood risk management over the next 50-100 years. Table 8-1 provides a summary of the CFMP Policy units and their associated flood risk management policies:

Table 8-1: CFMP Policy Units and associated Flood Risk Management Policies

POLICY UNIT	FLOOD RISK MANAGEMENT POLICIES
Cuckmere Estuary	**P2** Reduce existing flood risk management actions (accepting that flood risk will increase over time);
Tidally Influenced Lower Cuckmere	**P3** Continue with existing or alternative actions to manage flood risk from the current level (accepting that flood risk will increase over time from this baseline);
Hailsham	**P4** Take further action to sustain the current scale of flood risk into the future (responding to the potential increases in flood risk from urban development, land use change, and climate change);
Hellingly and Horam	**P3** Continue with existing or alternative actions to manage flood risk from the current level (accepting that flood risk will increase over time from this baseline);
High Weald	**P6** Take action to increase the frequency of flooding to deliver benefits locally or elsewhere, which may constitute an overall flood risk reduction (e.g. for habitat inundation).
Low Weald	**P6** Take action to increase the frequency of flooding to deliver benefits locally or elsewhere, which may constitute an overall flood risk reduction (e.g. for habitat inundation).
Polegate	**P5** Take further action to reduce flood risk (now and/or in the future;
Eastbourne and Willingdon	**P4** Take further action to sustain the current scale of flood risk into the future (responding to the potential increases in flood risk from urban development, land use change, and climate change);
Pevensey and Pevensey Bay (including Norman's Bay)	**P4** Take further action to sustain the current scale of flood risk into the future (responding to the potential increases in flood risk from urban development, land use change, and climate change);
The Levels (Pevensey Levels, Wallers Haven and Combe Haven)	**P6** Take action to increase the frequency of flooding to deliver benefits locally or elsewhere, which may constitute an overall flood risk reduction (e.g. for habitat inundation).
South Downs	**P1** No active intervention (including flood warning and maintenance). Continue to monitor and advise;

Allied to the CFMP, the South Foreland to Beachy Head SMP has a long term policy (Section 3.4.4) from Pevensey Bay to Eastbourne of 'hold the line'. The SMP notes that this policy will be achieved by maintaining and upgrading the present defence structures. This will continue to protect assets from predicted sea level rise but will probably induce increased scour along the beaches due to the need for hard engineered solutions. The policy unit of Beachy Head and the policy units of Beach Head to Cuckmere Haven in the Beachy Head to Selsey Bill SMP has a present day and long term policy of no active intervention, allowing natural processes to continue, as no built assets are at risk. Consequently it is possible to say that the EBC and WDC study area is defended from tidal sources for the next 100 years.

In addition to these policies it is recommended that the following flood management works are undertaken to reduce flood risk in the areas identified:

1. In Polegate it is recommended that the Wannock Mill Stream, Mill Stream Ditch and Brook Street Stream are deculverted to increase capacity and reduce flooding.

2. Where an allocation uses the road crossing culverts at Horam for access these should be improved by the developer to increase capacity, including an allowance for climate change;

3. River corridors should be reintroduced around Hellingly and Lower Horsebridge, to restore floodplain and reduce flooding impacts on infrastructure;

4. Provide secondary bunds to contain flooding through tide locked outfalls at West Dean and Alfriston;

8.2 Flood Warning Areas

The first device in the flood risk management arsenal is flood warning. Ensuring people in areas of flood risk are aware of potential flooding is key to ensuring they are prepared, facilitating the protection of property and evacuation where necessary.

The Environment Agency operates a flood warning service in all areas at risk of flooding. It consists of four flood warning codes from 'All Clear' to 'Severe Flood Warning' that indicate the level of danger. The flood warnings are disseminated through a variety of mediums that include TV, radio, an automated voice messaging service direct to a phone/fax/pager, the Internet and/or loudhailer. There is also an emergency Floodline number (0845 988 1188) and a quick dial number for individual rivers.

The flood warning areas covering the Eastbourne and Wealden SFRA study area have recently been revised. The service extent for these flood warning zones have not increased, but the flood warning cells have been divided into discrete areas to ensure that dissemination of any flood warnings is more effective. The Flood Warning areas that exist within the study boundary are displayed in Figure 13 **(GIS layer: Mitigation/Flood Warning Areas).** Table 8-2 provides details of amended flood warning areas in the study area.

8.3 Flood Risk Operational and Water Level Management

In addition to the flood defence and warning services provided by the EA, there is also a substantial amount of ongoing maintenance and management of water levels and watercourses throughout the study area. The EA maintenance and operations department carry out channel clearances, maintain defences and structures and ensure that water levels are maintained. The Local Authorities may also undertake work on smaller, ordinary watercourses, from time to time to ensure that culverts are clear of debris for example.

These activities form an important part of the overall flood risk management of the area and ensure that flood defences and flood warning assets operate as designed.

Table 8-2 : New Flood Warning Areas

Target Area Code	Target Area Name	Target Area Description	Quick Dial Number	Property At Risk		
				Residential	Business	Total
074FWC11B	Coastal areas from Western Arm, Newhaven Harbour to Beachy Head	The coastline at Newhaven, Seaford and the lower Cuckmere Haven	**0124112**	**1108**	**261**	**1369**
074FWC11C	Coastal areas from Beachy Head to Hastings	The coastline from Beachy Head to Hastings including Eastbourne, Pevensey Bay and Bulverhythe	**0124113**	**18602**	**1004**	**19606**
074FWF1201	Hellingly & Horsebridge	The Cuckmere River and Bull River at Hellingly and Horsebridge including Mill Lane, Station Road and the A271 at Lower Horsebridge	**012431**	**12**	**1**	**13**
074FWF1202	Alfriston	The Cuckmere River at Alfriston from Shermans Bridge to Deans Place Hotel including Milton Lock and Long Bridge	**012432**	**1**	**0**	**1**
074FWF1301	Willingdon, Eastbourne and Langney Levels	The Willingdon, Eastbourne and Langney Levels including Eastbourne Park and Langney Bridge	**012441**	**64**	**8**	**72**
074FWF1302	Langney Haven at Eastbourne	The Langney Haven including Langney Village and areas of Eastbourne, including Brampton Road Trading Estate, Highfield Industrial Estate and the Birch Road and Hammonds Drive Industrial Estates	**012442**	**8721**	**572**	**9293**

9 Drainage of Development Sites

9.1 Principles

Traditionally, built developments have utilised piped drainage systems to manage storm water and convey surface water run-off away from developed areas as quickly as possible. Typically these systems connect to the public sewer system for treatment and/or discharge to local watercourses. Whilst this approach rapidly transfers storm water from developed areas, the alteration of natural drainage processes can potentially impact on downstream areas by increasing flood risk and reducing water quality. Receiving watercourses are therefore much more sensitive to rainfall intensity and volume after a catchment, or areas of a catchment have been developed.

Due to the difficulties associated with upgrading the sewer systems it is typically uncommon for sewer and drainage systems to keep pace with the rate of development/re-development and there are increasingly stringent controls placed on discharges to watercourses. As development progresses and/or urban areas expand these systems become inadequate for the volumes and rates of storm water they receive, resulting in increased flood risk and/or pollution of watercourses. Allied to this are the implications of climate change on rainfall intensities. Climate change is likely to lead to flashier, more responsive catchments and sites resulting in the surcharging of piped systems.

In addition, as flood risk has increased in importance within planning policy, a disparity has emerged between the design standard of conventional sewer systems (1 in 30 year return period) sewers built pre 1980 and the unknown capacity and sizes issues associated with these, and the typical design standard flood (1 in 100 year). This results in drainage inadequacies for the flood return period developments need to consider, often resulting in potential flood risk from surface water/combined sewer systems.

A sustainable solution to these issues is to reduce the volume and/or rate of water entering the sewer system and watercourses.

9.2 What are SuDS?

Sustainable Drainage Systems (SuDS) are the Government's preferred method for managing the surface water run-off generated by developed sites and PPS25 notes that regional planning bodies and Local Authorities should promote their use for the management of runoff. SuDS seek to manage surface water as close to its source as possible, mimicking surface water flows arising from the site, prior to the proposed development. Typically this approach involves a move away from piped systems to softer engineering solutions inspired by natural drainage processes.

SuDS should be designed to take into account the surface run-off quantity, rates and also water quality ensuring their effective operation up to and including the 1 in 100 year design standard flood including an increase in peak rainfall of 30% to account for climate change.

Wherever possible, a SuDS technique should seek to contribute to each of the three goals identified below with the favoured system contributing significantly to each objective. Where possible SuDS solutions for a site should seek to:

1. Reduce flood risk (to the site and neighbouring areas),

2. Reduce pollution, and,

3. Provide landscape and wildlife benefits.

These goals can be achieved by utilising a management plan incorporating a chain of techniques, (as outlined in Interim Code of Practice for Sustainable Drainage Systems 2004), where each component adds to the performance of the whole system:

Prevention	good site design and upkeep to prevent runoff and pollution (e.g. limited paved areas, regular pavement sweeping)
Source control	runoff control at/near to source (e.g. rainwater harvesting, green roofs, pervious pavements)
Site control	water management from a multitude of catchments (e.g. route water from roofs, impermeable paved areas to one infiltration/holding site)
Regional control pond)	integrated runoff management from a number of sites (e.g. into a detention

In keeping with the guidance of PPS25, local authorities should encourage the application of SuDS techniques. This chapter presents a summary of the SuDS techniques currently available and a review of the soils and geology of the study area, enabling the local authorities to identify where SuDS techniques could be employed in development schemes.

Detailed design guidance can be found in the SuDS Manual C697, and associated Site Handbook for the Construction of SuDS, C698. These publications provide best practice guidance on the planning, design, construction, operation and maintenance of SuDS, to ensure effective implementation within developments.

9.3 SuDS Policies

There are a number of policies and planning documents that promote the implementation of SuDS in new developments.

9.3.1 Building Regulations 2002 H3 Rainwater Drainage

- Adequate provision shall be made for rainwater to be carried from the roof of the building;
- Paved areas around the building shall be so constructed as to be adequately drained;
- Rainwater from a system provided pursuant to sub-paragraphs 1) or 2) shall discharge to one of the following, listed in order of priority:
    - an adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable,
    - a watercourse; or, where that is not reasonably practicable,
    - a sewer.

9.3.2 PPS25 (Reference 2)

In terms of identifying a requirement to consider SuDS on a development project the following general principle (set out in PPS25) should be followed:

"The surface water drainage arrangements for any development site should be such that the volumes and peak flow rates of surface water leaving a developed site are no greater than rates prior to the proposed development, unless specific off-site arrangements are made and result in the same net effect."

This is to alleviate the pressure on sewer systems that are often antiquated, serving a catchment area greater than their original design and/or designed to a standard less than that required to mitigate development from a 1% annual probability flood event.

If a proposed development results in an increase in surface water, then the Environment Agency will expect to see SuDS forming part of the proposed mitigation. With their new powers of direction over planning applications in flood zones or for major development, any developments that do not incorporate SuDS can expect them to be required through Section 106 legal agreements. Where the consented discharge rates are low, this can significantly impact on the viability of development proposals.

9.3.3 Code for Sustainable Homes (Reference 20)

The Code for Sustainable Homes identifies the proactive reduction of surface water run off as a mandatory element worth two credits towards the 57 required for the Code's Level 3 rating. Through incorporating suitably designed systems into a development SuDS can also contribute to several other assessment criteria under the Code for Sustainable Homes, such as those relating to ecology and potable water consumption, which offer a further 9 and 5 points respectively towards the Level 3 rating.

9.3.4 Other Policies

Section 3 outlines the policies that govern development and flood risk management in the EBC and WDC study area. SuDS are promoted in 'Making Space for Water'; RPG9 (INF2); Draft South East Plan (NRM 1, NRM 3); and, Eastbourne Borough Plan (NE4) Wealden Local Plan (CS5).

9.4 SuDS Methods

SuDS techniques can be used to reduce the rate and volume and improve the water quality of surface water discharges from sites to the receiving environment (i.e. natural watercourse or public sewer etc). Various SuDS techniques are available, however the techniques operate on two main principles:

- Infiltration
- Attenuation

All systems generally fall into one of these two categories, or a combination of the two.

The design of SuDS measures should be undertaken as part of the drainage strategy and design for a development site. A ground investigation will be required to access the suitability of using infiltration measures, with this information being used to assess the required volume of on-site storage. Hydrological analysis should be undertaken using industry approved procedures, to ensure a robust design storage volume is obtained.

During the design process, liaison should take place with the Local Planning Authority, the Environment Agency and Southern Water in order to establish that the design methodology is satisfactory and to also agree on a permitted rate of discharge from the site.

Table 9-1 provides a summary of the different SuDS techniques, and which techniques are suitable to comply with the three goals of sustainability.

Management Train			Component	Description	Water Quantity	Water Quality	Amenity Biodiversity
	Source	Prevention	Green roofs	Layer of vegetation or gravel on roof areas providing absorption and storage.	●	●	●
			Rainwater harvesting	Capturing and reusing rainwater for domestic or irrigation uses.	●	○	○
			Permeable pavements	Infiltration through the surface into underlying layer.	●	●	○
			Filter drains	Drain filled with permeable material with a perforated pipe along the base.	●	●	
			Infiltration trenches	Similar to filter drains but allows infiltration through sides and base.	●	●	
			Soakaways	Underground structure used for store and infiltration.	●	●	
			Bio-retention areas	Vegetated areas used for treating runoff prior to discharge into receiving water or infiltration	●	●	●
			Swales	Grassed depressions, provides temporary storage, conveyance, treatment and possibly infiltration.	●	●	○
			Sand filters	Provides treatment by filtering runoff through a filter media consisting of sand.	●	●	
Regional	Site		Basins	Dry depressions outside of storm periods, provides temporary attenuation, treatment and possibly infiltration.	●	●	○
			Ponds	Designed to accommodate water at all times, provides attenuation, treatment and enhances site amenity value.	●	●	●
			Wetland	Similar to ponds, but are designed to provide continuous flow through vegetation.	●	●	●

Key: ● – highly suitable, ○ - suitable depending on design

Table 9-1: Summary of SuDS Techniques and their Suitability to meet the Three Goals of Sustainability

9.5 Where can SuDS be utilised?

The underlying ground conditions of a development site will often determine the type of SuDS approach to be used at development sites. This will need to be determined through ground investigations carried out on-site, however an initial assessment of a sites suitability to the use of SuDS can be obtained from a review of the available soils/geological survey of the area.

Based on a review of the following maps we can then recommend suitable SuDS techniques that would be compatible with the underlying geology:

- The Soil Survey of England and Wales 1993 – 1:250,000 Soils Maps (Sheet 6), and
- The Geological Survey of Great Britain (England and Wales) 1:50,000 Series Solid and Drift Edition Sheets 334 (1979), Sheet 317 (1979), and Sheet 320/321 (1980)
- The Soils Map Legend and Geological Survey Memoir were also consulted as part of this assessment.

In the design of any drainage system and SuDS approach, consideration should be given to site-specific characteristics and where possible be based on primary data from site investigations. The information presented in Table 9-2 and Table 9-3 is provided as a guide and should not be used to accept or refuse SuDS techniques.

Table 9-2 : Suitable SuDS Techniques Dependent on Geology

SuDS Technique	Geology	Description	Permeability	Location
Infiltration or Combined Infiltration and Attenuation	1st and 2nd Terrace	Contain loams and gravels. Permeability depended on fines content	High	Upper tributaries of Cuckmere River
	Dry valley and Nailbourne Deposits	Permeability depended on fines content	High	Seven Sisters Coastline
	Storm Gravel Beach Deposits	-	Very High	Eastbourne Coast
	Upper and Middle Chalk, undivided	Permeability dependent on the level of the water table.	High	Majority of study area – outcrops between Eastbourne and Cuckmere River
	Melbourne Rock	Permeability dependent on the level of the water table.	High	Willingdon
	Lower Chalk	Permeability dependent on the level of the water table.	High	West of Eastbourne
	Upper Greensand	Consists of alternating beds of sand, sandstone, malmstone and clay	Moderate	North of Eastbourne

	Lower Greensand	Comprised of limestone, cherts, clays and sand. Permeability depended on fines content	Moderate	Willingdon Levels, Polegate
	Tunbridge Wells Sands	Unconsolidated or partly cemented into a friable stone known as sandrock. Clay seams are also present throughout the formation	Moderate	Between East Hoathly and Windmill Hill
	Ashdown Beds	Comprised of sand with subordinate clay and silt seams throughout and a pebble bed	Moderate	From Waldron, through Heathfield to Rushlake Green
ATTENUATION	Alluvium	Permeability low if high proportion of silt and clay	Low	Pevensey Levels, Willingdon Levels and Cuckmere River Valley
	Clay-with-flint	Comprises of clay flints, gravels, sand and loam	Low	West of Eastbourne
	Head	Soliflucted materials such as brown silt loams	Low	West of Eastbourne
	Gault	Predominately consists of clay and sand with some marls running throughout. No permeability within the clay, limited permeability within sand	Very Low	Willingdon Levels
	Weald Clay	Composed of a shaly clay which. Beds of limestone, sand, sandstone and clay ironstone are also interdispersed in the clay.	Low	Between Hallisham and Arlington
	Wadhurst Clay	Contains grey and blue-grey clays and shales which are interdispersed with beds of siltstone and sandstone and thin layers of shelly limestone and clay ironstone	Low	Between Boodle Street and Foxhurst Green
	Made Ground	Made ground should not be used for infiltration due to possible leaching of contaminants.	N/A	Arlington Reservoir, Polegate, Wilmington Wood and Manxey Level

Table 9-3: Suitable SuDS Techniques Dependant on Soil Type

SuDS Technique	Soil	Description	Permeability	Location
Infiltration / Combined Infiltration and Attenuation	Charity 2 571m	Well drained flinty fine silty soils over chalk or chalk rubble	High	East Dean
	Waterstock 573a	Deep permeable mainly fine loamy soils variably effected by groundwater	Moderate	Upper Cuckmere - Hellingly
	Sandwich 361	Deep well drained calcareous and non-calcareous sandy soils. Waterlogged soils occur in localised hollows.	Moderate	Pevensey Bay
	Marlow 581e	Well drained fine loamy soils over clayey soils. Slight seasonal waterlogging	Moderate	Between Eastbourne and Cuckmere River
	Upton 1 342 a	Shallow well drained calcareous silty soils over chalk, often on steep land.	Moderate	Willingdon Levels
	Coombe 2 511g	Well drained calcareous fine silty soils over chalk or chalk rubble.	Moderate	Around Folkington
Attenuation	Kingston 711j	Slowly permeable seasonally waterlogged fine loamy over clayey soils and similar soils with slowly permeable subsoils and slight seasonal waterlogging.	Low	North of Polegate and West of Arlington
	Andover 1 343h	Shallow well drained calcareous silty soils over chalk on slopes and crest.	Low	Between Eastbourne and Cuckmere River
	Wickham 1 711e	Slowly permeable seasonally waterlogged fine silty over clayey, fine loamy over clayey and clayey soils.	Low	North of Eastbourne - Arlington
	Denchworth 712b	Slowly permeable seasonally waterlogged clayey soils with similar fine loamy over clayey soils.	Low	North of Folkington
	Curtisden 572i	Generally silty soils over siltstone with slowly permeable subsoils. Seasonal waterlogging is common.	Low	Heathfield and Hellingly
	Newchurch 2 814c	Calcareous clayey soils. Groundwater is controlled by ditches and pumps and there is a risk of flooding in places.	Low	Pevensey Levels Wallers Haven

If, after, geotechnical analysis of the geology and associated permeability of the strata underlying the allocation site infiltration is considered appropriate, the allocation site must also be categorised in terms of proximity to a groundwater abstraction source.

9.6 SuDS Constraints

The use of sustainable drainage systems throughout the study area can be limited based on a number if issues, which include:

- Groundwater vulnerability and potential contamination of an aquifer;
- The presence of groundwater source protection zones and potential contamination of the potable water source;
- Restrictions on infiltration on contaminated land to prevent the spread of contamination; and
- Restrictions on space on development sites where housing densities are large.

9.6.1 Groundwater Vulnerability

Groundwater resources are vulnerable to contamination from both direct sources (e.g. into groundwater) or indirect sources (e.g. infiltration of discharges onto land). Groundwater vulnerability within the study area has been determined by the Environment Agency, based on a review of aquifer characteristics, local geology and the leachability of soils.

The vulnerability of the groundwater is important when advising on the suitability of SuDS. Through examination of groundwater vulnerability maps the following classifications can be found within the study area. The following maps were examined:-

- NRA (1986) 'Groundwater Vulnerability of East Sussex: Sheet 46', HMSO: London.

GIS layer: Groundwater

The groundwater vulnerability of the study area is summarised in Table 9-4 and shown in Figure 14

Table 9-4: Groundwater vulnerability by area

FULL VULNERABILITY CLASSIFICATION	VULNERABILITY DESCRIPTION	TYPICAL LOCATION
Major High (H) 1	Highly Vulnerable	South Downs Willingdon
Major Intermediate (I) 1	Moderately Vulnerable	South Downs
Major Low (L)	Low Vulnerability	Arlington Polegate
Minor High (H) 1	Highly Vulnerable	Pevensey Levels Eastbourne
Minor Intermediate (I) 1	Moderately Vulnerable	Pevensey Levels Hellingly Heathfield
Minor Low (L)	Low Vulnerability	East of Heathfield
Non-Aquifer	Low Vulnerability	Hailsham Lower Willingdon South of Heathfield

9.6.2 Source Protection Zones

In addition to groundwater vulnerability, the Environment Agency also defines groundwater source protection zones. Source Protection Zones (SPZ) are defined to protect areas of groundwater that are used for potable supply, including public/private potable supply, (including mineral and bottled water) or for use in the production of commercial food and drinks.

SPZs are defined based on the time it takes for pollutants to reach an abstraction point. This transmission time enable the Environment Agency to define 3 zones around a groundwater abstraction point. The majority of the study area has not been classified, but the four zones and their locations are **(GIS layer: Mitigation/Source Protection Zones):**

- **Zone 1 (Inner Protection Zone)** – This is defined as 'any pollution that can travel to the borehole within 50 days from any point within the zone is classified as being inside zone 1'. In the study area this zone is delineated in approximate 100 m diameter circles;
- **Zone 2 (Outer Protection Zone)** – This is defined as the area that 'covers pollution that takes up to 400 days to travel to the borehole, or 25% of the total catchment area – whichever area is the biggest';
- **Zone 3 (Total Catchment)** - The total catchment is the total area needed to support removal of water from the borehole, and to support any discharge from the borehole; and,
- **Zone 4 (Zone of special interest)** – In the study area a fourth zone has been defined. 'This is usually where local conditions mean that industrial sites and other polluters could affect the groundwater source even though they are outside the normal catchment area'.

Depending on the nature of the proposed development and the location of the development site with regards to the SPZs, restrictions may be placed on the types of SuDS appropriate to certain areas.

Any restrictions imposed on the discharge of site generated runoff by the Environment Agency will be determined on a site by site basis using a risk based approach.

The source protection zones in the study area are indicated in the GIS layer-Source Protection Zone and in Figure 15.

9.6.3 Planning Considerations for SuDS

The application of SuDS techniques is not limited to one technique per site. Often a successful SuDS solution will utilise a number of techniques in combination, providing flood risk, pollution and landscape/wildlife benefits to the site and surrounding area. In addition, SuDS can be employed on a strategic scale, for example with a number of sites contributing to large scale jointly funded and managed SuDS, however, each development site must offset its own increase in runoff. Attenuation cannot be "traded" between developments.

The design of SuDS measures should be undertaken as part of a drainage strategy proposed during the design of a development site. A ground investigation will be required to access the suitability of using infiltration SuDS, with this information also being used to assess the required volume of on-site storage. Hydrological analysis should be undertaken using industry-approved procedures; to ensure a robust design storage volume is obtained.

All relevant organisations should meet at an early stage of the drainage design process to agree on the most appropriate drainage system for the particular development. These organisations may include the Local Authority, the sewage undertaker, Highway Agency, and the Environment Agency.

Liaison with these organisations should focus on establishing a suitable design methodology, any restrictions and provision for the long-term maintenance of the feature.

There are, at present, no legally binding obligations relating to the provision and maintenance of SuDS. However, PPS25 (Reference 2) states that:

"Where the surface water system is provided solely to serve any particular development, the construction and ongoing maintenance costs should be fully funded by the developer."

The most convenient vehicle for agreeing long-term management responsibilities is through Section 106 of the Town and Country Planning Act (1990). Under this, agreement for SuDS maintenance can be a requirement of the planning permission.

It is recommended that EBC and WDC complete Table 14-1 to assist in identifying suitable SuDS for development sites in their areas. Completion of Table 14-1 will assist in identifying where various types of SuDS are most suitable and enable developers to account for SuDS when developing master plans for development sites.

10 Policy Recommendations

National and local policies have been reviewed against the local flood risk issues and objectives identified by the Environment Agency in the CFMP. From these policies the following catchment wide and specific area strategies have been developed under the headings Flood Risk, SuDS, Flood Mitigation and the Water Environment. Integration of these suggested policy considerations into LDF / LDDs should ensure that the objectives and aspirations of the Environment Agency and national policy are met whilst strengthening the position of the Local Planning Authority with regard to Flood Risk.

10.1 Flood Risk

Planning Policy Statement 25 (PPS25) aims to guide new development to those areas at lowest risk of flooding, both now and in the future (allowing for the effects of climate change) and to ensure development does not increase the risk of flooding elsewhere.

10.1.1 Study Area Wide Strategies

To achieve the aim of PPS25 the following policy considerations are recommended:

- Abide by the principles of PPS25 and liaise closely with the Environment Agency to ensure that all concerns and issues are dealt with.
- Have regard to the cumulative impact of development on flood risk;
- Determine decisions for windfall development through application of the Sequential Test. Where this is not practical the Councils should balance the flood risk at an individual site, the type of development proposed, emergency planning and the contribution the development would make to the wider sustainability of the area before making a decision.
- Consider flood risk as one of a number of policies that in tandem can provide mechanisms to deliver sustainable developments with multiple benefits
- Engage with developers and local regulators throughout the development process to develop and instigate initiatives for the reduction of flood risk.
- Prepare flood risk assessments for all scenarios identified in Table 11-1 that would not automatically be picked up by the Environment Agency;
- Ensure flood risk assessments prepared for developments conform to national policy and the additional elements identified in this SFRA, where considered suitable by the planning authority.
- Have regard to the role development sites could have to alleviate flood risk elsewhere.

10.1.2 Area Specific Strategies

Groundwater flooding has been noted as occurring in the areas of Alfriston and West Dean.

1. The Councils should ensure new developments in these areas undertake a site investigation to determine the risks from groundwater flooding and incorporate mitigation measures into the design of any buildings to prevent flood damage from this source.

Polegate and Willingdon have suffered flooding as a result on incapacity of the river systems in the area.

2. Surface water flooding should be investigated in detail as part of FRAs for developments located in those areas, and comprehensive surface water runoff calculations undertaken.

3. The Councils should ensure new development in the areas do not increase the burden on the existing drainage system either though restricting site discharge rates and/or through capital contributions to improvements works of the existing drainage infrastructure.

4. The Councils should also consider seeking opportunities through development or strategic planning to deliver schemes to alleviate flooding from this source to existing properties, where practicable, viable and deliverable. Planning applications for developments in these areas should submit a flood risk assessment that considers flooding from the sewer system and the consequences of a failure of the drainage system through blockage.

Through integration of these suggestions, the emerging LDF will comply with PPS25 and the aspirations and policies represented in the following and presented in Section 3:

- Regional Planning Guidance for the South East (RPG9) Policy INF1
- The Draft South East Plan Policy NRM3
- Wealden Local Plan Policy CS3
- Eastbourne Borough Plan (2001-2011) Policies US4 and US5
- Cuckmere and Sussex Havens Catchment Flood Management Plan Objectives B and C in table 5.2

10.2 Flood Risk Management

Evidence collected through the Level 1 SFRA suggests flood risk throughout the study area is exacerbated by poor conveyance of some structures (bridges, culverts etc). With the impact of climate change, flooding as a result of poor capacity of structures would be expected to increase. To mitigate for this, the Councils should consider the following policy recommendations.

10.2.1 Study Area Wide Strategies

- Opportunities should be considered to 'daylight' (deculvert) culverted rivers, where possible and necessary, to return them to a natural system, reducing back up of flows and under capacity where this does not exacerbate the flooding elsewhere;
- Where this is impossible seek opportunities to facilitate the investigation and where necessary and suitable the upgrade of, bridges, culverts, drainage systems etc in-line with current climate change considerations, through local development documents where possible.

- Review the condition of existing local defences, the dependence of additional local development on them for flood mitigation and where necessary the Councils should seek to maintain and or improve defences if necessary.

- Safeguard floodplains from development, ensuring the maximum possible capacity is available to attenuate floodwater and thereby safeguard existing property. Where development in the floodplain is unavoidable and flood plain storage is removed, the development should provide compensatory storage on a level for level basis to ensure that there is no loss in flood storage capacity.

- Consider where practical, viable and deliverable opportunities to restore natural river forms and floodplains (through managed retreat where possible) and in so doing restore river corridors and floodplains as areas of biodiversity and increasing their amenity value.

10.2.2 Area Specific Strategies

1. Mitigate flood risk from developments through development of flood storage schemes which will also provide amenity benefit.

2. Where a development is applying for a change of use flood evacuation plans should be developed through liaison with the emergency services.

Through integration of these suggestions, the emerging LDF will comply with PPS25 and the aspirations and policies represented in the following and presented in Section3:

- Regional Planning Guidance for the South East (RPG9) Policy INF1

- The Draft South East Plan Policy NRM3 and NRM6

- Wealden Local Plan Policy CS4

- Eastbourne Local Plan (2001 – 2011) Policy US6

- Cuckmere and Sussex Havens Catchment Flood Management Plan Objectives C, E, F and G in table 5.2

10.3 Sustainable Drainage Systems

Due to expansion of developed areas, the drainage systems designed to serve the original settlements can become overloaded leading to flooding of old centres. In addition the design standard of newer sewer systems is typically to accommodate the 30 year storm, with events in excess of this expected to result in flooding. With the impacts of climate change the effective design standard of the sewer system is expected to decrease leading to more frequent flooding and more severe flooding within the design standard of the defence.

In addition, conventional drainage systems typically discharge storm water to nearby watercourses. As urbanisation and intensification of catchments increases, storm water inputs can impact on water quality. With the incorporation of the Water Framework Directive into UK law the Councils should seek opportunities to contribute to the goal of improving the quality of local watercourses.

10.3.1 Study Area Wide Policies

- Require sustainable drainage design to consider the impacts of climate change for the lifetime of the development at the site and downstream.
- Consider the potential benefits an appropriately designed Sustainable Drainage System could have for the biodiversity, amenity value, water quality and resource value of a development and/or surrounding area.
- Consider the vulnerability and importance of local resources when determining the suitability of drainage strategies/SuDS.
- Ensure discharge rates from new developments do not increase following redevelopment, including an allowance for climate change and preferably restrict discharge rates to greenfield runoff rates in areas known to have a history of sewer flooding.

10.3.2 Area Specific Policies

The areas surrounding Polegate, Willingdon, Eastbourne and Hailsham suffer from flooding as a result of incapacity in the existing drainage infrastructure and/or the speed at which storm water is delivered to the Brooks.

1. To mitigate this, the Councils should consider where practicable, viable and deliverable the implementation of strategic flood storage areas to reduce flood risk to towns and villages where necessary.

The areas around Pevensey and Willingdon suffer from flooding through overland flow.

2. To mitigate for this the Councils should consider the implementation of strategic flood storage areas operated by a single authority in areas of the High Weald and South Downs, above to reduce flood risk to towns and villages;
3. Developments in the locality of Eastbourne Park should assess whether capacity is available within the system to attenuate for the excess site runoff and provide a contribution to the maintenance of the scheme.

Through integration of these suggestions, the emerging LDF will comply with PPS25 and the aspirations and policies represented in the following and presented in Section 3:

- Regional Planning Guidance for the South East (RPG9) Policy INF2
- The Draft South East Plan Policy NRM1
- Wealden Local Plan Policies: NE1, CS5, PW5
- Eastbourne Borough Plan (2001 – 2011) Policies: NE4, NE14, NE15, US3, US4
- Cuckmere and Sussex Havens Catchment Flood Management Plan Objectives A, B and E in table 5.2

10.4 Flood Risk & Environment

As the population increases and climate change leads to hotter drier summers, the prospect of droughts will increase. New development can tackle this by incorporating water efficiency measures, such as greywater recycling, rainwater harvesting and water use minimisation technologies. In doing so, knock-on benefits could be felt by the sewer system which will receive less wastewater from properties, potentially freeing up capacity during flood events.

In addition, increasing people's awareness of the water environment around them together with its importance and its hazards, will contribute to their understanding of where floods come from and what they can do to limit the consequences of flooding and resource shortages.

10.4.1 Study Area Wide Strategy

1. Ensure that proposed developments can be accommodated by the existing resource provision. Where a development cannot be met by current resources, ensure that the phasing of development is in tandem with resource infrastructure investment.

2. Consider opportunities to 'daylight' (de-culvert) watercourses where necessary, viable and deliverable and increase people's interaction with the watercourse (as opposed to hiding it in a concrete channel);

3. Where necessary and achievable adopt a policy for the routine maintenance of all watercourses ensuring they are clear of debris that could affect flood flow conveyance and water quality.

Through integration of these suggestions, the emerging LDF will comply with PPS25 and the aspirations and policies represented in the following and presented in Section 3:

- Regional Planning Guidance for the South East (RPG9);
- The Draft South East Plan Policy NRM3 and NRM6
- Wealden Local Plan Policy CS2;
- Eastbourne Borough Plan (2001 – 2011) Policies NE22, US2 and US4-6; and,
- Cuckmere and Sussex Havens Catchment Flood Management Plan Objective D, Table 5.2.

Table 6.3 in the CFMP provides a summary of the flood risk management policies that have been set out by the Environment Agency and assigned to different zones of the study area. The strategies suggested above mesh with these aspirations and if integrated will aid to strengthen the position of the Local Planning Authority.

Adoption of policies to address the points of consideration identified above will ensure the emerging LDFs and LDDs for Eastbourne BC and Wealden DC are in agreement with the policy and planning documents presented in Section 3. Section 3 presents those policies identified from a review of relevant regional and local documents that relate to flood risk and/or water resources. In addition the suggested consideration will ensure several of the existing policies are strengthened to ensure flooding is a key consideration for new developments.

11 Site Specific Flood Risk Assessment Guidance

Flood Risk is a fundamental consideration for any development project regardless of scale or type. Understanding the flood risk to and arising from a development is key to managing the risk to people and property reducing the risk of injury, property damage or even death. Climate change is of particular concern to flood risk. Current predictions suggest the UK will experience milder wetter winters and on average hotter drier summers, whilst sea levels will continue to rise. This will lead to an increase in rainfall and therefore flood events in winter months and increase the risk of large thunderstorms in the summer months, as well as increasing the unpredictability of our weather.

Flooding is not limited to just rivers and sea, in fact flooding can arise from a number of sources, each presenting their own type of risk and requiring management. In addition some areas currently defended from flooding may be at risk in the future as the effects of climate change take hold or defence condition deteriorates with age.

However, development can work with flood risk if it is accurately understood and managed. Using a sound understanding of flood risk to locate, and design developments enables flood risks to be managed through positive planning. This positive planning needs to consider the risks to a development from local flood sources but also the consequences a development may have on increasing flood risk. Early identification of flood risk constraints can ensure developments maximise development potential whilst achieving the principles of sustainability.

Level 1 Strategic Flood Risk Assessments present sufficient information to assist Local Planning Authorities to apply the Sequential Test and identify where the Exception Test may be required. These documents are predominately based on existing data. The scale of assessment undertaken for a Strategic Flood Risk Assessment is typically inadequate to accurately assess the risks faced by a particular development at any location within the study area. The Level 1 SFRA has attempted to identify all sources of flood risk at the catchment and district scale using the best available information. More local and site specific sources of flooding may become apparent during Level 2 or during the course of Site Specific FRAs. For example, there will be some locations adjacent to watercourses that on first inspection, it is suggested there is no flood risk. This should be fully investigated to ensure more people are not placed at risk through inappropriate development.

Therefore, site specific flood risk assessments are required to assess the flood risk posed to proposed developments and to ensure that where necessary and appropriate, suitable mitigation measures are included in the development.

This section presents the recommendations for site specific flood risk assessments prepared for submission with planning applications in the Eastbourne Borough Council and Wealden District Council administrative areas.

The site specific flood risk assessment guidance presented in the following sections has been developed based on:

- the recommendations presented in Planning Policy Statement 25 and the consultation draft of the Practice Guide companion to PPS25;

- a review of the policies contained within the existing Local Plans for Eastbourne BC and Wealden DC; and
- the information gathered through and findings of the Level 1 SFRA process.

11.1 When are Flood Risk Assessments Required?

When informing developers of the requirements of a flood risk assessment for a development site, consideration should be given to the position of the development relative to flood sources, the vulnerability of the proposed development and its scale.

In the following situations a Flood Risk Assessment should always be provided with a planning application:

- The development site is located in Flood Zone 2 or 3;
- The proposed development comprises 5 or more residential dwellings and/or the site area is greater than 1 hectare (even if the site is located in Flood Zone 1. This is to ensure storm water generated by the site is managed in a sustainable manner and does not increase the burden on existing infrastructure and/or flood risk to neighbouring property);
- The floor space of proposed non-residential development is greater than 1000m² or the site area is greater than 1 hectare;
- The development site is located in an area known to have experienced flooding problems from any flood source; and,
- The development is located within 20m of any watercourse regardless of Flood Zone classification.

11.2 Flood Risk Assessment Requirements

Annex E of PPS25 presents the minimum requirements for flood risk assessment. These include:

- Considering the risk of flooding arising from the development in addition to the risk of flooding to the development;
- Identifying and quantifying the vulnerability of the development to flooding from different sources and identify potential flood risk reduction measures;
- Assessments of the remaining 'residual' risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular development;
- The vulnerability of those that could occupy and use the development, taking account of the Sequential and Exception Tests and the vulnerability classification, including arrangements for safe access;
- Considering how the ability of water to soak into the ground may change with development, along with how the proposed layout of development may affect drainage systems; and

- Fully account for current climate change scenarios and their effect on flood zoning and risk.

The Practice Guide Companion to PPS25 (consultation document) advocates a staged approach to site specific flood risk assessment with the findings from each stage informing the next and site master plans, iteratively throughout the development process.

The staged approach comprises:
- Level 1 Screening Study
- Level 2 Scoping Study
- Level 3 Detailed Study

11.2.1 Level 1 - Screening Study

A Level 1 Screening Study is intended to identify if a development site has any flood risk issues that warrant further investigation. This should be based on existing information such as that presented in the Level 1 SFRA. Therefore this type of study can be undertaken by a development control officer in response to the developer query or by a developer where the Level 1 SFRA is available. Using the information presented in the Level 1 SFRA and associated GIS layers a development control officer could advise a developer of any flooding issues affecting the site. This information can then be used by the developer as a basis to further their understanding of how the flood risks could potentially affect their development.

11.2.2 Level 2 - Scoping Study

A Level 2 Scoping Study is predominately a qualitative assessment designed to further understand how the flood sources affect the site and the options available for mitigation. The Level 2 FRA should be based on existing information where this is available to further a developers understanding of the flood risk and how it may affect their development. This type of assessment should also be used to inform master plans of the site raising a developer's awareness of the additional elements the proposed development may need to consider.

11.2.3 Level 3 – Detailed Study

Where the quality and/or quantity of information for any of the flood sources affecting a site is insufficient to enable a robust assessment of the flood risks, further investigation will be required. For example it is generally considered inappropriate to base a flood risk assessment for a residential care home at risk of flooding from fluvial sources on Flood Zone maps alone. In such cases the results of hydraulic modelling are preferable to ensure details of flood flow velocity, onset of flooding and depth of flood water is fully understood and that the proposed development incorporated appropriate mitigation measures.

Further details of the elements a Level 2 and/or a Level 3 site specific flood risk assessment should consider are presented in Table 11-1. This also presents those elements a developer may wish to consider through a flood risk assessment that will have additional and/or strategic benefit to their development and/or surrounding area.

11.3 Flood Risk Assessment Guidance Table

The Flood Risk Assessment Guidance Table (Table 11-1) is intended to provide guidance to developers and Local Authorities on the requirements of a FRA for those areas or flood sources for which the Environment Agency is not a statutory consultee.

The example table below provides a framework with which Local Authorities and developers will be able to assess the requirements of each individual development with regard to flood risk.

The table is intended to be used working from the column on the left through to the column on the right as indicated by the column legend. A summary of the details included in each of the columns is detailed below:

1. The initial column provides the details of which scenarios the Environment Agency would be expected to be consulted and advise on a planning application (within Flood Zone 2 and 3 or a major development in Flood Zone 1).

2. The second column then sets out the minimum requirements that the Environment Agency would expect to be presented within a FRA as part of a planning application.

3. The third column identifies situations where the Local Authority would be expected to advise on flood risk, in instances where the SFRA has identified that an area may be at risk from another flood source other than tidal or fluvial. This column provides details on what would be required in addition to the minimum requirements presented in column 2. For example particular locations have been identified as being at risk from a review of the CFMP, or possible mitigation measures that could be incorporated into the development and where these recommendations tie in with other existing policies.

4. Column 4 then provides details on specific development locations, and what constraints and issues may be associated with these development locations. Possible mitigation measures / design requirements that could be integrated into such development locations to mitigate flood risk, and tie in with existing policies have also been incorporated.

5. Column 5 provides a glossary of terms which relates to the table.

11.3.1 Risks of Developing in Flood Risk Areas

Developing in flood risk areas can result in significant risk to a development and site users. Through following the advice provided in Table 11-1 this should highlight the majority of the potential risks to developments. Additional issues to consider in flood risk areas include:

- Failure to consider wider plans prepared by the Environment Agency or other operating authorities may result in a proposed scheme being objected to.
- Failure to identify flood risk issues early in a development project could result in failure of a development proposal, requiring redesign of the site to mitigate flood risk.
- Failure to adequately assess all flood risk sources and construct a development that is safe over its lifetime could increase the number of people at risk from flooding and/or increase the risk to existing populations.
- Failure to mitigate the risk arising from development may lead to claims against the developer if an adverse effect can be demonstrated (i.e. flooding didn't occur prior to development) by neighbouring properties/residents.
- Properties may be uninsurable and therefore unsaleable if flood risk management is not adequately provided for the lifetime of the development.
- By installing SuDS without arranging for their adoption or maintenance the SuDS will eventually cease to operate as designed and may present a flood risk to the development and/or neighbouring property.
- The restoration of river corridors and natural floodplains can significantly enhance the quality of the built environment whilst reducing flood risk. Such an approach can significantly reduce the developable area of sites or lead to fragmented developments, however positive planning and integration throughout the master planning process should resolve these.

Table 11-1: Flood Risk Assessment Guidance Table

Table 11-1 Development Control Flood Risk Assessment Guidance

Table 11-1 Development Control Flood Risk Assessment Guidance

Situations when the Environment Agency are a Statutory Consultee on Flooding → **Situations when the Local Authority would be Expected to Advise on Flood Risk** → **Constraints / Issues Associated with the Development Location**

Glossary of Terms

Fluvial And Tidal Flood Zones

Flood Zones 2 and 3

The Environment Agency are statutory consultees for all developments in Flood Zones 2 and 3

Any developer wishing to develop a site in Flood Zones 2 or 3 should contact the Environment Agency to determine the precise requirements of a FRA.

The FRA should be prepared in accordance with Annex E of PPS25 and the Practice Guide Companion and should include but not limited to the minimum requirements set out in column 2.

The FRA should be prepared through consultation with the Environment Agency and the Local Planning Authority.

Flood Zone 2 and 3 Flood Risk Assessment Minimum Requirements

Consideration should be given to flood risk issues throughout the development process, using the findings from a flood risk assessment to iteratively inform the site's design.

A suitable assessment of flood risk for any development must assess flood risk to and arising from the development for all forms of flooding, including flooding from:

- Rivers;
- the Sea (including estuaries);
- the Land (overland flow);
- Groundwater;
- Sewers;
- Reservoirs, Canals & other artificial sources.

The Flood Risk Assessment for a successful planning application will be appropriate to the scale of the development and the level of risk, and will demonstrate but not necessary limited to:

1. The site will be safe and operational during extreme flood events as stipulated in PPS25, taking into account predicted climate change over the lifetime of the development;
2. The development will not have an adverse impact on the flood risk to properties and activities elsewhere; and
3. The development will not impact negatively on the local morphology and ecology of any nearby watercourses.

Development proposals (master plans) should apply the Sequential Test (set out in Planning Policy Statement 25: Development & Flood Risk) to guide vulnerable development types to areas of lowest flood risk.

Where a risk is identified the development proposals must mitigate the risk to ensure the development (and occupants) will be 'safe' (definition to be agreed with the Environment Agency) throughout its lifetime.

The assessment must consider the impacts of climate change for the lifetime of the development and mitigate the risks.

The development must not exacerbate flood risk to neighbouring property and residents from any of the flood sources identified above.

The FRA will be expected to cover the following points in addressing statements 1 – 3 above:

Statement 1
- Flooding on site will be confined to areas of open space and will not cause damage to homes or property, or pose a threat to life;
- Site occupants will have safe and permanent access to and from the site during extreme events.

Statement 2
- There will be no net increase in surface water runoff leaving the site for the relevant range of return periods;
- Buildings and structures on site will not cause an obstruction to flood flows;
- Floodplain storage taken up by proposed structures will be compensated for through additional volume provision at the same level in 100mm increments.

Statement 3
- The development will not create a threat to natural aquatic habitats through encroachment into sensitive areas;
- The development will not result in a serious reduction or increase in runoff volumes, nor will it adversely change any existing flow paths and characteristics.

Sites within 20m of a Water body

Sites within 20m of a water body
- Where the site lies close to a water body, but is not shown in the SFRA as being within an area liable to flood risk, the FRA should perform an analysis to confirm that the site is not at risk from any of the possible flood pathways;
-
- Additionally, the FRA should identify any issues with flood defence maintenance and provide information sufficient to support an application for Land Drainage Consents (requested by the Environment Agency for Main Rivers).

Flood Zone 1
Sites greater than: 1 hectares and/or 10 residential dwellings, or 1 ha and/or >1000m2 of floor space for non-residential

The Environment Agency are statutory consultees for all major developments in Flood Zones 1

Any developer wishing to develop a major development in Flood Zones 1 should contact the Environment Agency to determine the precise requirements of a FRA.

The FRA should be prepared in accordance with Annex E of PPS25 and the Practice Guide Companion and should include but not limited to the minimum requirements set out in column 2.

The FRA should be prepared through consultation with the Environment Agency and the Local Planning Authority.

Major development for residential purposes are defined as:
- The site area is greater than or equal to 0.5 hectares;
- More than 10 dwellings are to be provided.

Major developments for non residential purposes are defined as:
- The new floorspace provided is greater than 1000m²;
- The site area is greater than or equal to 1 hectare.

Flood Zone 1
Flood Risk Assessment Minimum Requirements

Background
For sites satisfying the criteria above, regardless of flood zone it is imperative that the runoff generated by the development does not exacerbate flooding elsewhere. The primary concern for a development in Flood Zone 1 is the developments contribution of surface water runoff to the sewers. The flood risk assessment for a successful planning application will demonstrate that:

1. There will be no risk of surface water flooding on the site as a result of the proposed drainage schemes;
2. There will be no increased probability of flooding in nearby watercourses as a result of the proposals; and
3. The proposed drainage schemes on the site are sustainable, and contribute beneficially to the ecology of the site, preferably incorporating SuDS solutions.

Procedure
The FRA should be developed in parallel with the site drainage system in order to ensure that the design meets the requirements 1 – 3 above. The drainage design should give preference to SuDS solutions in providing storage and attenuation of surface water runoff.

The FRA will be expected to show that the system has been designed to include allowance for the effects of climate change for the lifetime of the development, and should include an assessment of flood risk from other sources where these may affect the site.

The potential requirement for Environment Agency consent for any of the proposed works should be considered and the relevant permissions obtained where possible (e.g. Land Drainage Consent)

Minimum Requirements[7]
The FRA should include:
- A location plan showing geographical features and any watercourses in the vicinity of the site;
- Plans of the existing and proposed development sites, including any structures which may influence flood flows;
- Topographic survey to Ordnance Datum;
- Calculations of the runoff likely to be generated from the proposed development;
- Surface water management strategy including sustainable solutions, with allowance for projected changes to intensity and frequency of storms resulting from climate change;
- Demonstration that the proposals will result in a net reduction (where appropriate) in the rates of surface water runoff from the site;
- An assessment of flood risk from other sources on the site.

Other Sources of Food Risk

Sewers

Background:
The Environment Agency is not a statutory consultee in areas of flood risk from sewers. Flooding from sewers has been identified in the study area.

Procedure:
The Environment Agency would not necessarily require a FRA as part of a planning application, but the SFRA identifies that the site may be at risk of flooding from surcharging of the sewer system. Any development in an area at risk of sewer flooding should produce a FRA incorporating the following points (in addition to the minimum requirements):

- Stormwater runoff calculations in relation to the capacity of the sewer system;
- Analysis of surcharge flood levels;
- Undertake a drainage strategy as part of the FRA to ensure that surface water runoff from the development is not exacerbated;
- Where necessary sewer modelling could be undertaken for any developments to ensure that further pressures are not placed on the current drainage network.

Mitigation Measures:
- Raising finished floor levels ;
- Construct buildings with solid floors;
- Providing raised walkways to ensure safe, dry egress and access from the site during a flood event;
- Incorporating Sustainable drainage systems to limit runoff.

Locations at Risk:
Due to the pressures on the drainage network, it is recommended that any developments located in the following areas undertake a FRA regardless of the flood zone they are located in or size of development to address the points listed above:
- Eastbourne;
- Polegate;
- Pevensey;
- Willingdon;
- Hailsham.

Supporting Policies:
South East Plan – NRM3
EBC Local Plan – NE4
WDC Local Plan – CS5

Groundwater

Background:
The Environment Agency is not a statutory consultee in areas of flood risk from groundwater. Flooding from groundwater has been identified in the study area.

Procedure:
The Environment Agency would not necessarily require a FRA as part of a planning application, but the SFRA indicates that the site lies in an area with a rising groundwater trend or has a historical record of flooding. Any development in an area at risk of groundwater flooding should produce a FRA incorporating the following (in addition to the minimum requirements):

- Risk from groundwater flooding;
- Groundwater monitoring should be considered for any development, to assess the level of groundwater in relation to the topographic levels for the site;
- Incorporate suitable mitigation techniques into the design of the development as part of the FRA to ensure that the development and site users are safe from groundwater flooding;
- Preventing contamination.

Mitigation Measures:
Possible mitigation measures include:
- Raising finished floor levels;
- Construct buildings with solid floors;
- Providing raised walkways to ensure safe egress and access from the site during a flood event.

Locations at Risk:
Due to the historical evidence of groundwater flooding it is recommended any development located in the following areas undertake a FRA regardless of the flood zone they are located in or size of development to address the points listed above:
- Alfriston;
- Westdean.

Supporting Policies:
South East Plan – NRM1, NRM3
EBC Local Plan – NE14
WDC Local Plan – NE1

Overland Flow and Springs

Background:
The Environment Agency is not a statutory consultee in areas of flood risk from overland flow and springs. Flooding from overland flow and springs has been identified in the study area.

Procedure:
The Environment Agency would not necessarily require a FRA as part of a planning application, but the SFRA indicates that the site may be at risk of flooding from overland flow. Any development in an area at risk of overland flow and spring flooding should produce a FRA incorporating the following points (in addition to the minimum requirements):

- Risk from overland flows, including velocities, pathways and flood depths, ponding areas etc;
- Incorporate suitable mitigation techniques into the design of the development as part of the FRA to ensure that the development and site users are safe from overland flows. The FRA should also undertake a drainage strategy as part of the FRA to ensure that surface water runoff from the development is not exacerbated;
- Preventing contamination.

Mitigation Measures
- Raising finished floor levels;
- The use of roads as flood channel;
- Orientating buildings in such a way as to not impede the movement of overland flow across the site;
- Construct buildings with solid floors;
- Incorporating Sustainable drainage systems to limit runoff.

Locations at Risk
Due to the historical evidence of overland flow it is recommended any development located in the following area undertake a FRA regardless of the flood zone they are located in or size of development to address the points listed above:
- Willingdon

Supporting Policies
South East Plan – NRM 1, NRM3
EBC Local Plan – NE14
WDC Local Plan - NE1

Artificial Bodies

Background:
The Environment Agency is not a statutory consultee in areas of flood risk from artificial bodies. Flooding from artificial bodies has been identified in the study area.

Procedure:
The Environment Agency would not necessarily require a FRA as part of a planning application, but the SFRA indicates that the site may be at risk of flooding from artificial sources. Any development in an area at risk of flooding from artificial bodies should produce a incorporating the following points (in addition to the minimum requirements):

- Risk from overtopping
- Risk from breach
- Risk from wave overtopping in the case of reservoirs

Mitigation Measures
- Raising finished floor levels;
- Construct buildings with solid floors;
- Develop flood warning and evacuation plans through consultation with the Emergency Services.

Locations at Risk
Due to the presence of artificial bodies of water it is recommended that developments in the following areas undertake a FRA regardless of the flood zone they are located in or the size of a development to assess the potential risk to the development::
- Arlington
- Alfriston
- Folkington.

Supporting Policies
EBC Local Plan -
WDC Local Plan – CS3

Development Location

Brownfield Redevelopment

The Environment Agency is not a statutory consultee for development on brownfield land. Development on brownfield land should:

Redevelopment
A FRA will be required to ensure that the development is safe for its life time and will not exacerbate the flood risk to other properties.

If the development is located within Flood Zone 3 and the interior of the current development is considered as a floodable area, then this will be considered floodplain. Consequently and redevelopment of the site will need to ensure that removal of floodplain storage does not occur.

Mitigation Measures:
- Raising finished floor levels above the design flood level;
- No net increase in the volume of floodplain development
- Reduction of surface water runoff rates through SuDS

Listed buildings
To reduce the flood risk to the building and site users a FRA should consider:
- Retrofitting of flood proofing measures;
- Reduction of surface water runoff rates through SuDS;
- Restructuring of development, removing vulnerable uses from the ground floor;
- Providing a safe means of egress and access to and from the development during a flood event;
- Sewer modelling should be undertaken for any redevelopments to determine the design standard of the sewer system, and ensure that flood risk will not be exacerbated.

Supporting Policies
South East Plan – NRM 3
EBC Local Plan – NE4, US4
WDC Local Plan – CS3

Greenfield Development

The Environment Agency is not a statutory consultee for development on greenfield land. Development on greenfield land should:

Development:
A FRA will be required to ensure that the development is safe for its life time and will not exacerbate the flood risk to other properties.

- Retain the rates and volumes of runoff from the development at greenfield rates;
- Use SuDS to provide storm water management and provide amenity value within the site and for off site users;
- Provide for the long term management and maintenance of Sustainable Drainage Systems and/or flood defence structures;
- Provide a drainage strategy for the site.

Mitigation Measures::
- Raising finished floor levels above the design flood level;
- Providing a safe, dry means of egress and access to and from the development during a flood event;
- Compensatory storage to be provided on a level for level basis.
- Use SuDS to retain the rates and volumes of runoff from the development at greenfield rates

Supporting Policies:
South East Plan – NRM3
RPG9 – INF1, INF2
EBC Local Plan – NE4, US4
WDC Local Plan – CS3, CS5

Riverside Development

The Environment Agency is not a statutory consultee for riverside development. Riverside development should:

Developments Alongside a Water body
- Where the site lies close to a water body, but is not shown in the SFRA as being within an area liable to flood risk, the FRA should perform an analysis to confirm that the site is not at risk from any of the possible flood pathways.;
- Additionally, the FRA should identify any issues with flood defence maintenance and provide information sufficient to support an application for Land Drainage Consents (requested by the Environment Agency for Main Rivers).

De-culverting
To mitigate the risk of flooding to developments should:
- Seek to de-culvert the river in the location of the development, whilst not increasing the flood risk to the development or surrounding areas;
- Through de-culverting a watercourse this will adhere to the policies and aspirations presented in the Environment Agency's Catchment Flood Management Plan and Flood Risk Management Strategies.

Naturalisation
To mitigate the risk of flooding to developments should:
- Seek to restore natural floodplains and restore river corridors as part of the development;
- This will adhere to the policies and aspirations presented in the Environment Agency's Catchment Flood Management Plan and Flood Risk Management Strategies.

Mitigation Measures:
- Compensatory storage to be provided on a level for level basis.

Supporting Policies
RPG9 – INF1
WDC Local Plan – CS3

Change of Use

The Environment Agency is not a statutory consultee for the change of use of a development. Change of use developments should:

Where a redevelopment plans a change of use of an existing building this can often lead to a higher density of people located within the floodplain.

To reduce the flood risk to the building and site users a FRA should consider:
- Retrofitting of flood proofing measures;
- Reduction of surface water runoff rates through SuDS;
- Restructuring of development, removing vulnerable uses from the ground floor;
- Providing a safe means of egress and access to and from the development during a flood event.

Supporting Policies
South East Plan – NRM 3
RPG9 – INF1
EBC Local Plan – NE4, US4
WDC Local Plan – CS3

Glossary of Terms

Safe access and egress – 'Safe' is defined as dry for more vulnerable and highly vulnerable uses. 'Safe' should be preferably dry for other uses such as educational establishments and less vulnerable land use classifications.

Finished Floor Levels – The level (m aOD) of the ground floor level of a development. If Catchment scale modelling has been used to determine flood levels for a location or the development is located within an area at risk of tidal flooding it would be expected that the finished floor level of the ground floor of a development to be 600mm above the design flood level accounting for climate change. For sites that have site specific modelling data a 300mm freeboard would be expected on the design flood level accounting for climate change.

Level for level compensatory storage - dfset any loss of flood storage capacity through development with an area of compensatory storage. This storage can take the form of a depression that would fill during a flood event, however this is required to be on a level for level basis i.e. that the area will flood at the same time during the flood event as the original flood plain would have done before redevelopment.

Preservation of flood flow routes – Ensuring on redevelopment that known flood routes are not blocked by buildings. This could be preventing through opening up green corridors adjacent to the river or orientating buildings in such away not to obstruct flood flows.

Flood resilience – (wet proofing), acceptance that flood waters will enter buildings and designing to ensure minimal damage to the property when this occurs. For example raising electrical sockets above the flood level.

Flood resistance – (dry proofing), prevention of flood waters from entering a building. For example this can be achieved through raising finished floor levels or using flood barriers ion doorways. Flood resistance can be achieved in new builds or by retrofitting into existing buildings.

Life time of a development – Expected duration the development is expected to exist for:
- 100 years for residential properties
- 60 years for non residential properties

12 Emergency Planning

When extreme flood events occur it is essential to have an emergency plan in place to provide clear procedural instructions. The mobilisation and organisation of the emergency services and supporting agencies, for example the County and District Councils is required to rescue, treat and transport potentially large numbers of casualties. During and after a flood event the role of the local authority includes providing transport for the evacuees and safe rest centres to stay in the event of homes being flooded. Further health and welfare issues are inevitable as a result of a serious flood event.

Table D.2 of PPS25 (Table 6-1) classifies 'More Vulnerable' developments, of those that should be taken into consideration in the event of an emergency are:

- Police Stations;
- Ambulance Stations;
- Fire Stations;
- Command Centres;
- Telecommunications installations required to be operational during flooding; and,
- Emergency dispersal points.

In the event of an emergency and to ensure that those services vital to the rescue operation are not also victims of flooding it is essential that all establishments related to these services are located in the lowest flood risk zones. In addition, future development control polices should seek to locate more vulnerable institutions such as schools and care homes in areas of the lowest risk to minimise the potential for flood casualties.

Allied to this, nominated rest and reception centres should also be identified within the study area and compared with the outputs of this SFRA to ensure that these allocated centres are not at high risk of flooding, so that evacuees will be safe during a flood event. Developments that would be suitable for such uses would include:

- Leisure centres;
- Churches;
- Schools; and
- Community Centres.

Table D.2 of PPS25 (Table 6-1) classifies 'Highly Vulnerable' developments, as those that should be taken into consideration in the event of an emergency. These are:

- Hospitals;
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels;
- Student halls of residence; and,
- Non-residential uses for health service, nurseries and educational establishments.

Situations may arise in an emergency where the occupants of the above institutions cannot be evacuated (such as prisons). Therefore particular significance must be given to these development types when looking to allocate them. These allocations should be assessed against the outputs of the SFRA to develop robust emergency plans.

The findings of this SFRA should be used to inform the development of any new Emergency Plans. In addition future development control polices should seek to locate more vulnerable institutions such as schools and care homes in areas of the lowest risk to minimise the potential for flood casualties.

13 Recommendations

Based on the information presented in this Level 1 SFRA Eastbourne Borough Council & Wealden District Council have sufficient information to apply the Sequential Test to their development sites.

Eastbourne BC & Wealden DC should apply the Sequential Test to determine where various types of development would be appropriate in line with the principles of Planning Policy Statement 25: Development & Flood Risk.

The release of Planning Policy Statement 25 in December 2006 clearly identifies the role Strategic Flood Risk Assessments have in identifying Flood Zones 1 2, 3a and 3b. In addition, it requires that proposed development takes account of the effects of climate change in strategic land allocations.

Using the information presented in the accompanying GIS layers both authorities can broadly identify suitable sites for development. Through discussion with their consultant and the Environment Agency, the LPAs will be able to identify those sites where further investigation of the flood zones is warranted. For example, for a site located adjacent to a watercourse, it would be appropriate to investigate the site and watercourse to determine Flood Zone 3b where this data is not available. Where a site is located on the boundary of Flood Zone 2 and 3 the site should be investigated to establish the effect climate change may have in changing the Flood Zone for the site.

Through application of the Sequential Test, EBC and WDC will be able to identify those sites requiring application of the Exception Test. Once these sites have been identified, EBC and WDC will be required to provide responses to parts ‘a’ and ‘b’ of the Exception Test before part ‘c’ is approached.

The LPAs should seek to incorporate the recommended policies in section 10 into their emerging LDDs to facilitate synergy between national and regional policy and aspirations regarding flood risk;

The LPAs should consider the consequences of including SuDS on development sites and the impact these can have on the developable area. In all cases the LPA should assess allocation sites in relation to geology and local issues to enable completion of the Sustainable Drainage Systems Summary in section Appendix E;

13.1 Further Work

1. The LPAs should apply the Sequential Test to the development site allocations and identify those sites the they consider it will be necessary to apply the Exception Test
2. Following completion of the Sequential Test and parts ‘a’ and ‘b’ of the Exception Test a meeting should be sought with the Environment Agency to confirm their acceptance of the LPAs arguments and justification for progressing with sites requiring the Exception Test. This meeting should also be used to confirm the information the Environment Agency will require to demonstrate a site is safe in line with part ‘c’ of the Exception Test.
3. Once the LPA and EA are in agreement regarding those sites for application of the Exception Test, the LPA’s consultant will confirm the works necessary to demonstrate a site is safe in line with the Exception Test.

As populations grow and the effects of climate change make our weather more unpredictable, flooding will be just one of a number of water related issues that Local Authorities will need to consider in the future. As well as increasing pressure on flood plains, the projected growth in housing stocks and population will have an impact on the availability of water resources, this could be especially

significant in areas of low yield (such as the south east of England) and during the drier summers forecasted due to the effects of climate change. Several key pieces of legislation and planning policy, currently integrated or due to be integrated will have an impact on the management of the water environment now and in the future. For example:

- The Water Framework Directive;
- The Groundwater Daughter Directive;
- The EU Flooding Directive;
- Planning Policy Statement 25: Development & Flood Risk;
- Planning Policy Statement 23: Planning and Pollution Control;
- Planning and Climate Change - Supplement to Planning Policy Statement 1; and,
- BREEAM Guidelines and the Code for Sustainable Homes.

Failure to fully grasp the implications of these documents could result in the Local Authority's best interests being marginalized. Creating a role within the Council to oversee and coordinate the council's interests under these directives and documents will ensure water resource issues are proactively managed, minimizing the impact they could potentially have in achieving growth.

13.2 How and when should the SFRA be updated?

The SFRA should be a living document. New sources of data will become available on a regular basis and as such EBC and WDC should liaise with the Environment Agency and other stakeholders (e.g. Highways Agency, Southern Water etc) to determine a rolling programme for updates that is acceptable to all parties.

The SFRA should also be updated when any new elements arise such as:

- New climate change updates;
- Modelling result updates; and,
- Issue of new guidance documentation (such as the final version of the PPS25 Practice Guide Companion).

13.2.1 EU Flooding Directive

Work on The European Flooding Directive is progressing steadily. The Flooding Directive will create a mandatory statutory framework for flood risk management, requiring Member States to prepare preliminary risk assessments, flood mapping, and the preparation of flood risk management plans. It applies to all types of flooding, although inclusion of sewerage floods will be optional. It is likely that the plans required by the Directive will be developed for the River Basin Districts defined for the Water Framework Directive

Member States will designate competent authorities to implement the Directive; for England, this will be the Environment Agency. Whilst the final requirements of the Flooding Directive are still to be finalised, the Environment Agency hope to achieve the requirements of the Directive through the use of existing published information. This may include reference to use of Strategic Flood Risk Assessments, Catchment Flood Management Plans and/or Strategic Flood Risk mapping projects. In some cases the assessments may require new information to be generated to inform the stages of assessment required by the Directive.

The EU Flooding Directive is due to be integrated into English law by 2009. The preparation or finalisation of Preliminary Risk Assessments, required by the Directive, may form a useful point in time to review the SFRA and assess its contribution to the Flooding Directives requirements or where an update to the SFRA may benefit from new data generated as part of assessments prepared to meet the requirements of the Flooding Directive.

13.3 Level 2 SFRA

From a wider review of the available data, and based on Scott Wilson's experience in producing flood risk assessments and SFRAs, we consider it unlikely that the available data will be sufficient to satisfy part 'c' of the Exception Test. To satisfy part 'c' of the Exception Test the Practice Guide companion to PPS25 requires the following minimum data to be derived for each development site:

- Flood probability
- Flood water depth
- Flood water velocity, and
- Rate of Onset of flooding

This data can only be determined through hydraulic modelling. The current paucity of suitable data from the existing hydraulic models and/or a lack of models for several of the watercourses in the study area will prevent this from being achieved using the existing data set.

Therefore the Level 2 SFRA may require hydraulic modelling for any sites identified as requiring the Exception Test and potentially adjacent to watercourses where there is insufficient data to define all the PPS25 flood zones including the effects of climate change.

13.4 Future Large Scale Flood Alleviation

- Tidal defences will need to be maintained for the next 100 years to abide with the policies of the SMP. The SMP identifies that these defences may need to resort to hard engineering to ensure that the 'hold the line' policy is maintained.
- Any large scale flood alleviation works that are undertaken would need to be assessed to determine what residual risk exists.
- Eastbourne Park Compensatory Flood Storage Scheme is likely to require expansion to attenuate the increase in runoff that is expected to arise as a result of climate change.

14 Reference

Reference 1 : HMSO (June 2004) *'Planning and Compulsory Purchase Act',* The Queens Printer of Acts of Parliament available at http://www.opsi.gov.uk/acts/acts2004/20040005.htm.

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Reference 3 : Non Statutory Wealden Local Plan, Wealden District Council, 2005.

Reference 4 : Eastbourne Local Development Framework, Eastbourne Borough Council, 2007

Reference 5 : HMSO Department for Communities and Local Government (February 2007) *'Development and Flood Risk: A Practise Guide Companion to PPS25 'Living Draft': A Consultation Paper'*, Communities and Local Government Publications: London

Reference 6 : Draft South East Plan, South East England Regional Assembly, 2006

Reference 7 : Environment Agency (Feb 2007) 'Cuckmere and Sussex Havens Catchment Flood Management Plan:, Environment Agency: Worthing

Reference 8 : Sewers for Adoption, 2006, Wrc

Reference 9 : DEFRA (March 2005) 'Making Space for Water,' DEFRA Publications: London. Available at http://www.defra.gov.uk/environ/fcd/policy/strategy.htm.

Reference 10 : DETR (March 2001) 'Regional Planning Guidance for the South East (RPG9)' London: The Stationary Office.

Reference 11 : South East England Regional Assembly (2006) 'Regional Flood Risk Appraisal for the South East Plan', SEERA.

Reference 12 : Eastbourne Borough Council (2006) Eastbourne Park Management Plan (Incorporating Water Level Management Plan (Consultation Draft)

Reference 13 : South Foreland to Beachy Head Shore Line Management Plan (April 2006)

Reference 14 : Beachy Head to Selsey Bill Shore Line Management Plan (January 2005)

Reference 15 : Environment Agency (February 2007) Polegate and Willingdon Levels Strategic Flood Risk Mapping – Draft Final Modelling Report

Reference 16 : Extreme Sea Levels Kent, Sussex, Hampshire and Isle of Wight, December 2004, JBA Consulting.

Reference 17 : The Institute of Civil Engineers (1978) *'Floods and Reservoir Safety',* David Green (Printers) Ltd: Kettering, Northamptonshire, UK.

Reference 18 : Scott Wilson (June 2002) Eastbourne Park - Review of Compensatory Flood Storage Scheme

Reference 19: Environment Agency, (April 2007) The Cuckemere and Pevensey Levels Catchment Abstraction Management Strategy

Reference 20 : HMSO Department for Communities and Local Government (2007) *'Code for Sustainable Homes: Technical Guide',* Communities and Local Government Publications: London.