

# Medway Flood Defence Strategy Strategic Flood Risk Assessment Addendum

Final Report  
February 2011



Prepared for



## Revision Schedule

### Final Report February 2011

Rev	Date	Details	Prepared by	Reviewed by	Approved by
01	May 2010	Draft	<b>Elizabeth Gent</b> Principal Consultant	<b>Peter Mansell</b> Associate	<b>Peter Mansell</b> Associate
02	June 2010	Final Draft	<b>Elizabeth Gent</b> Principal Consultant	<b>Peter Mansell</b> Associate	<b>Peter Mansell</b> Associate
03	August 2010	Final	<b>Elizabeth Gent</b> Principal Consultant	<b>Peter Mansell</b> Associate	<b>Jon Robinson</b> Technical Director
04	November 2010	Final with minor revisions	<b>Tom Edwards</b> Senior Consultant		
05	February 2011	Final with minor revisions	<b>Tom Edwards</b> Senior Consultant	<b>Peter Mansell</b> Associate	<b>Jon Robinson</b> Technical Director

*This document has been prepared in accordance with the scope of Scott Wilson's appointment with its client and is subject to the terms of that appointment. It is addressed to and for the sole and confidential use and reliance of Scott Wilson's client. Scott Wilson accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of the Company Secretary of Scott Wilson Ltd. Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole. The contents of this document do not provide legal or tax advice or opinion.*

© Scott Wilson [Ltd] 2011

**Scott Wilson**  
6-8 Greencoat Place  
London  
SW1P 1PL

Tel 0207 7985000  
Fax 0207 7985001

[www.scottwilson.com](http://www.scottwilson.com)

## Table of Contents

<b>1</b>	<b>Introduction</b> .....	<b>1</b>
	Study Area.....	1
	Previous SFRA.....	1
	Objective .....	2
<b>2</b>	<b>Updated Data Review</b> .....	<b>3</b>
	Topographic Data.....	3
	Flood Zone Maps .....	3
	Flood Defences .....	4
	Hydraulic Modelling .....	4
	Functional Floodplain .....	5
	Tidal Water Levels.....	5
	Climate Change.....	6
	National Flood Risk Assessment (NaFRA).....	7
	National Environment Agency Mapping: Areas Susceptible to Surface Water Flooding.....	7
	Information on Other Sources of Flooding .....	8
<b>3</b>	<b>Policy Summary</b> .....	<b>9</b>
	Planning Policy Statement 25: Development & Flood Risk.....	9
	European Union Floods Directive.....	10
	Floods and Water Management Act 2010.....	10
	North Kent Rivers CFMP .....	11
	Medway Estuary and Swale Shoreline Management Plans .....	12
	Thames Gateway Environmental Standards.....	12
<b>4</b>	<b>Sequential Test considerations</b> .....	<b>15</b>
	What is the PPS25 Sequential Test? .....	15
	Development Vulnerability Classifications.....	16
	Guidance .....	18
	Mapping Reference .....	20
<b>5</b>	<b>Guidance on Applying the PPS25 Exception Test</b> .....	<b>21</b>
	Why is there an Exception Test?.....	21
	What is the Exception Test?.....	21
	SFRA Addendum Guidance .....	21
	Flood Defence Improvements .....	25
<b>6</b>	<b>Site Specific Flood Risk Assessment Guidance</b> .....	<b>27</b>
	When is a Flood Risk Assessment Required? .....	27

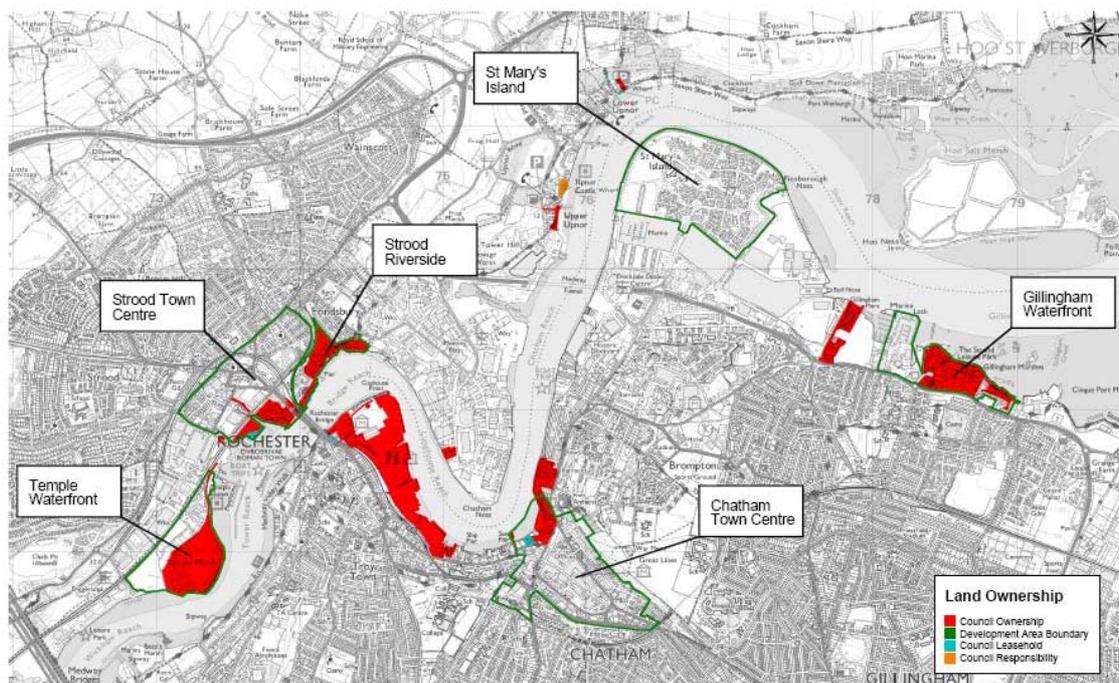
---

	FRA Requirements.....	27
	FRA Guidance.....	28
<b>7</b>	<b>Area Specific Considerations .....</b>	<b>31</b>
	Rochester Riverside .....	31
	Chatham Waterfront.....	32
	Star Hill to Sun Pier .....	33
	Historic Rochester .....	34
	Medway City Estate.....	34
	Brompton, Fort Amherst and The Lines .....	35
	Chatham Historic Dockyard.....	35
	Chatham Maritime and St Mary's Island.....	35
	The Upnors.....	36
	Strood Riverside .....	36
	Strood Centre .....	37
	Strood Waterfront (including Temple Marsh).....	37
	The Esplanade .....	38
	Gillingham Waterfront.....	39
	Chatham Port .....	39
	Chattenden .....	40
<b>8</b>	<b>Flood Defence Standards and Management.....</b>	<b>43</b>
	Flood Defences .....	43
	Flood warning and Flood Watch Areas .....	44
	Flood Mitigation on site .....	45
<b>9</b>	<b>Emergency Planning.....</b>	<b>47</b>
<b>10</b>	<b>Recommendations .....</b>	<b>49</b>
	SFRA Addendum .....	49
	Implications for Policy in Medway .....	49
	Next steps for Medway.....	49

# 1 Introduction

## Study Area

- 1.1 The Strategic Flood Risk Assessment (SFRA) Addendum focuses on the study area of Urban Medway defined as the parts of Medway where the main settlements of Strood, Rochester, Chatham and Gillingham border the River Medway which runs through the centre of the Medway Council area.
- 1.2 The River Medway is 70 miles long with its source in Sussex, it becomes tidal at Allington Lock and discharges into the North Sea at Sheerness. Known as the Lower Medway as it runs past the settlements of Medway Council, the adjacent land is prone to flooding.
- 1.3 Several areas for regeneration have been identified by the Medway Regeneration Framework as being on the Medway frontage and at risk of flooding.



Study area provided by Medway Renaissance as part of the project brief.

## Previous SFRA

- 1.4 A Strategic Flood Risk Assessment (SFRA) was completed for Medway in August 2006<sup>1</sup> by Mott Macdonald consultants. The SFRA included hydraulic modelling of overtopping throughout the study area. This study identified significant sections of existing defences have a lower crest level than that required to maintain a statutory level of flood protection.
- 1.5 Detailed mapping was provided as part of the study which also assessed the flood depth and hazard associated with different flooding scenarios.

<sup>1</sup> Mott MacDonald (2006) 'Medway Strategic Flood Risk Assessment', Mott MacDonald: Cambridge.

- 1.6 The previous SFRA was completed prior to the issue of policy Planning Policy Statement (PPS25; December 2006). Therefore some policy implications need to be updated in this addendum as a result of the updated policy.
- 1.7 In addition following the completion of the previous SFRA, Mott Macdonald has undertaken a revised 2D modelling exercise of the Lower Medway on behalf of the Environment Agency. This study was completed in 2007 and included the updated extreme water level information including climate change increases as set out in PPS25<sup>2</sup>.

## Objective

- 1.8 This SFRA Addendum has been produced to take account of updated hydraulic modelling information and changes in planning policy which have been published since completion of the original SFRA in August 2006.
- 1.9 A High Level Appraisal of potential solutions to manage flood risk in the Urban Medway document has been produced to provide specific guidance for regeneration areas with respect to the Medway Flood Defence Strategy. This SFRA Addendum should be read in conjunction with the original SFRA report and the High Level Appraisal report.

---

<sup>2</sup> Communities and Local Government (2010) *'Planning Policy Statement 25: Development and Flood Risk'*, TSO: London.

## 2 Updated Data Review

2.1 The objective of this SFRA addendum is to update the existing Medway SFRA in relation to new policy and available data and present this in a manner suitable for Medway Council to apply the PPS25<sup>2</sup> Sequential Test within the area. This information should also be used to inform the production of suitable flood risk management policies within the emerging LDF.

2.2 This section presents the updated available data and discusses its benefits and limitations.

### Topographic Data

2.3 The Environment Agency has provided Light Detection and Ranging (LiDAR) data for the study area. LiDAR is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground. The data varies in accuracy depending on the nature of the terrain such as in woodlands, complex urban areas and near lakes, where the accuracy reduces due to the limitations in the technique. However, LiDAR is generally recognised to have a vertical accuracy of +/- 250mm.

2.4 The data set covers the entire study area. The LiDAR data provided is a composite of data flown in 1999, 2001, 2004, 2006, 2007 and 2009. It provides an updated source of digital terrain on which to base the SFRA maps.

2.5 The LiDAR is presented in Figure 1.

2.6 This data is important because an accurate and up to date Digital Terrain Model (DTM) is required in order to produce high-resolution flood risk mapping.

### Flood Zone Maps

2.7 PPS25 requires definition of the following tidal Flood Zones:

**Table 2-2: Tidal Flood Zone Definitions (as defined in PPS25, Table D.1)**

Flood Zone	Definition	Probability of Flooding
Flood Zone 1	Land at risk from flood event less than the 1 in 1000 year event (less than 0.1% annual probability of flooding each year)	Low Probability
Flood Zone 2	Land at risk from flood event between the 1 in 200 and 1 in 1000 year event (between 0.5% and 0.1% annual probability of flooding each year)	Medium Probability
Flood Zone 3a	Land at risk from flood event equal to, or greater than, the 1 in 200 year event (greater than 0.5% annual probability of flooding each year)	High Probability
Flood Zone 3b	Land where water has to flow or be stored in times of flood, or land purposely designed to be flooded in an extreme flood event (0.1% annual probability). The 1 in 20 year annual probability floodplain is the starting point for consideration but local circumstances should be considered and an alternative probability can be agreed between the Local Planning Authority and the Environment Agency	Functional Floodplain

- 2.8 PPS25 Flood Zones subdivide the spatial variation of flood probability from rivers and the sea into 4 zones; the functional floodplain and the High, Medium and Low probability Flood Zones.
- 2.9 The Environment Agency has provided present day Flood Zone extents for Flood Zones 2 and 3 for the River Medway by extrapolating extreme water levels onto a DTM of the study area for the River Medway.
- 2.10 The Flood Map shows the estimated extent of Flood Zones 2 and 3 (ignoring the presence of flood defences) for all main rivers and/or watercourses with identified critical drainage problems and provides a good indication of the areas at risk of tidal flooding in the study area. However, it does not provide detail on individual properties, or information on flood depth, speed or volume of flow. It also does not show flooding from other sources, such as groundwater, direct runoff from fields, or overflowing sewers.
- 2.11 The Environment Agency Flood Zone Mapping is presented in Figure 2.

## Flood Defences

- 2.12 Information on flood defences throughout most of the study area has been provided by the Environment Agency from the National Flood and Coastal Defence Database (NFCDD). The NFCDD provides details of the asset reference, location, type of defence, level of protection provided by the structure, and the geographical extent of the defence or structure. Details of all NFCDD flood defences in the study area are presented as a GIS layer.
- 2.13 NFCDD data is not available for the defences to the east of St Marys Islands (from Finsborough Ness). The crest heights of the defences in this area were obtained from an interrogation of the LIDAR data, site walkover observations and a review of the aerial photography.
- 2.14 The location of the flood defences is presented in Figure 3. This figure also identifies where the defences are considered to be sub-standard. This is discussed later in this document as well as the High Level Appraisal report.

## Hydraulic Modelling

- 2.15 Correspondence with the Environment Agency has confirmed that the 2006 SFRA hydraulic modelling had some uncertainties and has been superseded by the Lower Medway 2D Modelling and Flood Risk Mapping<sup>3</sup> study completed in 2007. This revised model stretched between Allington and the M2 Crossing as well as being revised for Rochester.
- 2.16 The updated hydraulic modelling was 2D and provided both flood depth and velocity information for various return periods. The modelling was based on updated topographic data and updated allowances for climate change that are inline with current guidance PPS25<sup>2</sup>. The updated hydraulic modelling was provided by the Environment Agency to inform the SFRA addendum and Flood Defence Strategy.
- 2.17 Using the 2007 hydraulic modelling, flood zones have been produced for the following scenarios are return periods:
- 5% (1 in 20 year) annual probability tidal event in 2007;

<sup>3</sup> Mott MacDonald (2007) *Lower Medway 2D Modelling & Flood Risk Mapping Phase 5*, Mott MacDonald: Cambridge.

- 0.5% (1 in 200 year) annual probability tidal event in 2007;
  - 0.5% (1 in 200 year) annual probability tidal event in 2060;
  - 0.5% (1 in 200 year) annual probability tidal event in 2110;
  - 0.1% (1 in 1000 year) annual probability tidal event in 2007;
  - 0.1% (1 in 1000 year) annual probability tidal event in 2060; and,
  - 0.1% (1 in 1000 year) annual probability tidal event in 2110.
- 2.18 The modelled flood depth maps are presented in Figures 4, 5 and 6.
- 2.19 Rochester Riverside land raising was not included in the Lower Medway 2D hydraulic model. In agreement with the Environment Agency this model has formed the basis of all mapping deliverables. The Rochester Riverside area has been land-raised to 5.8m AOD but would still be at risk of flooding from the 1 in 200 and 1 in 1000 year events in 2110. Therefore the site should be considered as Flood Zone 2 and 3a with climate change. However the maps cannot be updated to reflect the land raising at this time until the strategic Lower Medway model is revised to include the land raising to ensure any implications of the land raising on the wider flood cell are also taken into consideration.

## Functional Floodplain

- 2.20 PPS25 (annex D table D.1) defines functional floodplain as Flood Zone 3b associated with a 1 in 20 event, where water has to flow or be stored in times of flood.
- 2.21 The PPS25 Practice Guide (December 2009) outlines in section 4.90 that 'Areas which would naturally flood with an exceedence probability of 1 in 20 or greater, but which are prevented from doing so by existing infrastructure or solid buildings, will not normally be defined as functional floodplain.
- 2.22 PPS25 states that functional floodplain should be determined considering the effects of defences and other flood risk management infrastructure. The functional floodplain relates only to river and coastal flooding, it does not include areas at risk of flooding solely from other sources of flooding (e.g., surface water, sewers).
- 2.23 Functional floodplain is only mapped for present day conditions (2010) in this document and has not been mapped under climate change considerations for 2060 or 2110 flood zones.
- 2.24 It should be noted that the functional floodplain outlined in Figure 4 of the SFRA Addendum shows an area of functional floodplain at Rochester Riverside. Figure 4 is based on the Lower Medway 2D model which did not take the recent land raising at Rochester Riverside into account. This site has been raised to 5.8m AOD therefore the functional floodplain identified on this site is no longer anticipated on this site.

## Tidal Water Levels

- 2.25 The extreme water levels used in this modelling were extracted from the JBA (2004) Extreme Sea Level Report<sup>4</sup> at Sheerness.

<sup>4</sup> JBA Consulting (2004) 'Extreme Sea Levels Kent, Sussex, Hampshire & Isle of Wight: Updated Summary Report', The Environment Agency: Worthing.

- 2.25.1 The boundary files for this modelling were not supplied but the maximum flood levels for the Medway Estuary were extracted from the results files. It was found that the flood levels vary by approximately 0.07m within the study area with the lowest at Upper Upnor and the highest at Temple Waterfront. The calibration that was undertaken as part of this study found that the modelled climate change scenarios and the January 1978 flood event had a difference of 0.08m. Therefore, given the margin of error likely in the model it was deemed that the highest flood level is the most sensible flood level to use throughout the estuary.
- 2.25.2 Table 2-1 presents the modelled maximum flood levels in the Medway Estuary (at Temple Waterfront).

**Table 2-1: Modelled flood levels for the Medway Estuary from Medway Model 2007**

Annual Probability (Return Period)	Modelled Maximum Flood Levels (at Temple Waterfront)
5% (1 in 20 year) in the present day (2007)	4.54
0.5% (1 in 200 year) in the present day (2007)	4.94
0.5% (1 in 200 year) in 2060	5.47
0.5% (1 in 200 year) in 2110	6.17
0.1% (1 in 1000 year) in the present day (2007)	5.33
0.1% (1 in 1000 year) in 2060	5.80
0.1% (1 in 1000 year) in 2110	6.44

## Climate Change

- 2.26 PPS25 states that Flood Zones should also be defined considering the effects of climate change. When mapping climate change Flood Zones for tidal systems, PPS25 requires that sea level rise is applied up to 2115 along the East coast of England as shown in Table 6-3.
- 2.27 An allowance of 100 years is recommended in PPS25 for climate change considerations for residential development. The allowance required for commercial development is more flexible, and is typically a minimum of 60 years but it can be decided upon a site by site basis.

**Table 2-3 Recommended contingency allowances for net sea level rise (from PPS25 Table B.1).**

Administrative Region	Net Sea Level Rise (mm/yr) Relative to 1990			
	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
East of England, East Midlands, London, SE England (south of Flamborough Head)	4.0	8.5	12.0	15.0

2.35 The Medway Model 2007 is compliant to the PPS25 climate change contingency. It should be noted that the recommended climate change allowances are due to be updated following UK Climate Projections 2009 (UKCP09)<sup>5</sup> however these are unlikely to have a significant impact on predicted flood levels.

## National Flood Risk Assessment (NaFRA)

2.36 The Environment Agency has included NaFRA mapping on their website which takes into account the presence of flood defences. It does not presently affect how Local Authorities apply the Sequential Test, which should be based on the Flood Zone map.

2.37 NaFRA maps the likelihood of flooding and assigns three classifications:

- Significant (red) - greater than 1.3% (1 in 75 year) annual probability;
- Moderate (orange) – 1.3% (1 in 75 year) or less, but greater than 0.5% (1 in 200 year) annual probability; and,
- Low (blue) – less than 0.5% (1 in 200 year) annual probability.
- The NaFRA mapping is presented in Figure 7.

## National Environment Agency Mapping: Areas Susceptible to Surface Water Flooding

2.38 Following the Summer 2007 flood events, the Environment Agency has undertaken broad scale surface water mapping in order to provide an initial indication of areas susceptible to surface water flooding. The mapping for Medway has been supplied by the Environment Agency and is shown in Figure 8.

2.39 The map has been produced using a simplified method that excludes urban sewerage and drainage systems, excludes buildings, and uses a single rainfall event. The mapping is primarily intended for use by Local Resilience Forums (LRFs) and to inform emergency planning, but has recently been released for use in SFRAs to inform the most strategic levels of land use planning. It is not intended for use in allocating individual sites or determining individual planning applications. This mapping has the following limitations:

- The mapping does not show the interface between the surface water network, the sewer systems and the water courses;
- It does not show the susceptibility of individual properties to surface water flooding;

<sup>5</sup> Defra (2009) 'UK Climate Projections', available at <http://ukcp09.defra.gov.uk/> accessed 05<sup>th</sup> May 2010.

- The mapping has significant limitations for use in flat catchments, which is important in the Medway.
- 2.40 In the light of these limitations, it is recommended that the mapping be used only as an initial review of surface water flooding in order to identify areas requiring further investigation.

## Information on Other Sources of Flooding

- 2.41 Medway Council have confirmed that there is no change in the status or additional data on other sources of flooding from the August 2006 SFRA. The 2006 SFRA includes information on historic flooding records, surface water flooding and infrastructure such as drainage systems.
- 2.42 Since completion of the SFRA in 2006 the 'Areas Susceptible to Surface Water Flooding' maps from the Environment Agency have been produced, as outlined in the above section, which are presented in this SFRA Addendum.
- 2.43 Medway Council has also confirmed they have not yet started their Surface Water Management Plan (SWMP). A Preliminary Flood Risk Assessment (PFRA) identifying risk areas from other sources of flooding is required for completion by Medway Council by March 2011 in accordance with the Flood and Water Management Act 2010.
- 2.44 Following completion of Medway's PFRA and SWMP, these documents should be used to provide additional detail on the issues associated with other sources of flooding. It is likely the PFRA and SWMP will update and supersede the information relating to other sources of flooding contained within the August 2006 SFRA.

### 3 Policy Summary

3.1 The main change in policy since completion of the previous SFRA is that Planning Policy Guidance Note 25 was superseded in December 2006 by Planning Policy Statement 25 (PPS25). Significant changes were introduced into the management of flood risk through spatial planning through PPS25. The main changes included:

- Introduction of a Sequential Test to support Core Strategy documents as part of the Local Development Framework evidence base;
- Introduction of vulnerability classifications and guidance on suitable flood zones for each classification;
- Introduction of an Exception Test
- Climate change guidance for extreme water levels, with a consideration of a 100 year time horizon for residential development.

3.2 This chapter provides a summary of relevant policies (since completion of the previous SFRA in November 2006) that provide direction and guidance with respect to flood risk. The information presented in the SFRA should be used by Medway Council to establish robust policies in relation to flood risk as part of their emerging Local Development Framework (LDF).

#### Planning Policy Statement 25: Development & Flood Risk

3.3 Planning Policy Statement 25 requires that local planning authorities achieve the following when preparing the local development framework:

- Set out policies that seek to avoid flood risk wherever possible and manage it elsewhere;
- Seek opportunities to relocate particularly vulnerable developments to locations at less risk of flooding, taking into account the impacts of climate change;
- Safeguard land from development that is required for current and future flood management.
- Allocate all proposed development sites in accordance with the 'Sequential Test', reduce the flood risk and ensure that the vulnerability classification of the proposed development is appropriate to the Flood Zone classification;
- Require site-specific Flood Risk Assessments to be submitted for all developments within Flood Zones 2 and 3 or over 1 hectare in size in Flood Zone 1 and for 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;
- Flood Risk to development should be assessed for all forms of flooding;
- 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.

3.4 PPS25 aims to ensure that flood risk is taken into account at all stages in the planning process from the inception of regional and local policy through to individual development control decisions.

## European Union Floods Directive

- 3.5 The European Directive on the Assessment and Management of Flood Risks came into force on the 26th November 2007. The Directive requires Member States and the community to consider the potential impacts that domestic policies may have on flood risk and the management of flood risk on neighbouring member states. It recognises that objectives regarding management of flood risk should be determined by the Member States themselves and should be based on local and regional circumstances.
- 3.6 Member States have two years to transpose the Directive into domestic law and a further six years to satisfy its requirements. The Directive requires Member States to designate competent authorities to implement the Directive; for England, this will be the Environment Agency. The Directive requires the following elements to be undertaken:
- preliminary flood risk assessments to identify areas that are at potentially significant flood risk, to be completed by 20 December 2011;
  - flood hazard maps (showing the likelihood and flow of the potential flooding) and flood risk maps (showing the impact), to be completed by 20 December 2013;
  - flood risk management plans (showing measures to decrease the likelihood or impact of flooding), to be completed by 22 December 2015; and
  - updates every 6 years thereafter that take into account the impact of climate change.

## Floods and Water Management Act 2010

- 3.7 The Floods and Water Management Act was granted Royal Assent on 8th April 2010. The Act will implement several key recommendations of Sir Michael Pitt's Review of the Summer 2007 floods, protect water supplies to consumers and protect community groups from excessive charges for surface water drainage.
- 3.8 The Act introduced new roles for the EA and Lead Local Flood Authorities (unitary or county local authorities). The Environment Agency is responsible for producing preliminary assessment reports for flooding from main rivers and the sea. Lead Local Flood Authorities (LLFA) are responsible for producing preliminary assessment reports for flooding from ordinary watercourses, ground water and surface water, which are due by February 2011. The preliminary assessment reports along with preliminary assessment maps (which will be provided by the EA) are the two elements which make up the Preliminary Flood Risk Assessment.
- 3.9 The EA is the coordinating body for implementation of the flood regulations and has two distinct roles as part of this 1) Support LLFA with national guidance and date and local advice for assessments, maps and plans. 2) Review LLFA assessments, maps and plans, collate and publish them.
- 3.10 The Act's provisions include:
- New statutory responsibilities for managing flood risk – There will be national strategies and guidance on managing flood risk in England and Wales. Unitary and county councils (LLFA)

will bring together the relevant bodies, who will have a duty to cooperate, to develop local strategies for managing local flood risk.

- Protection of assets which help manage flood risk – The Environment Agency, local authorities and internal drainage boards will be able to ensure that private assets which help manage the risks of floods cannot be altered without consent. For example, putting a gate in a wall that is helping protect an area could increase the risk of flooding.
  - Powers to carry out environmental works – the Environment Agency, local authorities and internal drainage boards will be able to manage water levels to deliver leisure, habitat and other environmental benefits.
  - Sustainable drainage – drainage systems for all new developments will need to be in line with new National Standards to help manage and reduce the flow of surface water into the sewerage system.
  - New sewer standards – all sewers will be built to agreed standards in future so that they are adopted and maintained by the relevant sewerage company.
  - Reservoir safety – the public will be protected by a new risk-based regime for reservoir safety. It will reduce the burden on regulated reservoirs where people are not at risk, but introduce regulation for some potentially risky reservoirs currently outside of the system.
  - Water company charges – there will be protection against unaffordable charges for surface water drainage for community groups such as churches, scouts and others. Future water company charges can include social tariffs for those who would otherwise face difficulty meeting their bills.
  - Protection of water supplies – there will be wider powers for water companies to control non-essential domestic uses of water in times of drought.
  - Other protection for water company customers – there will be new powers to reduce the level of bad debt, new arrangements for managing very risky infrastructure projects which could be a threat to the ability of the water company to provide its services, and updated arrangements for administration of water companies should they get into difficulties.
- 3.11 Medway Council should review the details associated with the Flood and Water Management Act and ensure sufficient detail regarding SuDS, surface water management and strategic flood risk management is included in their Core Strategy Policies.

## North Kent Rivers CFMP

- 3.12 The study area is contained within the North Kent Rivers Catchment Flood Management Plan (CFMP). Although this largely relates to the fluvial upper reaches of the Medway some of the proposed policies are relevant to the study area.
- 3.13 The catchment area is split in two by the North Downs which run east to west and separate the high ground from the lower reaches of the River Darent and River Medway. A total of 100-500 properties are at risk on the Medway Tributaries from fluvial flooding.
- 3.14 The policy for this area outlined in the CFMP is detailed as follows: Policy 4: Areas of low, moderate or high flood risk, where the Environment Agency are effectively managing flood risk but further actions may be required to keep pace with climate change. This policy will tend to be applied where the risks are currently deemed to be appropriately-managed, but where the risk of flooding is expected to significantly rise in the future. In this case the Environment

Agency would need to do more in the future to contain what would otherwise be increasing risk. Taking further action to reduce risk will require further appraisal to assess whether there are socially and environmentally sustainable, technically viable and economically justified options.

## Medway Estuary and Swale Shoreline Management Plans

- 3.15 The study area is included in the Medway Estuary and Swale Shoreline Management Plan (2007). The SMP highlights the implications of climate change on the existing coastline including coastal defences as a result of sea level rise. The study area for this SFRA addendum is split into south and north banks, with the north bank of the Medway divided into two main policy units; E5- Hoo Marina to Lower Upnor and E6- Lower Upnor to Medway Bridge. The south bank is separated into two policy units E12-Medway Bridge to West St Marys Island and E13- St Marys Island to the Strand.
- 3.16 Policies outlined for each of the policy units are outlined from the SMP as follows:
- E5- Hoo Marina to Lower Upnor: This coastline unit is currently un-managed, therefore the SMP proposes a long term plan of 'No Active Intervention' to maintain landscape value of the frontage by allowing continued natural erosion and rollback of the shoreline. It is considered unsustainable and uneconomic to protect the heritage feature in the long term. Sea level rise will eventually threaten the Saxon Shore coastal footpath. However, there is an alternative route to the Saxon Shore Way that extends inland along this frontage.
  - E6- Lower Upnor to Medway Bridge: This coastline unit includes a dense urban area extending onto the shore, and covers the residential areas of Lower Upnor, Frindsbury and Strood, the commercial and industrial are of the Medway City Estate and regionally important strategic links. The long term plan is to **Hold the Line** to ensure continued protection to property and infrastructure from flooding and erosion.
  - E12 Medway Bridge to West St Mary's Island: This unit is dominated by the dense urban areas of Rochester and Chatham that extend onto the shore. The frontage is of considerable commercial importance (e.g. Medway Port and the potential Thames Gateway regeneration area at Rochester Riverside) and is of significant international heritage importance attracting large visitor numbers (e.g. Chatham Historic Dockyard). The long-term plan is to **Hold the Line**. This will continue to protect urban communities and heritage assets from flooding and erosion.
  - E13 St Mary's Island to The Strand: This unit is dominated by the expanding residential area of St Mary's Island and the residential, commercial and recreational areas at Gillingham. The narrow intertidal mudflats along the eastern shoreline of St Mary's Island are nationally designated, whilst the intertidal mudflat and salt-marshes along The Strand are internationally designated. The long term plan is to **Hold the Line** to continue protection of these developments from flooding and erosion.

## Thames Gateway Environmental Standards

- 3.17 The Environment Agency has established a common set of environmental standards relating to strategic development across the Thames Gateway (February 2010). The standards address aspects of strategic development including a section on considerations of flood risk.
- 3.18 The Flood Risk Section outlines 'To manage and reduce flood risk, the Environment Agency need to understand the nature, likelihood and consequences of flooding. There are flood risk

management strategies that propose options to manage flood risk at a strategic scale. Development should help to implement these strategies and manage and reduce flood risk.'

3.19 The following actions are identified in the 'Flood Risk' section of the standards:

- **FRM1- Assess the risk from all forms of flooding** – all decisions about development should be supported by an appropriate flood risk assessment
- **FRM2- Avoid flood risk by directing development to sites at the lowest probability of flooding-** through demonstration of the Sequential and Exception Test process
- **FRM3- Design and construct developments that keep people safe-** This may be achieved through a combination of measures including the following:
  - flood risk management to an agreed target level, which may include flood defences;
  - placing the most vulnerable uses in the lowest risk locations (sequential approach);
  - safe access and exit routes from the development;
  - safe access to upper floors; and
  - designing and constructing buildings to remain structurally sound and for utilities to remain operational during flooding.
- **FRM4- Ensure essential infrastructure is resistant and resilient to flooding** – Essential infrastructure must remain operational in times of flood, both now and in the future, taking into account climate change. All new essential infrastructure should be located in the flood risk zone which is appropriate to its vulnerability. If it is unable to operate effectively in this location, it should then:
  - be located in the lowest risk alternative location;
  - demonstrate that the wider sustainability benefits outweigh flood risk;
  - be on previously developed land where available; and
  - demonstrate that it will be safe and not increase flood risk elsewhere.
- **FRM5- Construct developments that are resilient to flooding-** It is not possible to remove the risk of flooding entirely. To minimise disruption and the cost of flooding, the remaining risk needs to be managed and development designed to be brought back into use as soon, easily and economically as possible. Developments should be designed and constructed to be easily renovated after flooding. Building materials and utilities should not need replacing. Developers may also wish to incorporate flood resistance measures to minimise the damage from flooding.
- **FRM6- Manage Surface Water Appropriately-** A Surface Water Management Plan should be prepared and implemented. It should identify the likelihood and extent of surface water flooding and the measures needed to manage this risk. Developments should prepare a surface water management strategy to minimise surface water flood risk from on and off site sources and not increase surface water flooding elsewhere. They should utilise the best practicable environmental option, with a presumption for Sustainable Drainage Systems (SUDS), with the ambition of achieving Greenfield run off rates from their site.
- **FRM7- Provide and maintain flood risk management measures-** Flood risk management measures are in place to protect development from flooding. It is essential that flood risk management infrastructure is properly maintained, improved and replaced both now and in the future. It is also necessary for land to be

safeguarded for future flood risk management purposes. Spatial strategies should demonstrate that they have safeguarded land identified for flood risk management purposes and protected access to flood risk management infrastructure.

- 3.20 Flood Risk case studies are included in the Standards documents for reference (pages 89-93) which provide examples of how flood risk has been approached for different projects. A list of supporting documents for further reference is given on pages 124-125.

## 4 Sequential Test considerations

### What is the PPS25 Sequential Test?

- 4.1 The PPS25 Sequential Test is a process by which the precautionary principle is applied to the strategic land allocation process, in order to guide development towards areas that have the lowest possible risk of flooding.
- 4.2 The overall aim of the Sequential Test aims is to steer new development to areas of low flood risk, ideally to Flood Zone 1. However where there are no reasonably available sites within Flood Zone 1, sites within Flood Zone 2 can then be considered, and Flood Zone 3 can subsequently be considered if no reasonably available sites are identified within Flood Zone 2. Further guidance on the Sequential Test is contained in PPS25 Appendix D, and Chapter 4 of the PPS25 Practice Guide.
- 4.3 PPS25 requires local planning authorities to review flood risk across their districts, steering all development towards areas of lowest risk. Development is only permissible in areas at risk of flooding in exceptional circumstances where it can be demonstrated that there are no reasonably available sites in areas of lower risk, and the benefits of that development outweigh the risks from flooding. Such development is required to include mitigation/management measures to minimise risk to life and property should flooding occur, and wherever possible identify opportunities to reduce the overall flood risk posed to the local community.
- 4.4 A Level 1 SFRA is designed to be sufficiently detailed to allow the application of the Sequential Test to the Core Strategy Document, on the basis of PPS25 Table D.2 and D.3 (reproduced as Tables 4-1 and 4-2) and Figure 4.1 of the PPS25 Practice Guide.
- 4.5 Medway Council have completed several evidence base documents supporting their site allocation process, which has been undertaken with regular consultation with the Environment Agency. These studies and decisions should help to inform the Sequential Test process needed to support the Core Strategy.
- 4.6 PPS25 acknowledges that some areas will (also) be at risk of flooding from sources other than tidal and fluvial. Consequently all sources of flooding must be considered when looking to locate new development. The other sources of flooding requiring consideration when siting new development allocations include:
- Surface Water / Overland Flow;
  - Groundwater;
  - Sewers; and
  - Artificial Sources.
- 4.7 These sources are typically less well understood than tidal and fluvial sources and as a result, data only exists as point source data or through interpretation of local conditions. In addition, there is conflicting guidance on suitable return periods to associate with floods arising from these sources. For example, modern surface water drainage systems are constructed to a 1 in 30-year standard. Any rainfall event in excess of the 30-year return period would be expected to result in some flooding through insufficient capacities. Consequently when assessing these sources through the Sequential Test, where a location is recorded as having experienced

repeated flooding from the same source this should be investigated further in a site-specific Flood Risk Assessment (FRA).

## Development Vulnerability Classifications

4.8 Planning Policy Statement 25 classifies developments according to their vulnerability. Five vulnerability classifications are defined, these are:

- Essential Infrastructure;
- Highly Vulnerable;
- More Vulnerable;
- Less Vulnerable, and
- Water Compatible.

4.9 Table 4-1 shows the types of development that fall under these different classifications.

**Table 4-1: PPS25 Table D2 Flood Risk Vulnerability Classification (DCLG, 2009)**

Vulnerability Classification	Development Uses
Essential Infrastructure	<ul style="list-style-type: none"> <li>• Essential transport infrastructure (including mass evacuation routes), which has to cross the area at risk,</li> <li>• Essential utility infrastructure which has to be located in a flood risk area for critical operational reasons, including electricity generating power stations and grid and primary substations; water treatment plants; and sewage treatment plants if adequate measures to control pollution and manage sewage during flooding events are in place.</li> <li>• Wind turbines.</li> </ul>
Highly Vulnerable	<ul style="list-style-type: none"> <li>• Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required to be operational during flooding.</li> <li>• Emergency dispersal points.</li> <li>• Basement dwellings.</li> <li>• Caravans, mobile homes and park homes intended for permanent residential use.</li> <li>• Installations requiring hazardous substances consent.<sup>6</sup> (Where there is demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure'.</li> </ul>
More Vulnerable	<ul style="list-style-type: none"> <li>• Hospitals.</li> <li>• Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.</li> <li>• Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels.</li> <li>• Non-residential uses for health services, nurseries and educational establishments.</li> <li>• Landfill and sites used for waste management facilities for hazardous waste.</li> <li>• Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.</li> </ul>
Less Vulnerable	<ul style="list-style-type: none"> <li>• Police, ambulance and fire stations which are <u>not</u> required to be operational during flooding</li> <li>• Buildings used for: shops; financial, professional and other services; restaurants and</li> </ul>

<sup>6</sup> DETR Circular 04/00, paragraph 18: *Planning controls for hazardous substances*. See [www.communities.gov.uk/index.asp?id=1144377](http://www.communities.gov.uk/index.asp?id=1144377)

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.

Water-Compatible Development	<ul style="list-style-type: none"> <li>• Flood control infrastructure.</li> <li>• Water transmission infrastructure and pumping stations.</li> <li>• Sewage transmission infrastructure and pumping stations.</li> <li>• Sand and gravel workings.</li> <li>• Docks, marinas and wharves.</li> <li>• Navigation facilities.</li> <li>• MOD defence installations.</li> <li>• Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.</li> <li>• Water-based recreation (excluding sleeping accommodation).</li> <li>• Lifeguard and coastguard stations.</li> <li>• Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.</li> <li>• Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.</li> </ul>
------------------------------	---

4.16 PPS25 also stipulates where the differing types of vulnerable development may be appropriate based on flood risk. This is presented in Table D.3 of PPS25, which is reproduced below.

**Table 4-2: PPS25 Table D3 Flood Risk Vulnerability and Flood Zone 'Compatibility' (DCLG, 2006)**

Flood Risk Vulnerability Classification (Table D.2 PPS25)		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
FLOOD ZONE	1	✓	✓	✓	✓	✓
	2	✓	✓	Exception Test required	✓	✓
	3A	Exception Test required	✓	X	Exception Test required	✓
	3B	Exception Test required	✓	X	X	X

✓ – Development is appropriate      ✗ – Development should not be permitted

4.17 Using the information documented and mapped within this Level 1 SFRA, the Sequential Test should be undertaken for development within Medway Councils area. This process should be accurately documented to ensure decisions can be transparently communicated and reviewed where necessary.

4.18 The Sequential Test should be carried out on all development sites and seek to guide development to the lowest flood risk areas. Only where there are no reasonably available alternative sites to accommodate the development should sites in Flood Zones 2 or 3 be considered.

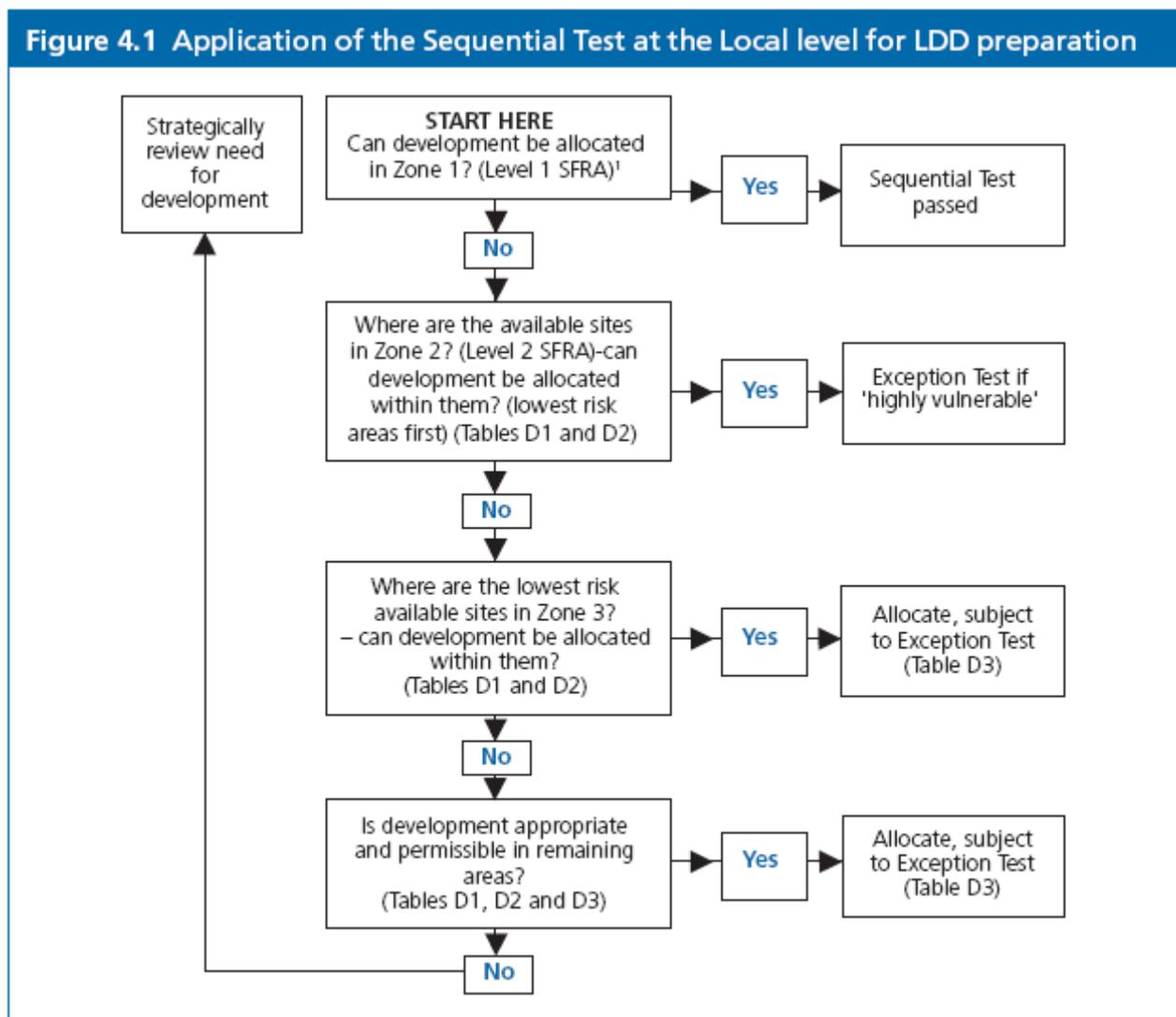
4.19 The Level 1 SFRA mapping provides the tools for the Sequential Test to be undertaken. This is achieved by presenting information to identify the variation in flood risk across the

administrative area and allowing an area-wide comparison of future development sites with respect to flood risk considerations.

## Guidance

4.20 The following flow diagram (Figure 4-1) is taken from the PPS25 Practice Guide and illustrates how the Sequential Test should be undertaken. The full process is described in Chapter 4 of the PPS25 Practice Guide (2009).

**Figure 4-1: Application of the Sequential Test (from Figure 4.1 of PPS25 Development and Flood Risk Practice Guide, 2009)**



**Note**

1 Other sources of flooding need to be considered in Flood Zone 1

## Additional Guidance

- 4.21 The sequence of steps presented below, coupled with Figure 4-1, provides a guide for the application of the Sequential Test and, where necessary, that the requirement for the application of the Exception Test is clearly identified.
- 4.22 Recommended stages for application of the Sequential Test:
1. The developments (i.e. housing, hospitals, industrial etc) that need to be accommodated 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 and the Flood Zones presented in this SFRA Addendum. 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 should be located in those sites 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 but will be subject to the Exception Test. According to PPS25 'highly vulnerable' uses would not be permitted in Flood Zone 3.
  4. Once all 'highly vulnerable' developments have been allocated to a development site, the council can consider 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 but will require the application of the Exception Test. When allocating in Flood Zone 3a the hazard rating of the site, as defined in the Level 2 SFRA, must also be considered with development being preferentially steered to those sites of least hazard. Evidence to support parts 'a' and 'b' of the Exception Test should be established before 'part c' is tackled. 'More vulnerable' developments are not permitted in Flood Zone 3b.
  5. Once all 'more vulnerable' developments have been allocated to a development site, the council can consider those development types defined as 'less vulnerable' which can be located in any remaining unallocated sites in Flood Zones 1, 2 or 3a. Again, sites with the highest hazard rating should be avoided wherever possible. 'Less vulnerable' development types are not permitted in Flood Zone 3b.
  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 subject to the Exception Test being passed. Where these types of developments are required in Flood Zones 3a or 3b, evidence to support parts 'a' and 'b' of the Exception Test should be established before part 'c' is tackled.
  7. Water compatible development typically has the least flood risk constraints and it is therefore recommended to consider these types of development last when allocating development sites.

8. For decisions made through stages 4 to 7 it will also be necessary to consider the risks posed to the site from other flood sources.

## Mapping Reference

- 4.23 PPS25<sup>2</sup> outlines that the Sequential Test should be completed using present day flood zones. These are outlined for the Medway area in Figure 2 which were provided by the Environment Agency and should be used as the initial basis for the Sequential Test. However consideration should be made of Figures 4, 5 and to 6 which represent the flood zones from the hydraulic modelling including an assessment of overtopping outlines for the 5% (1 in 20 year), 1% (1 in 100) and 0.1% (1 in 1000 year) annual probability tidal events.

## 5 Guidance on Applying the PPS25 Exception Test

### Why is there an Exception Test?

- 5.1 The aim of the Sequential Test is to steer all development towards areas of lowest risk. However, PPS25 recognises that in some exceptional circumstances, it may not be possible to locate development in areas of low or appropriate flood risk with respect to the vulnerability classification of the development. Where the Sequential Test has been carried out and it is shown that there are no reasonably available sites in lower flood risk areas, the Exception Test will then be required in some circumstances.
- 5.2 Through the application of the Exception Test any additional wider sustainability benefits resulting from development can be taken into account in order to demonstrate that the benefits for development of a site outweigh the flood risks to the development and its occupants.

### What is the Exception Test?

- 5.3 The Exception Test is a series of three criteria as shown below, all of which must be satisfied for development in a flood risk area to be considered acceptable. For the Exception Test to be passed:
- a) It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA. For this criteria to be passed, the site/broad area must be shown to positively contribute to the aims and objectives of the Sustainability Appraisal. Where this is not the case, it must be considered whether the use of planning conditions or S106 agreements could make it do so. If neither of these are possible, the site is not deemed to pass part 'a' and the allocation should be refused;
  - b) The development should be on developable previously developed land or, if not, it must be demonstrated there is no such alternative land available; and
  - c) A Flood Risk Assessment (FRA) must demonstrate that the development will be safe, without increasing flood risk elsewhere, and, where possible, reducing flood risk overall. At the level of strategic planning the SFRA must be used in order to assess the potential feasibility of providing flood risk management measures for site allocations/broad development locations.
- 5.4 All three parts of this test must be satisfied in order for the development to be considered appropriate in terms of flood risk. There must be robust evidence in support of every part of the test.

### SFRA Addendum Guidance

- 5.5 Further detail regarding flood depth and hazard help to inform part c) of the Exception Test. Figures 10, 11, 12, 13, 14 and 15 provide a useful guide to the flood depths and hazard across the Medway area so can be used to inform strategic sites for mitigation, and their potential ability to pass the Exception Test.
- 5.6 Proposed development requiring the Exception Test should use the councils Sustainability Assessment criteria to demonstrate part a) of the test. It is likely most sites will be on brownfield sites and are therefore likely to be able to demonstrate part b) of the Exception Test.

- Therefore consideration needs to be made as early in the planning process as possible regarding the sites ability to pass part c) of the Exception Test.
- 5.7 Part c) of the Exception Test should look at the following to demonstrate 'safe' with respect to the proposed development:
- Consideration of flood defences (including any proposed defence improvements);
  - Depth of flooding
  - Rate of inundation
  - Access and Egress
  - Site mitigation to manage and reduce flood risk where possible
  - Flood warning and evacuation procedures
- 5.8 The flood hazard and depth figures included in this report should be used by a developer to inform part c) of the Exception Test. At the time of writing this addendum there was no strategic preferred option for improving flood defences in the study area. If a strategic defence option is agreed and put in place this should be used to support part c) of the Exception Test with respect to the risk of flooding.
- 5.9 Additional consideration of emergency planning measures will be required to demonstrate that the development will be 'safe'. The Council's emergency plan should be used to inform and support access and egress arrangements from proposed developments.
- 5.10 A site specific Flood Risk Assessment should be used to look at the specific flood issues for each site with respect to part c) of the Exception Test.
- 5.11 Chapter 7 of this report looks at each of the development areas identified in the August 2006 SFRA and identifies potential policy implications in relation to PPS25 and the ability to pass part c) of the Exception Test, as well as mitigation considerations. This section should be used in conjunction with the previous SFRA to provide guidance for each development area.

## Safe Development

- 5.12 For developments proposed in areas at risk of flooding, the following items should be addressed as part of a FRA in order to demonstrate that proposed developments are 'safe' in line with PPS25.
- 5.13 It should be noted that the specific definition of a 'safe' development will vary for each individual site, based on location and development vulnerability. It is therefore recommended that developers consult the Environment Agency on a site by site basis to establish an appropriate definition of 'safe' development for specific sites. The text highlighted in bold in the following sections has been outlined in discussions with the Environment Agency as a minimum requirement for residential development in the floodplain although these should be confirmed as part of a site specific FRA for each site.

## Access and Egress

- 5.14 PPS25 requires that safe access and egress is provided to enable the evacuation of people from the development, at or above the 1 in 100 year (1%) fluvial and the 1 in 200 year (0.5%)

- tidal flood event up to the 1 in 1000 year (0.1%) flood event, in order to provide emergency services with access during a flood event and enable flood defence authorities to carry out their duties during periods of flood.
- 5.15 Wherever possible, access routes should be provided located above the design flood levels (see above). Where this is not possible limited depths of flooding may be appropriate, provided that the proposed access is designed with appropriate signage and other measures to make it safe. The acceptability of the proposed access should be assessed using Table 13.1 of Defra Research document FD2320/TR2: FRA Guidance for New Developments which takes into account the flood depth, velocity and risk of debris within the water. The access/egress route must fall within the “white cells” of this document.
- 5.16 As detailed in the PPS25 Practice Guide paragraphs 4.62 and 4.64, developers should ensure that appropriate evacuation and flood response plans are in place to manage the risk of flooding. These will need to be agreed with the Local Planning Authority and agreement is likely to be based upon guidance from the emergency services.
- 5.17 When assessing the suitability of potential access routes, the following should also be considered:
- The vulnerability and mobility of those in danger of flooding; development for highly vulnerable users e.g. disabled or the elderly, should be located away from high-risk areas. Whilst the Sequential Test accounts for the vulnerability of the intended use of the development, no specific consideration is made for the vulnerability of the end users of the site. A proposed residential development for highly vulnerable end users (elderly, physically impaired etc) will still fall under the ‘More Vulnerable’ classification in Table D.2 of PPS25 and the Sequential and Exception Tests will apply accordingly. Where development for highly vulnerable end users cannot be avoided, safe and easy evacuation routes are essential.
  - The time to peak inundation mapping relates to the amount of time it takes for a flood event to reach its maximum level, flow or height. Flood events with a very short time to peak provide very little time and opportunity for evacuation. As the main flooding mechanism in this area is currently overtopping due to the inadequate standard of flood defence, typically the areas immediately adjacent to the defences will have a shorter time to peak than areas set back from the flood defence.
- 5.18 Time to inundation mapping could not be produced as part of the SFRA Addendum as the modelling files were not made available for this study. However to ensure the rate of inundation is taken into consideration for part c) of the Exception Test a request should be submitted through the Environment Agency External Relations team for this information from the Lower Medway 2D model who will respond within 10 working days. Their contact details are:
- External Relations Team,  
Environment Agency,  
Kent Area Office,  
Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH  
sokes@environment-agency.gov.uk
- 5.19 Due to the low lying topography and prominence of the River Medway floodplain on the study area it may not be possible for all developments to be proposed in areas where both safe access and egress can be guaranteed during a flood. This is likely to be the case in parts of

Strood Town Centre. In this situation, the potential implications for development should be considered by assessing the following:

- Probability of flooding;
- Expected flood hazard;
- Likelihood of occupancy during flooding, based on the proposed use;
- Acceptability of disruption based on the proposed use;
- Availability of safe refuge;
- Potential for the provision of key services (e.g. water, electricity, telecommunications); and,
- Expected duration of inundation.

**5.20 Safe access/egress should ideally be lowest hazard associated with FD2320. Dry Refuge must be provided for any residential development proposed in the floodplain when safe access/egress is not achievable.**

5.21 The findings presented within this SFRA addendum and the High Level Appraisal report should, where appropriate, be used to assess proposed access routes with respect to the criteria listed above.

### Finished Floor Levels

5.22 Where development in flood risk areas is unavoidable the most common method of mitigating flood risk to people is to ensure habitable floor levels are raised above the maximum flood water level with an allowance of 300mm freeboard. This can substantially reduce the damage to property and risk of injury and fatalities.

5.23 In areas of minimal floodwater depth, raising finished floor levels may be included into the building design. Where the floodwater depth is more substantial, ground floor uses can be restricted to less vulnerable uses, such as commercial use, garage, utility areas and public space, with habitable areas above.

**5.24 The minimum floor level for residential development should be set at the 1 in 200 year flood level plus a freeboard allowance of 300mm for living accommodation and 600mm for sleeping accommodation. Where historic buildings are located in the floodplain and floor levels cannot be altered, flood proofing and resilience through potential demountable barriers should be considered as a potential mitigation option together with flood proofing of the building itself and an appropriate evacuation plan. Sleeping accommodation will not usually be allowed below the 1 in 200 year flood level including an additional 600mm freeboard allowance.**

5.25 It should be noted that the Environment Agency are constantly reviewing their guidance based upon experience, increasing knowledge and the findings of new research. The above criteria are therefore subject to change in the future.

## Flood Warning and Emergency Plans

- 5.26 Medway Council is currently preparing a detailed Emergency Flood Plan specific to the risks and needs of their administrative area. The Plan will use the information generated by this SFRA to identify suitable evacuation routes and rest centres within the Borough.
- 5.27 Evacuation Plans for individual developments should be prepared in conjunction with the council Flood Plan to direct people to safety during times of flood. This may include details of an evacuation route away from the site to an area outside the floodplain, or to a place of safe refuge within the development itself.
- 5.28 When submitting FRAs for developments within flood risk areas, developers should make reference to this strategic Emergency Flood Plan to demonstrate that their development will not impact on the ability of Medway Council and the emergency services to safeguard the current population. Emergency Plans are the responsibility of the LPA but should include details of flood warning and access/egress routes or refuge.
- 5.29 Medway Council are the competent authority with respect to Emergency Planning who should be responsible for assessing provision of safe access/egress routes and dry refuge areas within new development, based on the information contained within their detailed Emergency Flood Plan.

## Flood Defence Improvements

- 5.30 At present the majority of the flood defences along the tidal boundary of the study area are below standard resulting in large areas at actual risk of flooding. A separate High Level Appraisal report has been produced which assesses the standard of flood defence and identifies potential flood defence options for each flood cell.
- 5.31 It should be noted that for the purposes of an FRA and site mitigation considerations, flood defences should be considered at their current standard of defence and condition unless:
- a flood defence improvement scheme has been approved; and
  - funding is confirmed.
- 5.32 In the event that a flood defence improvement scheme can be considered as part of a sites development, the flood risk is likely to then be considered as residual risk. This should be confirmed with the Environment Agency as part of the FRA.
- 5.33 Residual Risk is defined as the risk remaining after flood management or mitigation measures have been put in place and the PPS25 Practice Guide gives the following examples:
- the failure of flood management infrastructure such as breach of a raised flood defence, blockage of a surface water conveyance system or failure of a pumped drainage system; or,
  - a severe flood which exceeds a flood management design standard, such as a flood event that overtops a raised defence or an intense rainfall event which exceeds the capacity of a piped drainage network.

- 5.34 It is recommended that advice should be sought from the Environment Agency regarding consideration of residual risks within FRAs and the appropriateness of mitigation measures on a site by site basis..

## 6 Site Specific Flood Risk Assessment Guidance

6.1 Site-specific Flood Risk Assessments (FRAs) are required to assess the flood risk posed to proposed developments and to ensure that, where necessary and appropriate, suitable mitigation measures are incorporated. This section presents recommendations for FRAs prepared for submission with planning applications for Medway Council. The guidance presented within this chapter has been based on:

- recommendations presented within Planning Policy Statement 25 and the accompanying Practice Guide; and
- information provided to enable preparation this SFRA Addendum.

### When is a Flood Risk Assessment Required?

6.2 When informing developers of the requirements of a FRA 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.

6.3 In the following situations a FRA should always be provided with a planning application:

- The development site is located in Flood Zones 2 or 3;
- The area of the proposed development site area is 1 hectare or greater in Flood Zone 1. This is to ensure surface 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. Surface water management will also need to be considered as part of the FRA for sites of 1 hectare or greater in Flood Zone 2 and 3;
- The development site is located in an area known to have experienced flooding problems from any flood source.

### FRA Requirements

6.4 The Practice Guide to PPS25 sets out a staged approach to site-specific FRA with the findings from each stage informing both the next level and the site Master Plan, throughout the development process. The staged approach comprises:

- Level 1 Screening Study
- Level 2 Scoping Study
- Level 3 Detailed Study

6.5 Table 6-1 overleaf provides further detail with respect to the various Levels of FRA, which has been adapted from the PPS25 Practice Guide.

**Table 6-1 Stages of site-specific FRA, adapted from Figure 3.5 PPS25 Practice Guide**

FRA Level	Description of Report Content
Level 1 Screening Study	<p>The Level 1 FRA is intended to identify any flooding or surface water management issues related to the development site that may require further investigation. The study should be based on readily available existing information, including:</p> <ul style="list-style-type: none"> <li>• SFRA,</li> <li>• Environment Agency Flood Maps,</li> <li>• Standing Advice</li> </ul> <p>The Level 1 FRA will determine the need for a Level 2 or 3 FRA.</p>
Level 2 Scoping Study	<p>Where the Level 1 FRA indicates that the site may lie in an area at risk of flooding, or may increase flood risk elsewhere due to runoff, a Level 2 FRA should be carried out. This report will confirm sources of flooding which may affect the site and should include the following;</p> <ul style="list-style-type: none"> <li>• Appraisal of available and adequacy of existing information;</li> <li>• Qualitative appraisal of the flood risk posed to the site, the potential impact of the development on flood risk on and off the site;</li> <li>• An appraisal of the scope of possible measures to reduce the flood risk to acceptable levels.</li> <li>• This Level may identify that sufficient quantitative information is already available to complete a FRA appropriate to the scale and nature of the development.</li> </ul>
Level 3 Detailed Study	<p>Undertaken if the Level 2 FRA concludes that further quantitative analysis is required in order to assess flood risk issues related to the development site.</p> <p>This Level should include:</p> <ul style="list-style-type: none"> <li>• Quantitative appraisal of the potential flood risk to the development;</li> <li>• Quantitative appraisal of the potential impact of development on the site under investigation on flood risk on and off the site;</li> <li>• Quantitative demonstration of the effectiveness of any proposed mitigation measures.</li> </ul>

- 6.6 At all stages Medway Council, and where necessary the Environment Agency and Southern Water, should be consulted to ensure the FRA provides the necessary information to fulfil the requirements for Planning Applications.

## FRA Guidance

- 6.7 The Environment Agency provides flood risk standing advice for applicants and agents on their website <http://www.environment-agency.gov.uk/research/planning/82587.aspx> which includes a matrix to determine the level of assessment that is required based on Flood Zone classification and development type. Within this matrix are links to FRA Guidance notes and advice for applicants as to which data they will need to purchase from the Environment Agency in order to carry out their FRA.

## Risks of Developing in Flood Risk Areas

- 6.8 Developing in flood risk areas can result in significant risk to a development and site users. Issues to consider include the following:
- 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 necessitate 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 un-insurable and therefore un-mortgageable if flood risk management is not adequately provided for the lifetime of the development;
  - By installing SuDS without arranging for their adoption or maintenance, there is a risk that they will eventually cease to operate as designed and could therefore 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.
- 6.9 In cases of redevelopment of brownfield sites in the functional floodplain, the advice of the Environment Agency National Development Control Policy team is that the existing building footprint should be considered part of the functional floodplain unless it can be proven that they exclude floodwaters. If the buildings do exclude floodwaters, then solely the area around these buildings will be deemed functional. When undertaking an FRA this matter should be clarified and ideally pre-agreed with the Environment Agency.

### Surface Water

- 6.10 Tidal discharge would be allowed into the River Medway but would need to allow for tide locked conditions which would necessitate onsite storage. SuDS should be encouraged and could count towards 'reducing flood risk'.
- 6.11 The Surface Water Management Plan has not yet been started by the council but should be used to provide more specific guidance on SuDS and suitable mitigation within Medway.

### Safe Development

- 6.12 Furthermore, the following items should be addressed as part of a FRA in order to demonstrate that proposed developments are 'safe' in line with PPS25. The Environment Agency has specified that the following should be achieved for all development vulnerability types in order to demonstrate safe development:
- Dry access and egress should be provided for all development where possible. Dry escape for residential dwellings should be up to the 1 in 100-year event for fluvial events and 1 in 200 year event for a tidal event, taking into account climate change for the lifetime of the development. Where dry access is unachievable, safe access should be provided in line with FD2320.
  - Finished floor levels should be set at or above the 1 in 100 year plus climate change level (fluvial) and 1 in 200 year plus climate change level (tidal) with a 300mm freeboard allowance.

- Where floodplain compensation is undertaken, the Environment Agency requires that this is provided on a 'Level for Level, Volume for Volume Basis'.
  - Flood flow routes should be preserved.
  - Flood resilient constructions measures should be incorporated into new developments where required.
- 6.13 It should be noted that the Environment Agency are constantly reviewing their guidance based upon experience, increasing knowledge and the findings of new research and therefore the above criteria are subject to change in the future.
- 6.14 The specific definition of a 'safe' development will vary for each individual site, based on location and development vulnerability. The Environment Agency encourages pre-application discussions and it is therefore recommended that developers for individual sites consult with the Environment Agency at an early stage to establish an appropriate definition of 'safe' development for their specific site.

## 7 Area Specific Considerations

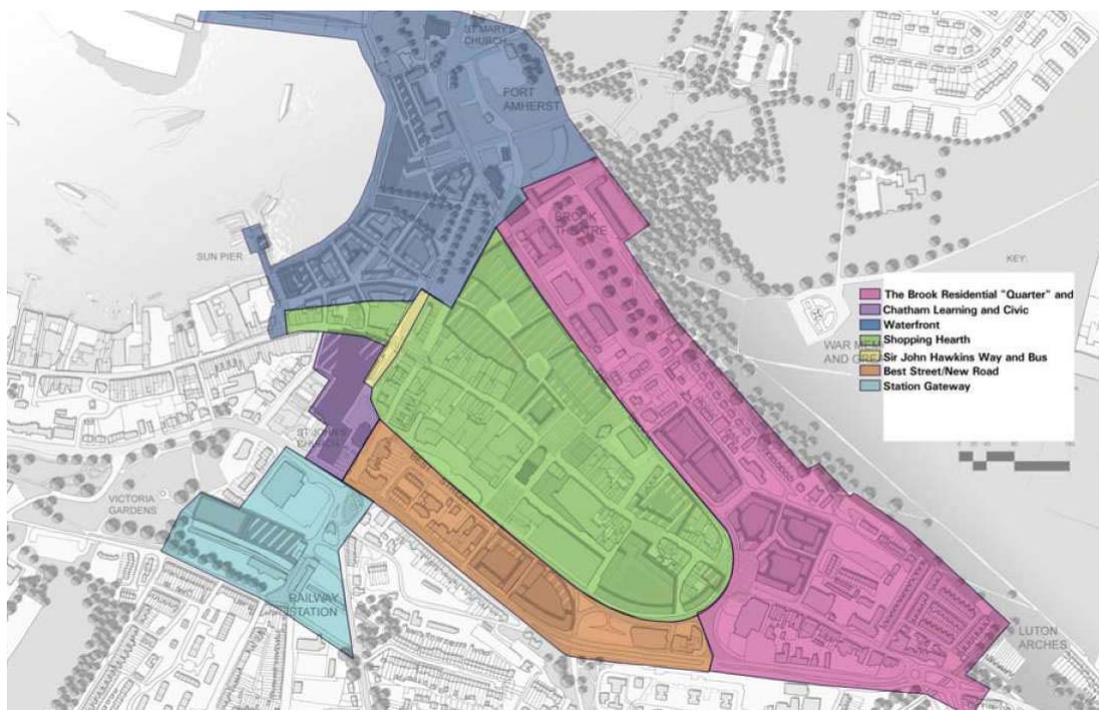
- 7.1 The August 2006 SFRA considered sixteen areas within the overall study area in greater detail in relation to flood risk, proposed development and potential flood risk mitigation considerations. The 2006 SFRA was completed under PPG25. This SFRA Addendum has considered the recommendations and comments in relation to each of the development sites using the revised modelling and mapping information, as well as relating to PPS25 policy and potential mitigation required to demonstrate part c) of the Exception Test. This information is presented in the following sections of this chapter.
- 7.2 A summary of flood depth and hazard information for each of the areas considered in this chapter are summarised in Table 7-1 which includes comments regarding the likelihood of each site satisfying the flood risk components of the Exception Test. It should be noted that prior to application of the Exception Test, Medway Council must have completed a Sequential Test including the relevant sites and be able to produce documentation demonstrating that no alternative sites are available within lower flood risk areas. Only then can the Exception Test be applied to consider sites within higher flood risk areas.
- 7.3 It should be noted that although flood zone, depth and hazard information have been updated as part of this SFRA Addendum, the modelling files were not made available to update the time to inundation information. Therefore where information on the time to inundation is stated in this chapter, it has not been updated from the previous August 2006 SFRA.

### Rochester Riverside

- 7.4 Since the 2006 SFRA was completed the Rochester Riverside area has undergone extensive flood mitigation in the form of land raising. The average ground level on site has been raised to 5.8m AOD with a retaining wall built along the river front to 5.5m AOD.
- 7.5 The mapping included in this SFRA Addendum is based on the Lower Medway 2D model outputs as agreed with the Environment Agency. The modelling was completed before land raising of the Rochester Riverside was completed, therefore the model does not represent the now current (raised) ground levels. As the model does not include the land raising, it cannot be guaranteed that there are no impacts on flood risk elsewhere due to potential displacement of flood waters. The mapping has therefore not been modified accordingly, however given that the principal flood source relates to tidal flooding any impact elsewhere is likely to be minimal although this has not been confirmed through modelling.
- 7.6 A comparison of the tidal water levels including climate change allowances and the new topographic level of the Rochester Riverside site identify the site is protected from flooding from the 1 in 20, 1 in 200 and 1 in 1000 year events for 2007 as well as the 1 in 200 and 1 in 1000 year events in 2060. However the site would be at actual risk of flooding from a tidal extreme water level associated with a 1 in 200 year and 1 in 1000 year event in 2110 allowing for climate change increases.
- 1 in 200 year extreme water level (2110) = 6.17m AOD
  - 1 in 1000 year extreme water level (2110) = 6.44m AOD
- 7.7 In light of the land raising at this site the guidelines for development in the August 2006 SFRA should be superseded by the following:

- The 1 in 200 year extreme predicted flood level (taking into account sea level rise until 2110) is 6.17m AOD. This estimated level is included within the modelling undertaken and reported in the Lower Medway 2D Flood Risk Mapping and Modelling report (December 2007).
- The minimum ground floor threshold levels (including sleeping accommodation) should be a minimum of 6.4m AOD. The Environment Agency would normally recommend that sleeping accommodation is 600mm above the predicted level to account for wave action and/or model error, however, wave action is unlikely to prevail in this location.
- Any construction below 6.1m AOD should incorporate flood resilient/proofing measures. Such measures include barriers on ground floor doors, windows and access points and bringing in electrical services into the building at a high level so that plugs are located above possible flood levels.
- All roads should be constructed at 6.1m AOD to ensure there is suitable dry access and egress to and from the site. This is with the exception of Doust way that we understand has been agreed with the Environment Agency at a level of 5.8m AOD in order to complete the flood defences and to provide protection to Doust way car park area.
- Implementation of agreed flood warning and evacuation procedures for the proposed development;
- Construction of a separate surface water drainage system, including adequate SuDS for the proposed development capable of attenuating flows in high tide events including the 1 in 100 year rainfall event with climate change.

## Chatham Waterfront



Source: SPG Chatham Centre and Waterfront Development Framework, 2005

- 7.8 Following completion of the August 2006 SFRA there have been no developments in respect of the flood defence structures or ground levels that would alter the flood risk status to this site. The flood zone maps based on the Lower Medway 2D model indicate the waterfront area of the site is located in Flood Zone 2 and 3 with a small area of 3b located along the immediate waterfront area. The flood zone extent is increased by 2060 and 2110.
- 7.9 Considerations will be needed in site specific FRAs in relation to the definition of Flood Zone 3b for areas of existing development. As the flood zone is constrained to a small area with higher topographic areas of Flood Zone 1 to the east and west, egress and access routes through areas of low hazard should be possible within this flood cell.
- 7.10 The guidelines for development outlined in the August 2006 SFRA are still considered valid for this development in this area as follows:
- 100% of the flood defences would be overtopped during a 1 in 200 and 1 in 1000 year tidal event in 2110;
  - The areas at risk are primarily adjacent to the water frontage;
  - Maximum inundation could reach between 2-3m in a 1 in 1000 year event in 2110;
  - The flood hazard in this area is between low and moderate hazard for the 1 in 200 and 1 in 1000 year events in 2110;
  - Inundation times in this area are outlined in the August SFRA 2006 as less than 60minutes and recede within 3-4 hours;

## Star Hill to Sun Pier

- 7.11 Following completion of the August 2006 SFRA there have been no developments in respect of the flood defence structures or ground levels that would alter the flood risk status to this site.
- 7.12 The guidelines for development outlined in the August 2006 SFRA are still considered valid for this development in this area as follows:
- 85% and 100% of the river frontage would be overtopped during the 1 in 200 and 1 in 1000 year tidal events in 2110;
  - The areas at risk are primarily adjacent to the waterfront and within 100m of the river bank;
  - Maximum inundation in this area as a result of overtopping of the existing flood defences would be 1-2m;
  - Inundation times in this area are outlined in the August SFRA 2006 as less than 60minutes and recede within 2-3 hours;
  - In the absence of improvements to the flood defences, demountable defences could be considered as a potential mechanism for mitigation although with a 60minute inundation time dry refuge should be made available for all new developments.

## Historic Rochester

- 7.13 The SFRA Addendum maps a part of the frontage area as Flood Zone 3b for present day flood zones. Therefore any development proposed in this area should consider the proposed vulnerability in respect of flooding, and the applicability of the Flood Zone 3b definition to any 'existing development'.
- 7.14 The guidelines for development outlined in the August 2006 SFRA should be updated to reflect the following:
- Approximately 90% of the river frontage would be overtopped during a 200 and 1000 year tidal event in 2110;
  - The areas at risk of flooding are still confined to the area within 200m of the water frontage
  - Maximum inundation could reach between 2-3m in a 1 in 1000 year event in 2110;
  - The flood hazard in this area is between low and significant hazard for the 1 in 200 and 1 in 1000 year events in 2110;
  - Inundation times in this area are outlined in the August SFRA 2006 as less than 30minutes and recede within 4 hours, therefore dry refuge should be provided for all new developments in this flood cell.

## Medway City Estate

- 7.15 This area has a significant river boundary along both the eastern and western extents. The present day flood zones show much of the area to be located in Flood Zone 1 with only the waterfront areas located in Flood Zones 2, 3a and some minor areas of Flood Zone 3b. The extent of Flood Zones 2 and 3a increase into the area for the 2060 and 2110 scenarios with almost the entire study area being located in the floodplain.
- 7.16 The guidelines for development outlined in the August 2006 SFRA should be updated to reflect the following:
- Approximately 90% of the river frontage would be overtopped during a 200 and 1000 year tidal event in 2110;
  - The areas at risk of flooding are still confined to the area within 200m of the water frontage
  - Maximum inundation could reach between 2-3m in a 1 in 1000 year event in 2110;
  - The flood hazard in this area is between low and significant hazard for the 1 in 200 and 1 in 1000 year events in 2110;
  - Inundation times in this area are outlined in the August SFRA 2006 as less than 30minutes and recede within 4 hours, therefore dry refuge should be provided for all new developments in this flood cell.

## Brompton, Fort Amherst and The Lines

- 7.17 This area is located in Flood Zone 1 including under the 2060 and 2110 climate change conditions. Therefore development in this area does not need to pass the Exception Test and restrictions on development should be concerned with other sources of flooding such as surface water and groundwater.

## Chatham Historic Dockyard

- 7.18 The southern area of the site is shown to be Flood Zone 2 and 3a and a small area of Flood Zone 3b. The extent of Flood Zones 2 and 3a increase into the area for the 2060 and 2110 scenarios with the entire study area being located in the floodplain.
- 7.19 The guidelines for development outlined in the August 2006 SFRA should be updated to reflect the following:
- 100% of the river frontage would be overtopped during a 200 and 1000 year tidal event in 2110;
  - Under climate change conditions the entire site is at risk of flooding;
  - Maximum inundation could reach between 3m in a 1 in 1000 year event in 2110;
  - The flood hazard in this area is between low and significant hazard for the 1 in 200 and 1 in 1000 year events in 2110;
  - Inundation times in this area are outlined in the August SFRA 2006 as less than 30minutes and recede within 3 hours, therefore dry refuge should be provided for all new developments in this flood cell.

## Chatham Maritime and St Mary's Island

- 7.20 This area has an extensive river boundary to the west and north. It is identified as Flood Zone 1 for present day water levels, but significant areas of the flood cell become Flood Zone 2 with 2060 climate change and Flood Zone 3 with 2110 climate change.
- 7.21 The guidelines for development outlined in the August 2006 SFRA should be updated to reflect the following:
- 100% of the river frontage would be overtopped during a 200 and 1000 year tidal event in 2110;
  - Under climate change conditions the entire site is at risk of flooding;
  - Maximum inundation could reach up to 2-3m in a 1 in 1000 year event in 2110;
  - The flood hazard in this area is between low and significant hazard for the 1 in 200 and 1 in 1000 year events in 2110;
  - The flood defence overtopping is not the only mechanism for tidal flooding in this flood cell, there is also a secondary flow path via the overtopping of the lock and basins from the east therefore to protect this area from flooding the flood defences along the flood cell and the lock would need to be improved;

- Inundation times in this area are outlined in the August SFRA 2006 as less than 30minutes and recede within 2.5 hours although a significant volume of water is retained across the area, therefore dry refuge should be provided for all new developments in this flood cell.

## The Upnors

- 7.22 The Upnors site is located on the northern bank of the River Medway and has an extensive river boundary along the eastern boundary. The southern area of Upper Upnor is identified as being located in Flood Zone 2, 3a and 3b in present day. The Lower Upnor has very minor flood zones along the immediate riverside area. Under climate change conditions for 2060 and 2110 these flood zones increase in size, with larger areas of Flood Zone 3a.
- 7.23 The guidelines for development outlined in the August 2006 SFRA should be updated to reflect the following:
- The majority of the river frontage would be overtopped during a 200 and 1000 year tidal event in 2110;
  - Under climate change conditions the area of Lower Upnor site is at risk of flooding and the southern area of Upper Upnor is at risk of flooding;
  - Maximum inundation could reach up to 2m in a 1 in 1000 year event in 2110, the more significant flood depths are experience in Upper Upnor;
  - The flood hazard in this area is between low and significant hazard for the 1 in 200 and 1 in 1000 year events in 2110, the more significant areas of Significant Hazard are located in Upper Upnor;
  - Development in the area is limited therefore drainage infrastructure in the area is also limited. Therefore adequate surface water drainage should be incorporated with future development to ensure there is no increase in surface water flooding to the surrounding areas;
  - Inundation times in this area are outlined in the August SFRA 2006 as 3 Hours for the maximum extent after initial inundation and recede within 3.5 hours although some isolated areas remain at Upper Upnor south of Tower Hill.

## Strood Riverside

- 7.24 This site is located on the northern bank of the River Medway and is identified as being located in Flood Zone 2 and 3a with the immediate riverfront area as 3b. Under 2060 and 2110 climate change the site becomes dominated by Flood Zone 3a.
- 7.25 The guidelines for development outlined in the August 2006 SFRA should be updated to reflect the following:
- 100% of the river frontage would be overtopped during a 200 and 1000 year tidal event in 2110;

- Maximum inundation could reach up to 2m in a 1 in 1000 year event in 2110;
- The flood hazard in this area is between low and moderate hazard for the 1 in 200 and 1 in 1000 year events in 2110, a very minor area of significant hazard is identified along the river edge;
- Inundation times in this area are outlined in the August SFRA 2006 as 1.5 Hours for the maximum extent after initial inundation and recede within 3.5 hours although some isolated areas remain trapped.

## Strood Centre

- 7.26 This site is located on the north bank of the River Medway and has a narrow river boundary by the Civic Centre. The site is identified as predominantly Flood Zone 2 with a minor area of Flood Zone 3a for present day water levels. Under 2060 and 2110 climate change conditions the entire area becomes Flood Zone 3a.
- 7.27 The guidelines for development outlined in the August 2006 SFRA should be updated to reflect the following:
- The majority of the river frontage would be overtopped during a 200 and 1000 year tidal event in 2110;
  - Maximum inundation could reach up to 2-3m in a 1 in 1000 year event in 2110;
  - The flood hazard in this area is between low and significant hazard for the 1 in 200 and 1 in 1000 year events in 2110;
  - Inundation times in this area are outlined in the August SFRA 2006 as 30 minutes with a guide of 2 Hours by which flood waters have covered the majority of the area. Flood waters recede 3.6 hours after initial overtopping and some isolated areas remain.

## Strood Waterfront (including Temple Marsh)

- 7.28 This site is located on the north bank of the River Medway between Wickham and Tower Reach. The entire south eastern boundary is located on the river. The flood defences are identified as providing less than the 1 in 200 under climate change conditions and less than 1 in 1000 for present day and climate change conditions. The area immediately adjacent to the riverfront is identified as a mixture of Flood Zone 2, 3a and 3b under present day. The extent of Flood Zone 2 and 3a extend further inland under 2060 and 2110 climate change conditions with the exception of the Temple Marsh area which is raised ground.
- 7.29 The Environment Agency understand the Temple Marsh site is largely proposed for commercial with housing in FZ1. Raised floor levels would be needed 300mm above the 1 in 200 year level for commercial development.
- 7.30 The guidelines for development outlined in the August 2006 SFRA should be updated to reflect the following:

- The majority of the river frontage would be overtopped during a 200 and 1000 year tidal event in 2110;
- The areas at risk are mainly adjacent to the river frontage, but extend further inland under climate change conditions;
- Maximum inundation could reach up to 2m in a 1 in 1000 year event in 2110, the most significant depths are experienced in the north east of the flood cell by Temple Manor;
- The flood hazard in this area is between low and moderate hazard for the 1 in 200 and 1 in 1000 year events in 2110, minor areas of significant hazard are identified along the river front at Temple Manor and south of Temple Marsh;
- Inundation times in this area are outlined in the August SFRA 2006 as widespread inundation within an hour with a maximum extent reached within 3 hours. Flood waters recede 3.5 hours after initial overtopping and some isolated areas remain in low lying areas.

## The Esplanade

- 7.31 This site is located on the south bank of the River Medway opposite Temple Marsh. The northern part of the site immediately adjacent to the river is identified as Flood Zone 2 and 3 under present day, the southern extent of the area is identified as Flood Zone 1. Under 2060 and 2110 climate change conditions the Flood Zones extend slightly south but the majority of the area in the south remains Flood Zone 1.
- 7.32 The guidelines for development outlined in the August 2006 SFRA should be updated to reflect the following:
- The northern extent of the site frontage would be overtopped during a 200 and 1000 year tidal event in 2110;
  - Maximum inundation could reach up to 2m in a 1 in 1000 year event in 2110, the inundation area is limited to the area immediately adjacent to the riverfront in the northern part of the site;
  - The flood hazard in this area is between low and moderate hazard for the 1 in 200 and 1 in 1000 year events in 2110 and is focused on the land immediately adjacent to the riverfront;
  - Inundation times in this area are outlined in the August SFRA 2006 as very minor overtopping along the Esplanade area, west of Hathaway Court. Further south by Centenary Walk, flooding is restricted to the very edges of the bank. Flooding begins to recede 3.5 hours after initial overtopping.

## Gillingham Waterfront

- 7.33 This area is located along the Gillingham Reach section of the River Medway on the southern bank. The area is identified as Flood Zone 2, 3a and 3b for present day. Under climate change conditions the Flood Zone 3a extends to cover the entire site.
- 7.34 The guidelines for development outlined in the August 2006 SFRA should be updated to reflect the following:
- The entire extent of the site river frontage would be overtopped during a 200 and 1000 year tidal event in 2110;
  - Maximum inundation could reach up to 3-4m in a 1 in 1000 year event in 2110;
  - The flood hazard in this area is between low and significant hazard for the 1 in 200 and 1 in 1000 year events in 2110;
  - Inundation times in this area are outlined in the August SFRA 2006 as initial overtopping around the piers and Leisure park. Within 30 minutes the area of inundation is extensive. Flooding begins to recede 2.5 hours after initial overtopping and some isolated areas remain in low lying areas.

## Chatham Port

- 7.35 This site is located between the St Marys Island and Gillingham Waterfront areas. Under present day conditions only a small corner of the site adjacent to the Bull Nose and Lock is located in Flood Zone 2. Under 2060 and 2110 climate change conditions, Flood Zone 3a extends into the site with a small island of Flood Zone 1.
- 7.36 The guidelines for development outlined in the August 2006 SFRA should be updated to reflect the following:
- The entire extent of the site river frontage would be overtopped during a 200 and 1000 year tidal event in 2110;
  - Maximum inundation could reach up to 2m in a 1 in 1000 year event in 2110, the most significant flood depths are experienced around the basin and lock area;
  - The flood hazard in this area is between low and significant hazard for the 1 in 200 and 1 in 1000 year events in 2110, a small area of extreme hazard has been identified around the lock area;
  - The flood defence overtopping is not the only mechanism for tidal flooding in this flood cell, there is also a secondary flow path via the overtopping of the lock and basins from the east therefore to protect this area from flooding the flood defences along the flood cell and the lock would need to be improved;
  - Inundation times in this area are outlined in the August SFRA 2006 as initial overtopping either side of the locks to the eastern basin. Within 30 minutes the area of inundation is extensive via the locks and basins reaching a maximum at 2.5 hours. Flooding begins to recede 3 hours after overtopping and some isolated areas remain in low lying areas.

## Chattenden

- 7.37 This area is located in Flood Zone 1 including under the 2060 and 2110 climate change conditions. Therefore development in this area does not need to pass the Exception Test and restrictions on development should be concerned with other sources of flooding such as surface water and groundwater.

**Table 7-1 Summary of Flood Risks to sites in Study Area**

- Red – less than present day 1 in 200 year level (5.01mAOD);
- Amber – greater than the present day 1 in 200 year level (5.01mAOD) but less than 1 in 200 year in 2110 (6.17mAOD); and,
- Green – greater than the 1 in 200 year level in 2110 (6.17mAOD).

ID	Location	Proposed Development	Size (hectares)	Brownfield/ Greenfield	Flood Zone (Figure 4, 5 & 6)	Current Standard of Defences for the flood cell (Figure 3 – worst case)	Likelihood of passing Part (c) Exception Test	Historic Flooding	Primary Flooding Mechanism	Flood Depth Information		Hazard Rating (worse case classification)	Potential Mitigation	Potential Defence Option
										Present Day	2110			
1	Rochester Riverside	Mixed Use including Residential	30	Brownfield	Following land raising Flood Zone 3 and 2 with climate change 2110	1 in 200 year present day, less than 1 in 200 year 2110	High	Tidal flooding (shown on Figure 4.1 2006 SFRA)	Tidal overtopping of flood defences.	Up to 1m in 1 in 200 year. Up to 3m in 1 in 1000 year.	Up to 4m in 1 in 200 and 1 in 1000 year	Significant	FFL thresholds need to be 6.4m AOD.	Site has been raised to 5.8m AOD.
2	Chatham Waterfront	Mixed use including a commercial, cultural and civic centre	64	Brownfield	Flood Zone 3 with climate change 2110	1 in 200 year present day	High	Tidal flooding (shown on Figure 4.1 2006 SFRA)	Tidal overtopping of flood defences. and surface water	Up to 1m in 1 in 200 and 1 in 1000 year.	Up to 2m in 1 in 200 and 1 in 1000 year.	Moderate	FFL thresholds need to be above flood level	Sheet Piling
3	Star Hill to Sun Pier	Mixed use, including commercial and residential	13	Brownfield	Flood Zone 3 and 2 with climate change 2110	1 in 200 year present day	Moderate	Tidal flooding (shown on Figure 4.1 2006 SFRA)	Tidal overtopping of flood defences. and surface water	Up to 1m in 1 in 200 and 1 in 1000 year	Up to 2m in 1 in 200 and 1 in 1000 year.	Low	FFL thresholds need to be above flood level	Sheet Piling
4	Historic Rochester	Commercial and Recreational	38	Brownfield	Flood Zone 3 with climate change 2110	1 in 200 year present day, less than 1 in 200 year 2110	High	Tidal flooding (shown on Figure 4.1 2006 SFRA)	Tidal overtopping of flood defences. and surface water	Up to 2m in 1 in 200 and 1 in 1000 year	Up to 3m in 1 in 200 and 1 in 1000 year.	Significant	FFL thresholds need to be above flood level	Earth embankment, sheet piling
5	Medway City Estate	Improvement to mixed industrial use	106	Brownfield	Flood Zone 3 and 2 with climate change 2110	1 in 200 year present day	High	Tidal flooding (shown on Figure 4.1 2006 SFRA)	Tidal overtopping of flood defences. and surface water	Up to 1m in 1 in 200 and 1 in 1000 year	Up to 2m in 1 in 200 and 1 in 1000 year.	Moderate	FFL thresholds need to be above flood level	Sheet Piling
6	Brompton, Fort Amherst and The Lines	Mixed use, including Residential	176	Brownfield	Flood Zone 1	1 in 200 year present day, less than 1 in 200 year 2110	N/A	N/A	N/A	-	-	-	N/A	N/A
7	Chatham Historic Dockyard	Mixed use, including recreational and commercial	26	Brownfield	Flood Zone 3 and 2 with climate change 2110	1 in 200 year present day, less than 1 in 200 year 2110	Moderate	Tidal flooding (shown on Figure 4.1 2006 SFRA)	Tidal overtopping of flood defences. and surface water	Up to 1m in 1 in 200 and 1 in 1000 year.	Up to 1m in 1 in 200 and 1 in 1000 year	Significant	FFL thresholds need to be above flood level	Sheet Piling and additional or new concrete wall

ID	Location	Proposed Development	Size (hectares)	Brownfield/ Greenfield	Flood Zone (Figure 4, 5 & 6)	Current Standard of Defences for the flood cell (Figure 3 – worst case)	Likelihood of passing Part (c) Exception Test	Historic Flooding	Primary Flooding Mechanism	Flood Depth Information		Hazard Rating (worse case classification)	Potential Mitigation	Potential Defence Option
										Present Day	2110			
8	Chatham Maritime and St Mary's Island	Mixed use, including educational, commercial and housing	136	Brownfield	Flood Zone 2 and 1 with climate change 2110	1 in 200 year present day, less than 1 in 200 year 2110	Moderate	Tidal flooding (shown on Figure 4.1 2006 SFRA)	Tidal overtopping of flood defences and surface water	-	Up to 2m in 1 in 200. Up to 3m in 1 in 1000 year.	Significant	FFL thresholds need to be above flood level	Sheet Piling and additional or new concrete wall
9	The Upnor's	Mixed use, including residential	70	Brownfield	Flood Zone 3, 2 and 1 with climate change 2110	1 in 200 year present day	High	Tidal flooding (shown on Figure 4.1 2006 SFRA)	Tidal overtopping of flood defences and surface water	Up to 1m in 1 in 200. Up to 2m in 1 in 1000 year.	Up to 2m in 1 in 200. Up to 3m in 1 in 1000 year.	Moderate	FFL thresholds need to be above flood level	Sheet Piling, Earth embankment
10	Strood Riverside	Residential	10	Brownfield	Flood Zone 3 with climate change 2110	1 in 200 year present day	Low	Tidal flooding (shown on Figure 4.1 2006 SFRA)	Tidal overtopping of flood defences	Up to 1m in 1 in 200 and 1 in 1000 year	Up to 2m in 1 in 200 and 1 in 1000 year	Significant	FFL thresholds need to be above flood level	Sheet Piling, Earth embankment
11	Strood Centre	Mixed use, including residential and commercial	30	Brownfield	Flood Zone 3 with climate change 2110	1 in 200 year present day	Moderate	Tidal flooding (shown on Figure 4.1 2006 SFRA)	Tidal and surface water	Up to 1m in 1 in 200 and 1 in 1000 year	Up to 2m in 1 in 200. Up to 4m in 1 in 1000 year.	Significant	FFL thresholds need to be above flood level	Sheet Piling, Earth embankment
12	Strood Waterfront	Mixed use, including residential	98	Brownfield	Flood Zone 3, 2 and 1 with climate change 2110	1 in 200 year present day	Moderate	Tidal flooding (shown on Figure 4.1 2006 SFRA)	Tidal overtopping of flood defences and surface water	Up to 1m in 1 in 200 and 1 in 1000 year	Up to 2m in 1 in 200 and 1 in 1000 year	Significant	FFL thresholds need to be above flood level	Sheet Piling, Earth embankment
13	The Esplanade	Improvements to schools	17	Brownfield	Flood Zone 3, 2 and 1 with climate change 2110	1 in 200 year present day, less than 1 in 200 year 2110	Moderate	Tidal flooding (shown on Figure 4.1 2006 SFRA)	Tidal	Up to 1m in 1 in 200 and 1 in 1000 year	Up to 2m in 1 in 200 and 1 in 1000 year	Significant	FFL thresholds need to be above flood level	Sheet Piling, Earth embankment
14	Gillingham Waterfront	Mixed use, including residential and marine activities	32	Brownfield	Flood Zone 3 and 2 with climate change 2110	1 in 200 year present day	High	Tidal flooding (shown on Figure 4.1 2006 SFRA)	Tidal overtopping of flood defences and surface water	Up to 4m in 1 in 200 and 1 in 1000 year	Up to 4m in 1 in 200 and 1 in 1000 year	Significant	FFL thresholds need to be above flood level	Sheet Piling
15	Chatham Port	Water related commercial and industrial	57	Brownfield	Flood Zone 3 and 2 with climate change 2110	1 in 200 year present day	High	Tidal flooding (shown on Figure 4.1 2006 SFRA)	Tidal overtopping of flood defences and surface water	Up to 0.5m in 1 in 1000 year	Up to 2m in 1 in 200 and 1 in 1000 year	Moderate	FFL thresholds need to be above flood level	Sheet Piling,
16	Chattenden	Residential	23.5	Brownfield	Flood Zone 1		N/A	N/A	N/A	-	-	-	N/A	N/A

## 8 Flood Defence Standards and Management

### Flood Defences

- 8.1 Flood defences are typically engineered structures designed to limit the impact of flooding. The National Flood and Coastal Defence Database (NFCDD) is compiled by the Environment Agency and provides information on natural and man-made defences. Figure 3 shows the location of NFCDD defences throughout the study area and identifies the design life and the authority responsible for maintenance of the defences. As noted earlier the NFCDD was not available east of St Marys Island (from Finsborough Ness). The crest heights of the defences in this area were obtained from an interrogation of the LIDAR data, site walkover observations and a review of the aerial photography.
- 8.2 The Environment Agency Flood Zone maps define the extent of flooding without considering the presence of defences. The reason for this approach is to make an allowance for residual flood risk in the event of a failure or breach/blockage/overtopping of the flood defences. This conservative approach raises the awareness of flood risk in defended areas and helps to ensure that it is not discounted as part of development but is managed appropriately.
- 8.3 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 and may vary depending on the age of the structure, the monetary 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.

#### Defence standard

- 8.4 As part of the High Level Appraisal a deliverable was the identification of the defences that are considered to be sub-standard. It was confirmed by the Environment Agency that those defences that fall below the 0.5% (1 in 200 year) annual probability flood level in 2110 are considered to be sub-standard (6.17mAOD).
- 8.5 Using the min actual crest level (more detail is contained in the Appraisal report) in the NFCDD the defences have been classified as the following: -
- Red – less than present day 1 in 200 year level (5.01mAOD);
  - Amber – greater than the present day 1 in 200 year level (5.01mAOD) but less than 1 in 200 year in 2110 (6.17mAOD); and,
  - Green – greater than the 1 in 200 year level in 2110 (6.17mAOD).
- 8.6 Figure 3 in Appendix A presents the defences and their corresponding standard.
- 8.7 Figures 3, 4, 5, 6 and 7 show the implications of the low defence standard in the area, with concentrated areas of associated tidal floodplains from the River Medway. The flood inundation maps show the scenarios for the present day, 2060 and 2110 extreme water levels. The inundation maps show actual flood risk associated with 'overtopping' of floodwater (i.e. the extreme still water level exceeds the height of the flood defence crest height and would therefore overtop the defence, this does not imply overtopping through wave action).

- 8.8 **There are significant implications of the nature of the flood risk along the Medway as a direct result of the low flood defence standards. As the risk is actual in some areas i.e. the defences do not provide the required standard of protection, existing urban areas in addition to the regeneration areas outlined by Medway are at risk of flooding during extreme tidal events. The present day flood map in Figure 4 shows the areas that would potentially become inundated in such an event based on present day tidal levels.**
- 8.9 Actual flood risk as a result of overtopping requires a strategic approach including consideration of future flood defence improvements, emergency planning and mitigation agreements to assist future development. The SMP proposes a 'hold the line' policy for this coastal unit therefore to ensure protection of existing settlements and assist in the future development of sites a strategic consensus on flood defence improvements is required and needs to be supported by the Environment Agency as part of the overall planning process relating to PPS25 and flood risk.
- 8.10 Flood defence options have been considered as part of the High Level Appraisal document. The various options and details are included report which should be read in conjunction with this SFRA Addendum.
- 8.11 In the absence of improved flood defences or an agreed protocol on this basis, existing settlements are at increased risk of flooding and may experience difficulty purchasing insurance, typically if the frequency of flooding is estimated to exceed 1 in 75 years.. Planning applications within the floodplain will need extremely robust flood risk assessments to demonstrate compliance under PPS25, although the ability to pass part c) of the Exception Test will vary on location. Due to the nature of the low lying land and flood mechanisms the speed at which the flooding would occur challenges most emergency plans for site specific developments. Therefore safe refuge above the flood level is essential for any new developments, with the Medway emergency plan providing an overall strategy for dealing with flood risk and rescue that individual sites can use to support their applications.
- 8.12 The supplementary planning guidance provides specific information in relation to these issues and policy.

## Flood warning and Flood Watch Areas

- 8.13 Flood Warning is an essential component of the strategy to reduce flood risk. The current flood warning systems provided by the Environment Agency are outlined in the previous SFRA and mapped in Figure 9.
- 8.14 Overtopping as a direct result of low flood defence standards and tidal surges in the River Medway is a flood related event that could benefit from flood warning services. The Environment Agency and Met Office can now predict in advance the approach of tidal surges from the North Sea, helping to provide additional time for areas such as Medway to raise the flood alert and set systems in place for advance evacuation from high risk areas. All existing settlements, businesses and support infrastructure should be registered for the EA Warning service. As a minimum any new development should also be signed up for the service and ensure a flood evacuation and warning plan is in place as part of the planning application.
- 8.15 Sir Michael Pitt's review of the summer 2007 floods stresses the importance of developing a flood warning system for surface water flooding. One of the reports interim conclusions (IC3) was "the Environment Agency further develops tools and techniques for predicting and

modelling river flooding, especially to take account of extreme multiple events; and takes forward work to develop similar tools and techniques to model surface water flooding.”

- 8.16 The Environment Agency is currently researching a flood warning system for surface water flooding. This will require rainfall alerts from the Met Office that are currently not widely available but are being piloted in a study in 2008. Following this pilot further testing and feasibility of a warning system will need to be carried out before a warning system could be widely used.

## Flood Mitigation on site

- 8.17 Flood mitigation measures can also be incorporated within a development to manage the risk of flooding. The Pitt Review recognised the importance of flood resilient and resistant techniques and came to an interim conclusion (IC11) that “no new building should be allowed in a flood risk area that is not flood-resilient, and that Government should work with organisations such as the Royal Institute of British Architects and the building industry to encourage flood-resilient building and development design.”

### Flood Avoidance

- 8.18 This is defined as:
- ‘Constructing a building and its surrounds (at site level) in such a way to avoid it being flooded (e.g. by raising it above the flood level, re-sitting outside flood risk area etc.)’.
- 8.19 These are used to restrict the pathway between the flooding source and the receptor. The preferential option is to locate the building outside a flood risk area through rearranging the site layout if possible. Alternatives within this category could include a permanent or temporary defence such as raised kerbs to contain and route flood water through a site or demountable barriers.

### Flood Resistance

- 8.20 This is defined as:
- ‘Constructing a building in such a way to prevent floodwater entering the building and damaging its fabric’.
- 8.21 Floodwaters will enter buildings through the weakest points in the construction which maybe in the brickwork, party walls of terraced or semi-detached buildings, expansion joints between walls where different construction materials meet, vents, door thresholds, seepage from below ground through floors and basements and/or sanitary appliances from backflow from surcharged drainage systems.
- 8.22 Flood resistance techniques are employed within the fabric of the buildings. They include the use of low permeability materials in the construction of the building and are likely to only be effective for short duration flood events and of low flooding depths (less than 0.3 m). They may be used in conjunction with flood resilience techniques when the predicted flood level is between 0.3 - 0.6 m.

### Flood Resilience/Repairable

- 8.23 This is defined as:-

- 'Constructing a building in such a way that although floodwater may enter the building its impact is reduced (i.e. no permanent damage is caused, structural integrity is maintained and drying and cleaning is facilitated)'.
- 8.24 Flood resilience techniques are also employed on buildings within the floodplain. This type of approach is often more appropriate when the predicted depth of flooding is greater than 0.3 m or flooding is expected to last for a long time. In these cases the use of more durable materials that will not be easily damaged by floodwaters as well as the use of construction materials that are more effective at draining and drying are recommended.
- 8.25 There is currently no guidance with the UK Building Regulations for appropriate means of construction for properties in flood risk areas. For more information on flood resistant construction please refer to DCLG (2007) 'Improving the Flood Performance of New Buildings: Flood Resilient Construction'<sup>i</sup>.

## 9 Emergency Planning

- 9.1 In Sir Michael Pitts Review of the 2007 floods he recognises the ‘dedicated and quick response’ of emergency services which prevented the worsening of many situations. However, he also identified a number of failings and opportunities to improve our preparedness for future flood events. In particular he advises that with ‘stronger local leadership of flood risk management, clarification of roles, more effective co-operation between responsible organisations, better protection of infrastructure and wider and deeper public engagement’ the impact of flooding on communities could be significantly reduced.
- 9.2 If many of these opportunities identified by Sir Michael Pitt are to be achieved, the role local authorities have in planning and responding to flood events must be clearly defined. To assist local authorities in understanding their role it is essential to have a technically sound emergency plan in place to provide clear procedural instructions to the organisations, companies and individuals involved and affected.
- 9.3 As detailed in the PPS25 Practice Guide paragraphs 4.62 and 4.64, developers should ensure that appropriate evacuation and flood response plans are in place to manage the risk of flooding. These will need to be agreed with the Local Planning Authority and agreement is likely to be based upon guidance from the emergency services.
- 9.4 The mobilisation and organisation of the emergency services and supporting agencies, for example Medway Council and Kent County Council can be integral in the coordinated rescue, treatment and transport of potentially large numbers of displaced residents or casualties. Similarly during and after a flood event the role of the local authority can include providing transport for the evacuees and safe rest centres in the event of homes being flooded. Further health and welfare issues are inevitable as a result of serious flood events, which may impact on the ability of people to return to their homes or places of business.
- 9.5 Whilst this SFRA addendum is not designed to fulfil that role it does contain useful information for Medway Council and other key organisations to assist them in understanding their risks and begin the process of developing an appropriate co-ordinated response.
- 9.6 The primary responsibility of Medway Council would be to provide temporary accommodation to any displaced people until such time that they are in a position to return to their homes or their insurance companies can arrange temporary accommodation for them. This shelter is provided in the form of rest centres, and provides a warm dry place to sleep and basic facilities including shower, food, etc.
- 9.7 The following developments are typically suitable for such use as refuge and/or reception centres:
- Leisure centres;
  - Churches;
  - Schools; and
  - Community Centres.
- 9.8 In the event of an emergency, it is essential to ensure that those services vital to the rescue operation are not impacted by flood water. PPS25 classifies Emergency dispersal points, police

stations, ambulance stations, fire stations, command centres and telecommunication installations that are required to remain operational during a flood event as 'Highly Vulnerable' buildings and these are therefore not permitted to be developed in Flood Zone 3. Hospitals are also vital to the rescue operation, but are classified in PPS25 as 'More Vulnerable' establishments and therefore might be situated within a flood zone, although they should remain accessible and operational. In addition future development control polices should seek to locate other 'More Vulnerable' institutes such as schools, nurseries, residential care homes, children's homes, prisons, hostels and health services in areas of the lowest risk to minimise the potential for flood casualties. Situations may arise in an emergency where the occupants of the above institutions cannot be evacuated (such as prisons) and therefore special consideration should be made when allocating sites for such development types.

- 9.9 In respect of the level of actual flood risk facing the area of Medway, a council wide emergency plan should be produced to help inform the main stakeholders of responsibility and actions in the event of a flood. This will help provide a framework base for individual developments to support as part of their requirement to demonstrate part c) of the Exception Test where necessary.

## 10 Recommendations

### SFRA Addendum

- 10.1 This SFRA Addendum provides an update of policy and data since the completion of the previous Medway SFRA in 2006.
- 10.2 The addendum presents the updated Flood Zone Maps from recent hydraulic modelling that delineate the Flood Zones outlined in PPS25 as Flood Zone 1, low probability, Flood Zone 2, medium probability, Flood Zone 3a, high probability and Flood Zone 3b, functional floodplain.
- 10.3 Table D.1 of PPS25 provides information on which developments are considered appropriate in each Flood Zone, subject to the application of the Sequential Test and either the Exception Test or a site-specific Flood Risk Assessment (FRA) to demonstrate safety.
- 10.4 Information regarding flood risk should be used to assist Medway Council with the application of the Sequential Test for their development sites.

### Implications for Policy in Medway

- 10.5 In line with flood risk issues and objectives identified by the Environment Agency, it is suggested that the following strategies and considerations are incorporated into Medway Councils LDF to strengthen their position with respect to flood risk management.
- Ensure the Sequential Test is undertaken for all land allocations. This will ensure that all development is steered towards the areas of lesser flood risk wherever possible and that the vulnerability of proposed developments are appropriate to the defined Flood Zone, thereby reducing the overall flood risk posed to the residents of the borough;
  - Site-specific FRAs should be carried out for all developments in Flood Zones 2 and 3; all sites in Flood Zone 1 which are greater than 1.0 ha and all sites that are known to have a critical drainage problem, whatever their size;
  - Sustainable Drainage Systems should be included in new developments wherever possible to manage surface water.
  - Additional rest centres across the borough should be identified and included in the emerging Flood Emergency Plan for Medway.
  - The Flood Defence Strategy High Level Appraisal document should be referred to with specific reference to the flood risk associated with the specific sites of Strood Riverside, Civic Centre and Chatham Riverside.
  - Consideration of an overall flood defence management strategy to assist in the future regeneration of the urban areas of Medway bordering the River Medway.

### Next steps for Medway

- 10.6 Using the information presented in this addendum, Medway Council is now in a position to carry out the Sequential Test with respect to flood risk. This will enable the council to identify those areas where further information is required regarding the nature of the flood risk as well as those areas where the Exception Test will need to be applied. The further detail on flood

hazard and flood depth presented in this Addendum should help inform the council of a sites ability to pass part c) of the Exception Test.

---

<sup>i</sup> Communities and Local Government (2007) *'Improving the Flood Performance of New Buildings: Flood Resilient Construction'*, DCLG: London.