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**Tendring District  
Council  
Strategic Flood Risk  
Assessment  
Addendum**

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August 2017

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Essex County Council Flood  
Services

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## VERSION CONTROL

Issue	Date	Details	Prepared By	Reviewed By	Approved By
1	19/05/2017	Working draft report for client review	Tom Palmer Project Design Engineer		
2	27/05/2017	Working draft report v2 for client review	Tom Palmer Project Design Engineer		
3	09/06/2017	Draft report v1.1 for client review	Tom Palmer Project Design Engineer	Tim Simpson, Development and Flood Risk Manager	Tim Simpson, Development and Flood Risk Manager
4	30/06/17	Draft report v1.2 for client review	Tom Palmer Project Design Engineer	Tim Simpson, Development and Flood Risk Manager	Tim Simpson, Development and Flood Risk Manager
5	21/08/2017	Final report	Tom Palmer Project Design Engineer	Tim Simpson, Development and Flood Risk Manager	Tim Simpson, Development and Flood Risk Manager

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## EXECUTIVE SUMMARY

This report forms an addendum to the existing Tendring District Council Strategic Flood Risk Assessment of 2009. It includes information on the following new or updated policies surrounding planning, flooding and climate change;

- National Planning Policy Framework (2012)
- Flood and Water Management Act (2010)
- National Flood and Coastal Erosion Risk Management Strategy (2011)
- North Essex Catchment Flood Management Plan (2009)
- Anglian Flood Risk Management Plan (2016)
- Climate Change Allowances (2016)
- Essex Local Flood Risk Management Strategy (2013)
- Flood Risk Regulations (2009)
- Jaywick Strategic Flood Risk Assessment Update Report (2015)

Updated climate change allowance values were released by the Environment Agency in 2016. Many existing fluvial flood models for the Tendring area were created prior to this and as such the flood extents do not reflect the changes. Assessments have been undertaken of each model to determine which, if any, outputs best reflect the new climate change values. These are given and should be used to help inform planning decisions.

Sequential tests have been undertaken for all of the 2017 Tendring Strategic Housing Land Availability Assessment (SHLAA) sites. These have been categorised into high, medium and low risk based on their interaction with and proximity to Environment Agency Flood Zones 2 and 3 (relating to flood risk from rivers and the sea), and their risk of flooding from surface water and groundwater. Of the 262 sites analysed, 17 have been determined to be at high risk and 12 at medium risk.

### Key Changes and Updates

National Planning Policy Framework (2012);

This document replaced PPS25 Development and Flood Risk, though sequential and exception tests must still be undertaken for proposed development sites. It requires Local Planning Authorities to set 5 year land supplies for development and requires production of a Local Development Plan to set out local planning policy.

## Tendring District Council Strategic Flood Risk Addendum

### Flood and Water Management Act (2010);

This enacted the recommendations of the Pitt Review 2008. It created Lead Local Flood Authorities and gave them responsibility for managing flood risk from local sources; that from watercourses, surface water and groundwater. It required LLFAs to produce a Local Flood Risk Management Strategy outlining how local flood risk will be managed.

### Anglian Flood Risk Management Plan (2016);

Flood Risk Management Plans explain the risk of flooding from rivers, the sea, surface water, groundwater and reservoirs and set out how Risk Management Authorities will manage flood and coastal erosion risk over the next 6 years. Tendring district falls entirely within the Combined Essex catchment of the Anglian FRMP, the key issues of which are identified as;

- High risks of coastal flooding due to the lower lying areas of land
- Higher coastal erosion rates due to the clay and sand based soils and soft underlying geology
- High risks of surface water flooding from high intensity, short duration storms. This can occur in both rural and urban areas.

### Climate Change Allowances (2016);

Updated climate change values for both rainfall events and fluvial flooding events were released by the Environment Agency in 2016 based on modelled using updated CO<sub>2</sub> emissions and scenario predictions. The results are categorised into Upper End, Higher Central and Central based on the likelihood of the scenarios occurring. Values are given as percentage increases, with rainfall events relating to the percentage increase in rainfall intensity and for fluvial flooding the percentage increase relating to peak river flows.

In Essex the Upper End values must be used for surface water flooding, which are 20% or 40% based on the lifetime of the proposed development. The Upper End and Higher Central values should be used for river flooding, with discretion as to the exact value to be agreed by Tendring District Council and the Environment Agency based on site specific variables. These are 20% or 35% and 35% or 65% respectively based on the lifetimes of the proposed developments.

## CONTENTS

1.0 INTRODUCTION.....	1
1.1 Report Purpose.....	1
1.2 Scope and Limitations .....	1
1.3 Background .....	2
1.4 Definition of Event Frequencies .....	2
2.0 PLANNING FRAMEWORK .....	3
2.1 Introduction .....	3
2.2 National Planning Policy .....	3
2.2.1 Planning Policy Statement 25 (December 2006).....	3
2.2.2 National Planning Policy Framework (March 2012) .....	3
2.2.3 Flood and Water Management Act (April 2010) .....	6
2.3 Regional Planning Policy .....	7
2.3.1 East of England Plan (Regional Spatial Strategy for the East of England). 7	
2.4 Local Planning Policy.....	7
2.4.1 Tendring District Local Plan .....	7
2.5 Environment Agency Policy .....	9
2.5.1 National Flood and Coastal Erosion Risk Management Strategy (NFCERMS) (May 2011) .....	9
2.5.2 North Essex Catchment Flood Management Plan (CFMP) (December 2009).....	10
2.5.3 Anglian River Basin District Flood Risk Management Plan 2015 – 2021 (March 2016).....	13
2.5.4 Essex and South Suffolk Shoreline Management Plan (SMP) (October 2010).....	14
2.5.4 Climate Change Allowances (February 2016).....	16
2.5.4.3 Coastal Climate Change Allowances .....	18
2.6 Additional Documents of Relevance .....	18
2.6.1 Essex Local Flood Risk Management Strategy (LFRMS) (February 2013) .....	18
2.6.2 Flood Risk Regulations (December, 2009) .....	19
2.6.3 Harwich SFRA (August 2008) .....	20
2.6.4 Jaywick SFRA Update Report (April 2015) .....	20

3.0 FLOOD RISK DATA AND INFORMATION .....	21
3.1 Flood Zones (Rivers and the Sea) .....	21
3.2 Surface Water Flood Risk Areas.....	22
3.3 Groundwater Flood Risk Areas.....	23
3.4 Hydraulic Modelling Studies .....	23
4.0 FLUVIAL FLOOD RISK .....	24
4.1 Introduction .....	24
4.2 Fluvial and Coastal Flood Risk .....	25
4.2.1 Kirby Brook.....	26
4.2.2 Ramsey River.....	27
4.2.3 Other Main Rivers and Major Watercourses .....	27
4.3 Fluvial Flood Defences .....	27
4.4 Effects of Climate Change on Fluvial Flood Risk.....	28
4.5 Effects of EA Policy on Fluvial Flood Risk.....	28
5.0 FLOOD RISK FROM OTHER SOURCES.....	28
5.1 Introduction.....	28
5.2 Surface Water Flood Risk.....	29
5.3 Groundwater Flooding .....	29
6.0 SEQUENTIAL TEST RESULTS.....	30
6.1 Overview.....	30
6.2 SHLAA Site Assessment Methodology.....	30
6.3 Sites with Medium Flood Risk.....	32
6.4 Sites with High Flood Risk .....	32
7.0 GUIDANCE FOR FUTURE DEVELOPMENTS.....	32

## **LIST OF FIGURES**

Figure 2.1: North Essex CFMP Areas

Figure 2.2: Essex and South Suffolk SMP management units

## **LIST OF TABLES**

Table 2.1: Anglian Region fluvial climate change allowances

Table 2.2: Anglian Region peak rainfall intensity climate change allowances

Table 3.1: Environment Agency Flood Zone definitions

Table 3.2: Environment Agency surface water flood risk area definitions

Table 3.3: Environment Agency hydraulic models covering Tendring district

Table 4.1: EA Fluvial models and new climate change allowances summary

Table 6.1: SHLAA site risk categories and map representation

Table 6.2: Summary information for the 12 medium flood risk sites

Table 6.3: Summary information for the 17 high flood risk sites

## **LIST OF APPENDICES**

Appendix 1: Map of SHLAA sites rated by flood risk

Appendix 2: Essex and South Suffolk SMP Policies

Appendix 3: Environment Agency hydraulic model extents

Appendix 4: Flood Zones – Rivers, Estuaries and the Sea

Appendix 5: Fluvial Zones (Rivers, Estuaries and the Sea) and SHLAA sites

Appendix 6: 1% AEP Risk of Flooding from Surface Water map

Appendix 7: 0.1% AEP Risk of Flooding from Surface Water map

Appendix 8: 1% AEP Risk of Flooding from Surface Water map with SHLAA sites

Appendix 9: 0.1% AEP Risk of Flooding from Surface Water map with SHLAA sites

Appendix 10: Areas Susceptible to Groundwater Flooding map

Appendix 11: Areas Susceptible to Groundwater Flooding map with SHLAA sites

Appendix 12: SHLAA Stage 1 analysis results table

Appendix 13: SHLAA analysis high risk site maps and information

## GLOSSARY AND ABBREVIATIONS

Annual Exceedance Probability	AEP	The probability of a rainfall or flood event occurring in a given year. A 1% AEP event is likely to occur on average once every 100 years.
Critical Drainage Area	CDA	A smaller catchment area identified within a wider SWMP study area as being at higher risk of surface water flooding.
Catchment Flood Management Plan	CFMP	A strategic plan produced by the EA to develop complementary policies for the long-term management of flood risk within a river catchment area over the next 50 years taking into account the likely impacts of changes in climate, the effects of land use and land management, and to seek to identify multiple benefits and to contribute overall towards sustainable development.
Environment Agency	EA	The authority responsible for managing the risk of flooding from main rivers and the sea.
Flood and Coastal Erosion Risk Management	FCERM	The term for activities and actions undertaken by RMA's to reduce flood risk and coastal erosion.
Flood Risk Management Plan	FRMP	FRMP's explain the risk of flooding from rivers, the sea, surface water, groundwater and reservoirs and set out how Risk Management Authorities will manage them over the next 6 years. They are a requirement of the EU Floods Directive 2007 and cover river basin districts.
Flood and Water Management Act 2010		The Act that implemented the recommendations of the Pitt Review 2008 and created Lead Local Flood Authorities.
Local Development Framework	LDF	Local Development Frameworks (LDFs) were introduced under the Local Government Act in 2000 and are a framework in which local development documents sit and is based on the objectives of the Local Community Strategy., these strategies set out the long-term vision for your local area. The Framework is intended to be a more flexible plan and will comprise of two main parts:  1. Development Plan Documents: These are local development documents and contain, amongst others, Core Strategy, Area Action Plans and a proposals map.



## Tendring District Council Strategic Flood Risk Addendum

2. Other documents: These documents contain, amongst others, the Statement of Community Involvement (SCI), the Local Development Scheme (LDS), and Supplementary Planning Documents (SPD).

Local Development Plan	LDP	The Local Development Plan is a plan for the future development of the local area, drawn up by the Local Planning Authority. It guides decisions on whether or not planning applications can be granted. In law it is described as the development plan documents adopted under the Planning and Compulsory Purchase Act 2004. A Local Plan can consist of one or more documents
Local flood risk		The risk of flooding from ordinary watercourses, surface water and groundwater, as defined by the Flood and Water Management Act 2010
Local Flood Risk Management Strategy	LFRMS	A strategic document produced by a LLFA as a requirement of the Flood and Water Management Act 2010. It sets out how local flood risk will be managed
Lead Local Flood Authority	LLFA	A unitary authority or county council with responsibility for managing local flood risk
Local Planning Authority	LPA	A unitary authority or district council whose duty it is to carry out specific planning functions (producing Local Plans and determining planning applications) for a particular geographical area.
National Flood and Coastal Erosion Risk Management Strategy	NFCERMS	A strategy produced by the EA as a requirement of the Flood and Water Management Act 2010. It sets out the overarching framework for future action by all risk management authorities to tackle flooding and coastal erosion in England, embedding localism at the heart of the strategy
National Planning Policy Framework	NPPF	The NPPF sets out the UK government's current planning policies for England and how they are to be implemented by Local Planning Authorities.
Risk Management Authority	RMA	Any authority with a responsibility for managing flood or coastal erosion risks
Strategic Flood Risk Assessment	SFRA	A study assessing the flood risk from all types of flooding in the councils' administrative areas, taking into account predicted changes in the climate. The study will be used as background information when preparing and reviewing the Tendring local development Plan. It guides the council in applying the sequential and exception test required by the NPPF. These tests seek to guide new development to the area of lowest flood risk and, if, following the

## Tendring District Council Strategic Flood Risk Addendum

application of the Sequential Test, development has no alternative other than to go ahead in areas of higher flood risk, then the SFRA provides advice on how to manage that risk.

Strategic Housing Land Availability Assessment SHLAA

An assessment of the availability of strategic and other land uses available for development within an area. Such a list is required to be compiled by Local planning Authorities under paragraph 159 of the NPPF in order to establish realistic assumptions about the availability, suitability and economic viability of land to meet the identified housing need over the Local Plan period.

Shoreline Management Plan SMP

A shoreline management plan (SMP) is a strategic document that sets out policies to assist decision-making on flooding from the sea and coastal erosion risk management over the next 20, 50 and 100 years.

Tendring District Council TDC

The District Council and Local Planning Authority for the area of Tendring.

Water Cycle Study WCS

A study that better understands the relationships between development and the water environment by examining the potential impacts of future growth on water resources, water quality and flood risk. This document forms part of the evidence based used when developing a Local Plan.

## 1.0 INTRODUCTION

### 1.1 Report Purpose

This report forms an addendum to the existing Tendring District Council (TDC) Strategic Flood Risk Assessment (SFRA) produced by JBA Consulting in 2009. It exists to update subsequent changes to national planning policy, climate change allowances and flood risk zones, the creation of the Flood and Water Management Act 2010 and Flood Risk Regulations, and to align with the current update to the Local Development Plan. It should be used in conjunction with the existing SFRA<sup>1</sup> to assess flood risk during the determination of all planning applications.

### 1.2 Scope and Limitations

An SFRA is a planning document used to fully understand the flood risk in an area to inform the assessment and selection of appropriate strategic development sites to ensure they are outside of flood risk areas. It involves the assessment of;

1. Flood risk from main rivers, other rivers and streams, surface water, groundwater and the sea, all including the impacts of climate change.
2. The impact that land use changes and development in an area will have on wider flood risk.

The National Planning Policy Framework requires Local Planning Authorities to prepare an SFRA in consultation with the Environment Agency and other Flood Risk Management Authorities to refine information on areas at risk of flooding, taking into account all sources of flooding and the impacts of climate change. In their creation and updating of policies under the Local Development Framework, planning authorities must develop a robust evidence base to inform and justify decision making. The SFRA forms an essential part of this evidence.

The existing Tendring SFRA, together with the associated Sequential Test Report and this addendum should inform the Sustainability Appraisal of the Local Plan and Strategic Housing and Land Availability Assessment (SHLAA) sites. Advice and guidance on how an SFRA should be used in plan making is provided in the National Planning Practice Guidance<sup>2</sup>.

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<sup>1</sup> Tendring DC Strategic Flood Risk Assessment (March 2009); <http://www.tendringdc.gov.uk/planning/local-plans-and-policies/view-our-local-plan/technical-studies-and-evidence/strategic-flood>

<sup>2</sup> National Planning Practice Guidance notes (November 2016); <https://www.gov.uk/government/collections/planning-practice-guidance>

The updated schedule of SHLAA sites currently being considered by TDC as part of the update to their Local Development Plan (LDP) has been subjected to Stage 1 assessments, with Stage 2 assessments completed where necessary.

An SFRA is also used as part of a wider flood risk evidence base during the assessment and determination of all planning applications. Updated fluvial and surface water flood risk mapping is included in this report to supersede that within the existing SFRA.

The scope of this report is to provide an addendum update to the existing SFRA following changes to legislation, planning guidance and other policies. This addendum includes;

- Changes resulting from the adoption of the National Planning Policy Framework
- Changes resulting from the enactment of the Flood and Water Management Act 2010
- Changes resulting from the updated Environment Agency Climate Change figures
- The latest 2017 SHLAA sites with Stage 1 assessments for all sites and Stage 2 assessments where required

This report does not constitute a full update or replacement of the existing SFRA. The aspects not covered by this report will need to be assessed during the creation of a full replacement SFRA.

### **1.3 Background**

In 2009 JBA Consulting completed a district-wide Strategic Flood Risk Assessment for TDC. This addendum forms an update to the 2009 SFRA to incorporate the subsequent changes to planning policy and climate change allowances, and to align with the development of the emerging TDC Local Development Plan.

### **1.4 Definition of Event Frequencies**

Rainfall and flood events are defined based on the frequency at which they are predicted to occur. Historically this has been expressed as return period with a form of 1 in x; so a 1 in 100 year storm is likely to occur on average once every 100 years.

To reduce confusion this has subsequently be redefined to become Annual Exceedance Probability (AEP) by the EA. This method details the risk of an event

happening each year, as a percentage, with a 1 in 100 year event becoming a 1% AEP event.

This addendum refers to flood risk in the form of AEP. All risk from flooding and rainfall should be expressed in this format to comply with EA best practice<sup>3</sup>.

## **2.0 PLANNING FRAMEWORK**

### **2.1 Introduction**

The purpose of this section is to identify all high level and strategic documents relevant to the content of an SFRA. Further details are given where updates have been completed or changes to policy have been made since the existing SFRA was completed.

Only relevant changes concerning new or updated documents are referred to in this addendum. All other additional documentation referenced in the existing SFRA remains current and relevant.

### **2.2 National Planning Policy**

#### **2.2.1 Planning Policy Statement 25 (December 2006)**

PPS25; Development and Flood Risk was repealed and replaced with the National Planning Policy Framework in March 2012. Details of relevant requirements can be found in the following section.

#### **2.2.2 National Planning Policy Framework (March 2012)**

The NPPF<sup>4</sup> sets out how national planning policies should be implemented by Local planning Authorities (LPA's). It sets out a presumption for sustainable development, which should be a key consideration in all aspects of plan creation and decision making. It places a focus on protecting the natural and historic environment and encourages the re-use of brownfield sites as a priority.

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<sup>3</sup> Environment Agency Fluvial Design Guide (January 2010); <http://evidence.environment-agency.gov.uk/FCERM/en/FluvialDesignGuide/Chapter2.aspx?pagenum=4>

<sup>4</sup> National Planning Policy Framework (March 2012); <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

The NPPF removed the need for housing targets to be set regionally through Regional Spatial Strategies and determined that all Local planning Authorities must identify a deliverable 5-year housing supply. This must be updated annually to ensure appropriate availability of land, with numbers agreed by the Planning Inspectorate. Local Development Frameworks were replaced with Local Plans, which are updated cyclically to guide development, infrastructure provision and economic growth.

The NPPF lists 12 core planning principles that should underpin plan creation and decision making<sup>5</sup>. Those relevant to flood risk are summarised below;

- Planning should proactively drive and support sustainable development.
- Planning should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change.
- Planning should contribute to conserving and enhancing the natural environment and reducing pollution. Allocations of land use should prefer land of lesser environmental value.
- Encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value.
- Promote mixed use developments, and encourage multiple benefits from the use of land in urban and rural areas, recognising that some open land can perform many functions (such as for wildlife, recreation, flood risk mitigation, carbon storage, or food production);

Flood risk is addressed in Section 10 of the NPPF<sup>6</sup>. This states that LPA's should adopt proactive strategies to mitigate and adapt to climate change, taking full account of flood risk, coastal change and water supply and demand considerations.

Local Plans should take account of climate change over the longer term, including factors such as flood risk, coastal change, water supply and changes to biodiversity and landscape. New development should be planned to avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure.

Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. A sequential, risk-based approach to the location of development should be implemented to avoid creating

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<sup>5</sup> National Planning Policy Framework (March 2012); paragraph 7, page 5

<sup>6</sup> National Planning Policy Framework (March 2012); page 21

flood risk to people and property and manage any residual risk, taking account of the impacts of climate change. This should be achieved by:

- Applying the Sequential Test
- If necessary, applying the Exception Test
- Safeguarding land from development that is required for current and future flood management
- Using opportunities offered by new development to reduce the causes and impacts of flooding
- Where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to facilitate the relocation of development, including housing, to more sustainable locations.

The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding.

If, following application of the Sequential Test, it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied if appropriate. For the Exception Test to be passed:

- It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
- A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Both elements of the test will have to be passed for development to be allocated or permitted.

This addendum undertakes Stage 1 and 2 sequential test analyses for all identified 2017 SHLAA sites, the results of which can be found in Section 6.

When determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific flood risk assessment following the Sequential Test, and if required the Exception Test, it can be demonstrated that:



- Within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location; and,
- Development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives priority to the use of sustainable drainage systems

For individual developments on sites allocated in development plans through the Sequential Test, applicants need not apply the Sequential Test. Applications for minor development and changes of use should not be subject to the Sequential or Exception Tests but should still meet the requirements for site-specific flood risk assessments.

To reduce risk from coastal change inappropriate development in vulnerable areas or adding to the impacts of physical changes to the coast should be avoided. Account must be taken of the UK Marine Policy Statement and marine plans to ensure integration of the terrestrial and marine planning regimes.

### **2.2.3 Flood and Water Management Act (April 2010)**

The 2008 Pitt Review<sup>7</sup> investigated the severe flooding across England and Wales in the summer of 2007 and identified a number of measures and changes to the way organisations in the UK adapt and react to the increased risk of flooding.

The Flood and Water Management Act of 2010<sup>8</sup> enacts the recommendations of the Pitt Review and designated County Councils and Unitary Authorities as Lead Local Flood Authorities (LLFA's). As LLFA for Essex, ECC has responsibility to lead and co-ordinate local flood risk management; defined as the risk of flooding from surface water, groundwater and ordinary watercourses.

Section 9 of the Act requires LLFAs to produce a Local Flood Risk Management Strategy (LFRMS) to set out a county-wide approach to the management of local flood risk. Further information on this can be found in Section 2.6.1.

The Flood and Water Management Act proposed the establishment of SuDS Approval Boards within LLFAs to assess SuDS within planning applications and manage adoption and maintenance. Following consultation this was not enacted and

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<sup>7</sup> The Pitt Review (June 2008); [http://webarchive.nationalarchives.gov.uk/20100807034701/http://archive.cabinetoffice.gov.uk/pittreview/thepittreview/final\\_report.html](http://webarchive.nationalarchives.gov.uk/20100807034701/http://archive.cabinetoffice.gov.uk/pittreview/thepittreview/final_report.html)

<sup>8</sup> The Flood and Water Management Act (2010); <http://www.legislation.gov.uk/ukpga/2010/29/contents>



the implementation and delivery of SuDS must now be achieved through the planning process.

In April 2015 LLFAs became statutory consultees on surface water drainage and SuDS for all major planning applications. ECC has produced a SuDS Design Guide<sup>9</sup> to demonstrate how new developments can accommodate SuDS, the standards expected of them so they are suitable for approval in the county of Essex, and provide advice on maintenance.

The Act also changed and formalised the activities of other flood risk management authorities. The responsibility to lead and co-ordinate the management of flooding from Main Rivers and the sea remains with the Environment Agency.

Section 7 of the Act required the EA to produce a National Flood and Coastal Erosion Risk Management Strategy (NFCERMS) outlining a wide-scale approach to the understanding of flood risks and how resilience can be better built through joint working and community engagement. Further information on this can be found in Section 2.5.1.

## **2.3 Regional Planning Policy**

### **2.3.1 East of England Plan (Regional Spatial Strategy for the East of England)**

Regional Spatial Strategies were removed as part of the implementation of the Localism Act 2011<sup>10</sup>, which gave councils and communities greater control over planning decision making. The supply of housing is delivered through LPA Local plans, with a requirement for a continuous, deliverable 5-year land supply<sup>11</sup>. This must be updated annually with numbers agreed by the Planning Inspectorate.

## **2.4 Local Planning Policy**

### **2.4.1 Tendring District Local Plan**

The current Tendring District Local Plan was adopted in December 2007. An update to this is ongoing, with the emerging 2013-33 Local Plan expected to be adopted in 2018. This addendum and the existing SFRA form supporting evidence to the new plan.

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<sup>9</sup> Essex County Council SuDS Design Guide (April 2016); [https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds\\_design\\_guide.pdf](https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/View-It/Documents/suds_design_guide.pdf)

<sup>10</sup> The Localism Act (2011); <http://www.legislation.gov.uk/ukpga/2011/20/contents/enacted>

<sup>11</sup> National Planning Policy Framework (March 2012); paragraph 47, page 12

In the existing Local plan the following policies surrounding flooding, flood risk and sustainable drainage are present. These will be superseded by the new local plan:

- Policy QL3; Minimising and Managing Flood Risk
- Policy COM32; Sea Defences
- Policy COM33; Flood Protection
- Policy EN13; Sustainable Drainage Systems

The new Local Plan is being created to provide sustainable housing and employment allocations for the district of Tendring, up to the year 2033. It details the visions, objectives and management policies to achieve this.

Objective 9 concerns water and climate change and aims to achieve the reduction of all types of flood risk by securing the appropriate location and design of new development, including SuDS, having regard to the likely impact of climate change.

The following new policies concerning flooding and water resourcing will be implemented within the emerging Local Plan:

### **2.4.1.1 Policy PPL 1; Development and Flood Risk**

This policy directly addresses Objective 9 and concerns the interconnection of flood risk and new development. It states that all development proposals should include measures to mitigate flood risk both on and off site and that new development in high flood risk areas must be designed to be resilient to flooding.

All applications for sites over 1ha in size must be accompanied by a site specific flood risk assessment and all new developments should consider the potential for green infrastructure to help mitigate flood risk, and it include this where appropriate.

For potential sites impacted by flood zones 2 and 3 (medium and high flood risk) the sequential and exception tests must be applied to meet the requirements of the NPPF and ensure appropriately located development.

### **2.4.1.2 Policy PPL 2; Coastal Protection Belt**

Tendring district has large areas at risk of coastal erosion and the NPPF states that inappropriate development should be avoided in vulnerable areas such as this. As such this policy exists to guide development in the defined Coastal Protection Belt.

In regards to the flood risk of coastal areas, it states that TDC will take an adaptive approach to coastal protection, where required, having regard to an assessment of the impact of coastal change.

#### **2.4.1.3 Policy PPL 5; Water conservation, Drainage and Sewerage**

Tendring District experiences the lowest average annual rainfall of the entire UK, so this policy exists to ensure the appropriate provision of potable water and sewage supplies to create sustainable development. This includes the impacts of climate change and the resultant changes to rainfall patterns which can impact both times of drought and flood.

Developments should include plans to conserve water supplies by managing demand and ensuring appropriate disposal, at all stages of development. The use of SuDS is promoted to help reduce water usage and minimise flood risk by mimicking natural drainage systems. The ecology and amenity values of such features should also be considered by proposed development. Applicants must consider SuDS and provide acceptable justification and explanations for not doing so.

#### **2.4.1.4 Policy PPL 14; Ardleigh Reservoir Catchment Area**

Ardleigh reservoir forms part of the wider water provision system for Tendring and the surrounding area and as such any development in its proximity must give a greater consideration to water quality. This policy exists to ensure any proposed development within the defined boundary around the reservoir is determined following detailed consultation with the reservoir operator.

## **2.5 Environment Agency Policy**

### **2.5.1 National Flood and Coastal Erosion Risk Management Strategy (NFCERMS) (May 2011)**

The NFCERMS<sup>12</sup> is a requirement of the Flood and Water Management Act 2010 and sets out a nationwide approach to actions that can be taken to manage flood and coastal erosion risks to balance the needs of communities, the economy and the environment.

The strategy builds on existing approaches to Flood and Coastal Erosion Risk Management (FCERM) and promotes a wide range of measures to co-ordinate this

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<sup>12</sup> Environment Agency National Flood and Coastal Erosion Risk Management Strategy (May 2011); <https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england>

within catchments and along the coast. It sets the framework for giving communities a greater role in local risk management decisions and sets out the EAs strategic overview role.

The strategy encourages more effective risk management by enabling people, communities, business, infrastructure operators and the public sector to work together to;

- Ensure a clear understanding of the risks of flooding and coastal erosion, nationally and locally, so that investment in risk management can be prioritised more effectively.
- Set out clear and consistent plans for risk management so that communities and businesses can make informed decisions about the management of the remaining risk.
- Manage flood and coastal erosion risks in an appropriate way, taking account of the needs of communities and the environment.
- Ensure that emergency plans and responses to flood incidents are effective and that communities are able to respond effectively to flood forecasts, warnings and advice.
- Help communities to recover more quickly and effectively after incidents.

The strategy shows how communities can be more involved in local flood and coastal erosion risk management. It also emphasises the need to balance national and local activities and funding.

In setting out future approaches to FCERM, this strategy considers the level of risk and how it might change in the future, the risk management measures that may be used, roles and responsibilities, future funding and the need for supporting information.

The NFCERMS focuses primarily on the mitigation and management of existing risk through community engagement and joint working across RMA's, however it should be considered during strategic, policy and planning decisions to ensure they align with the aims of the strategy and do not create conflict with ongoing management activities.

### **2.5.2 North Essex Catchment Flood Management Plan (CFMP) (December 2009)**

A Catchment Flood Management Plan (CFMP) is a high-level strategic document produced by the Environment Agency to provide an overview of the main sources of flood risk, and recommend measures to mitigate this over the subsequent 50 to 100

years. CFMP's are used to inform local planning policy and support the implementation of Water Framework Directive objectives.

CFMP's were superseded by Flood Risk Management Plans, further information surrounding which can be found in Section 2.5.3, however this section is included due to the specific information it contains regarding flood risk in Tendring.

Tendring district falls entirely within the North Essex CFMP<sup>13</sup>. This divides the area into 8 sub-areas based on their similar characteristics and assigns one of 6 policies detailing the preferred approach to managing flood risk, as shown in Figure 2.1.

The policy options are:

**Policy 1:** Areas of little or no flood risk where the EA will continue to monitor and advise.

**Policy 2:** Areas of low to moderate flood risk where we can generally reduce existing flood risk management actions. (Sub-area 1; The majority of Tendring District)

**Policy 3:** Areas of low to moderate flood risk where we are generally managing existing flood risk effectively. (Sub area 2; the areas of Tendring District bordering Suffolk Colchester and Colchester Borough, Sub area 8; Harwich and Clacton-on-Sea)

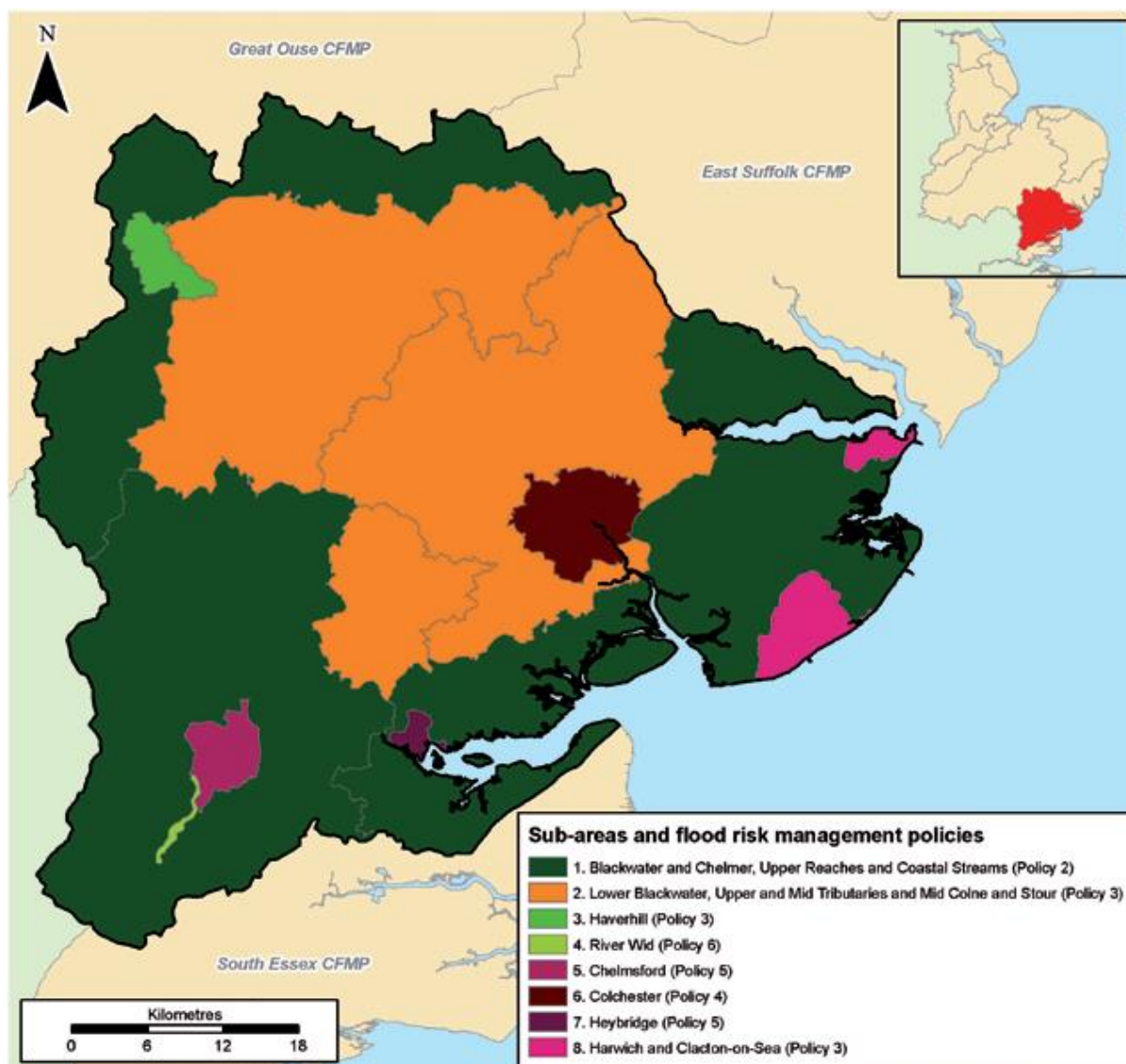
**Policy 4:** Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.

**Policy 5:** Areas of moderate to high flood risk where we can generally take further action to reduce flood risk.

**Policy 6:** Areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits.

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<sup>13</sup> Environment Agency North Essex Catchment Flood Management Plan (December 2009); <https://www.gov.uk/government/publications/north-essex-catchment-flood-management-plan>



**Figure 2.1:** North Essex CFMP policy areas<sup>14</sup>

The majority of Tendring district falls within sub-area 1, designated policy area 2. The proposed actions to implement this preferred policy option are;

- Cease or reduce current bank and channel maintenance to help naturalise rivers and improve flows between the channel and floodplain.
- Changes in land-use, development of sustainable farming practices and environmental enhancement should be investigated to mitigate an increase in future flood risk.
- Any new development should be resilient to flooding and provide opportunities to improve river environments.

<sup>14</sup> From Environment Agency North Essex Catchment Flood Management Plan (December 2009); Map 3, page 12



- Continue with the flood warning service including the maintenance of flood warning infrastructure and public awareness plans.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk of flooding.

Smaller areas on the north-east borders of the district along with the large urban areas of Harwich and Clacton-on-Sea fall within sub-areas 2 and 8 respectively, designated policy area 3. The proposed actions to implement this preferred policy option are;

- Continue with the current flood risk management activities.
- Continue with the flood warning service including the maintenance of flood warning infrastructure and public awareness plans.
- The location, layout and design of new and redeveloped property must be considered to ensure that only appropriate development is permitted.
- Work with partners to develop emergency response plans for critical infrastructure and transport links at risk of flooding.

### **2.5.3 Anglian River Basin District Flood Risk Management Plan 2015 – 2021 (March 2016)**

Flood Risk Management Plans explain the risk of flooding from rivers, the sea, surface water, groundwater and reservoirs. They set out how RMA's will manage flood and coastal erosion risk over the 6 year plan period, and are a requirement of the Flood Risk Regulations 2007. Tendring district falls entirely within the Combined Essex catchment of the Anglian FRMP<sup>15</sup>.

The key issues identified for this catchment are;

- High risks of coastal flooding due to the lower lying areas of land
- Higher coastal erosion rates due to the clay and sand based soils and soft underlying geology
- High risks of surface water flooding from high intensity, short duration storms. This can occur in both rural and urban areas.

In total 303 measures are proposed across the entire catchment to manage the flood risk. These include activities that are over and above the normal actions of Risk Management Authorities, and include discrete projects and campaigns. Those relevant to Tendring district are listed below;

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<sup>15</sup> Anglian River Basin District Flood Risk Management Plan (2016);  
<https://www.gov.uk/government/publications/anglian-river-basin-district-flood-risk-management-plan>

- Develop planning policy locally for caravan parks within a national policy framework e.g. roll-back policy. This needs to include the issue of permanent residency. Potential route for delivery via LA and caravan park owners with EA. And TDC Coastal pathfinder.
- Work with communities to investigate ways to manage flood risk in Bocking, Churchstreet, Braintree, Ashingdon, Bulpham, Gt Bardfield, Clacton, Gt Yeldham, Gt Dunmow, Haverings Gore, Little Waltham, Sible Hedingham, Steeple Bumpstead, Witham Dedham and Ford Street.
- Work with NE to agree a shared planned approach for adaptation and resilience of Holland Marshes, Cornard Mere, Cattawade Marsh, Upper Colne Marshes, Mark Tey Brick Pits, Roman River, Arger Fen, Chalky Wood SSSIs, Dedham Vale and Suffolk Coast and heaths AONB.
- Ensure partnership working and a flexible approach to the planning policies for Jaywick - short term planning guidance sought to avoid blight. Potential delivery route - TDC Core Strategy Review, TDC Pathfinder work.
- Develop and disseminate flood risk guidance specifically for caravan owners, occupants and businesses to raise awareness of risk and emergency plans. These are found along the Tendring peninsula, Colne, Blackwater, Roach and Crouch Estuaries.
- Conditioning, refurbishment and maintenance of assets at Borley Mill, Chelmsford automated gates, Cockett wick sluice trash screen, Colne Barrier, Long Melford channel clearance, Prittle Brook as well as others.
- Understand contaminated land at flood risk and waste filled flood defences along the Dengie peninsular and the Roach and Crouch Estuary and specific sites of Barling Marsh.

### **2.5.4 Essex and South Suffolk Shoreline Management Plan (SMP) (October 2010)**

The Essex and South Suffolk SMP<sup>16</sup> is a high-level strategic document in which the organisations that manage the shoreline set their long-term plan. It was withdrawn in August 2014 but is summarised within this document as the outputs remain relevant to planning in coastal areas.

The SMP aims to identify the best ways to manage flood and erosion risk to people and to the developed, historic and natural environment. It also identifies opportunities where shoreline management can work with others to make improvements.

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<sup>16</sup> Essex and South Suffolk Shoreline Management Plan 2 (March, 2010); <http://www.eacg.org.uk/docs/smp8/essex&southsuffolk%20smp%20final%202.4.pdf>



The SMP divides the coast into management units, as shown in Figure 2.2. Tending district covers four; Unit A: Stour and Orwell; Unit B: Hamwater; Unit C: Tending Peninsula and Unit D: Colne Estuary.



**Figure 2.2:** Essex and South Suffolk Shoreline Management Plan management units<sup>17</sup>

The outcomes of the SMP are to develop an ‘intent of management’ for the shoreline that achieves the best possible and achievable balance of all the values and features around the shoreline for the coming 100 years. These are categorised into 4 policy labels;

- **Hold the line (HtL);** Maintaining the defences in their current physical position. No detail is given on the specific standard of protection.
- **Advance the line (AtL);** Building new defences seawards of the existing defence line.
- **Managed realignment (MR);** Allowing or enabling the shoreline to move, with associated management to control or limit the effect on land use and environment. This can take various forms, all characterised by managing

<sup>17</sup> From Essex and South Suffolk Shoreline Management Plan 2 (March, 2010); Figure 1-1, page 16

change, either technically, for land use or for the environment. This is divided into 2 measures as detailed below.

- **No active intervention (Nal)**; No further investment in coastal defences or operations

Further subdivisions of managed retreat exist, and indications are given as to whether the standard of protection should be improved;

- **HtL+, AtL+, MR+**; Maintain or upgrade the standard of protection, including taking into account the impacts of climate change.
- **MR1**; Allow local and limited intervention to limit the risks of erosion as long as negative impacts are minimised. This may involve small scale works. And
- **MR2**; Breach of the frontline defence after building any necessary new landward defence line and counterwalls to limit flooding to adjacent areas.

A table showing the relevant management approaches for the coastal sections affecting Tendring can be found in Appendix 2.

#### **2.5.4 Climate Change Allowances (February 2016)**

The NPPF states that making allowances for the impacts of climate change is required as part of the creation of any flood risk assessment to ensure resilient and sustainable development<sup>18</sup>.

The climate change values outlined in the original SFRA arose from Annex B of PPS25, and have subsequently been updated by the Environment Agency on behalf of Defra and the Department for Communities and Local Government (DCLG). New values for both rainfall events and fluvial flooding events have been modelled using updated CO<sub>2</sub> emissions and scenario predictions. The results are categorised into upper end, higher central and central based on the likelihood of the scenarios occurring.

In Essex both the higher central and upper end values must be used to ensure that the range of uncertainty with regard to the magnitude of flow or rainfall changes is explored. This allows any potential impacts to the development or land use change as a consequence of the variance in climate change uncertainty to be understood by both planners and developers, ensuring the safest and most sustainable development.

Different values exist for different periods of time over the next century and those used should be chosen based on the lifetime of the proposed development.

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<sup>18</sup> National Planning Policy Framework (March 2012); Section 10

Residential development should be considered for a minimum of 100 years, unless there is specific justification for considering a shorter period. For example; the time in which flood risk or coastal change is anticipated to impact on it, where a development is controlled by a time-limited planning condition.

The lifetime of a non-residential development depends on the characteristics of that development. Planners should use their experience within their locality to assess how long they anticipate the development being present for. Developers would be expected to justify why they have adopted a given lifetime for the development, for example, when they are preparing a site-specific flood risk assessment. The impact of climate change needs to be taken into account in a realistic way and developers, the local planning authority and Environment Agency should discuss and agree what allowances are acceptable. In Essex the Environment Agency advise using a minimum lifetime of 60 years for non-residential development.

#### 2.5.4.1 Fluvial Climate Change Allowances

Fluvial climate change allowances apply to the peak flood flows in rivers. They apply to Flood Zones only, and should be used where a development abuts or contains a watercourse or main river.

Allowance Category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper End	25%	<b>35%</b>	<b>65%</b>
Higher Central	15%	<b>20%</b>	<b>35%</b>
Central	10%	15%	25%

**Table 2.1:** Anglian Region fluvial climate change allowances<sup>19</sup>

Table 2.1 shows the fluvial climate changes values for the Anglian Region. The upper end and higher central values shown in bold should be considered in line with the above guidance and lifetime of the proposed development.

<sup>19</sup> Government Guidance; Flood Risk Assessments and Climate Change Allowances (February 2016); <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-1> (Table1)

### 2.5.4.2 Surface Water Climate Change Allowances

Surface water climate change allowances apply to peak rainfall intensity and the subsequent surface water flooding that storms cause. They apply to runoff calculations and must be used to determine future greenfield runoff rates and storage volumes to ensure appropriate Sustainable Drainage Systems (SuDS) are utilised.

Table 2.2 shows the pluvial climate changes values for the Anglian Region. The upper end values shown in bold should be considered in line with the above guidance and lifetime of the proposed development.

Allowance Category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper End	10%	<b>20%</b>	<b>40%</b>
Central	5%	10%	20%

**Table 2.2:** Nationwide peak rainfall intensity climate change allowances<sup>20</sup>

### 2.5.4.3 Coastal Climate Change Allowances

No updates have been made to the coastal climate change allowances since the creation of the Tendring SFRA. As such the existing predicted sea level increases should still be used.

## 2.6 Additional Documents of Relevance

### 2.6.1 Essex Local Flood Risk Management Strategy (LFRMS) (February 2013)

As Lead Local Flood Authority, ECC completed and published a Local Flood Risk Management Strategy (LFRMS) in 2013<sup>21</sup>. This sets out a county-wide approach to the management of local flood risk, defined as the risk of flooding from surface water, groundwater and ordinary watercourses.

<sup>20</sup> Government Guidance; Flood Risk Assessments and Climate Change Allowances (February 2016); <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-2> (Table2)

<sup>21</sup> Essex County Council Local Flood Risk Management Strategy (2013); [https://www.essex.gov.uk/Publications/Documents/Local\\_Flood\\_Risk\\_Management\\_strategy.pdf](https://www.essex.gov.uk/Publications/Documents/Local_Flood_Risk_Management_strategy.pdf)

An outcome of the LFRMS is the production of Surface Water Management Plans (SWMP's) which investigate local flood risk on smaller scales. This allows the flooding processes to be better understood, highlighting potential mitigation measures and opportunities for joint working with partner RMA's.

SWMP's identify Critical Drainage Areas (CDA's), which are sub-catchments within the wider SWMP area that are at higher risk. These are prioritised county-wide based on a range of factors to determine which are taken forward for further analysis and the potential provision of a flood alleviation scheme.

In Essex the production of SWMP's has been divided into tier 1 and 2 based on the flood risks of separate areas. To date ECC has completed reports for all tier 1 areas, constituting 8 SWMP's, though none exist within the district of Tendring. Colchester has an SWMP though none of the identified CDA's exist in the areas bordering Tendring district.

The LFRMS is currently being updated with the new version expected to be published in 2018. Once available, it should be used as evidence during all relevant planning policy and development decisions and when determining planning applications.

### **2.6.2 Flood Risk Regulations (December, 2009)**

The Flood Risk Regulations 2009 transpose the 2007 EC Floods Directive (2007/60/EC)<sup>22</sup> into UK law. They require LLFA's to prepare Preliminary Flood Risk Assessments (PFRA's) to identify significant areas of surface water and groundwater flood risk. Where such areas are highlighted, a Flood Risk Management Plan (FRMP) must be undertaken to produce mapping showing the associated risks and hazards. Essex County Council published the Essex PFRA in 2011<sup>23</sup> and no significant flood risk areas were identified in the vicinity of Tendring.

PFRA's are completed on a 6 year cycle and ECC are currently producing an update document. This will be submitted to the EA for review in June 2017 and once published should be considered during all relevant planning policy and development decisions.

The Flood Risk Regulations require all EU member states to produce Flood Risk Management Plans (FRMPs) for each river basin district. Tendring is solely contained within the Anglian area, and information on the Anglian FRMP can be found in Section 2.5.3.

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<sup>22</sup> EC Floods Directive (October, 2007); <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32007L0060>

<sup>23</sup> Essex County Council PFRA (June 2011); <https://www.essex.gov.uk/Environment%20Planning/Environment/local-environment/flooding/Flood-water-management-strategies/Pages/Preliminary-Flood-Risk-Assessment.aspx>



### **2.6.3 Harwich SFRA (August 2008)**

The Harwich SFRA<sup>24</sup> constitutes a level 2 assessment for the Harwich area, and exists as a separate document to the Tendring-wide SFRA due to the higher population density of the area and the increased risk of flooding from coastal flooding. Potential development sites are assessed in terms of fluvial and coastal flooding to inform appropriate and sustainable development, with sequential and exception tests undertaken where required.

No subsequent updates have been undertaken to this specific document, however newer tidal modelling has been completed for the Stour estuary by the Environment Agency in 2011.

As such the Harwich SFRA remains relevant for the open coast flooding aspects of the area but fluvial and surface water flooding should be assessed using the district-wide SFRA and this addendum document.

### **2.6.4 Jaywick SFRA Update Report (April 2015)**

The Jaywick area is predominantly located within Flood Zone 3 due its relatively low and flat topography and proximity to the coast. It is currently protected to a high standard but a separate SFRA was completed due to the higher residual flood risk.

JBA consultants originally undertook a study in August 2007 to align with production of the current SFRA and this was subsequently updated in 2015<sup>25</sup>. The latter updated the SFRA to reflect legislation and policy changes and provide up-to-date information on flood zones and hazards.

This document should be used in conjunction with this addendum and the district-wide SFRA to assess potential development in the Jaywick area and to assist in determining appropriate site level flood risk mitigation measures that will help the development to pass the NPPF Exception Test.

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<sup>24</sup> Harwich Strategic Flood Risk Assessment (2008);

<http://www.tendringdc.gov.uk/sites/default/files/documents/planning/planning%20policy/HarwichSFRAPart2.pdf>

<sup>25</sup> Jaywick Strategic Flood Risk Assessment (2015); <http://www.tendringdc.gov.uk/planning/local-plans-and-policies/view-our-local-plan/technical-studies-and-evidence/strategic-flood>

## 3.0 FLOOD RISK DATA AND INFORMATION

### 3.1 Flood Zones (Rivers and the Sea)

Fluvial and coastal flood risk information is created and managed by the Environment Agency. Historically fluvial flood zones have been created and used to define the risk of flooding from rivers and the sea for the purposes of planning and development. The definition of each Flood Zone can be found in Table 3.1.

The flood zone mapping is termed the “Flood Map for Planning (Rivers and Sea)” and is available online for land use planning purposes and to align with the NPPF sequential and exception tests<sup>26</sup>. It should be noted that the zones are theoretically defined based on national modelling and have been revised in some areas where more refined modelling has been completed or errors have been found.

The maps also highlight areas with each Flood Zone that benefit from existing flood defences up to the 0.5% AEP tidal flood event and up to the 1% AEP fluvial flood event. The presence of these areas should be used to inform planning decisions by identifying areas where a flood risk exists but protection up to a certain level is currently in place.

Flood Zone	Probability of Flooding	Definition
Flood Zone 1	Low	Land having a less than 0.1% annual probability of flooding from rivers or the sea. These areas are shown as being clear on the online flood mapping.
Flood Zone 2	Medium	Land having a 0.1 - 1% annual probability of flooding from rivers, or a 0.1 - 0.5% annual probability of flooding from the sea, estuaries or tidal waters. This is shown as light blue on the online flood mapping.
Flood Zone 3a	High	Land having a greater than 1% annual probability of flooding from rivers, or a greater than 0.5% annual probability of flooding from the sea, estuaries or tidal waters. This is shown as dark blue on the online flood mapping.
Flood Zone 3b	The functional floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map). An indicative value for this zone is land that is susceptible to a 5% or greater annual probability of flooding.

**Table 3.1:** Environment Agency Flood Zone definitions<sup>27</sup>

<sup>26</sup> Environment Agency Flood Zone maps; <https://flood-map-for-planning.service.gov.uk>

<sup>27</sup> Environment Agency Flood Zone definitions; <https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables>

Separate fluvial flood risk mapping has been produced by the EA to take account of defences and present un-zoned risk. The latest version is the “Risk of Flooding from Rivers and the Sea”. These are updated quarterly with the mapping available to view online<sup>28</sup> or to use in GIS via a WMS layer.

The flood areas are created from national modelling using 50m grids. As such there are limitations to the resolution and as such the mapping cannot be used to determine flood risks for individual properties. It should be used only to indicate the general risk of an area, and whether further analysis and flood risk assessments may be needed.

### 3.2 Surface Water Flood Risk Areas

The responsibility for managing surface water flooding lies with LLFAs, however to ensure standardised mapping nationwide the EA produced surface water flood risk mapping covering the entire UK. This used a national model updated in those areas where LLFAs had more accurate information to better take account of local topography and historic flood data.

The latest version of mapping detailing surface water flood risk is the “Risk of Flooding from Surface Water” which replaced the previous “Updated Flood Map for Surface Water” mapping. This is available to interrogate through an online viewer<sup>29</sup> or to use in GIS via a WMS layer.

Probability of Flooding	Definition
Very Low	Areas with a less than 0.1% chance of flooding each year
Low	Areas with a 0.1 - 1% chance of flooding each year
Medium	Areas with a 1 – 3.3% chance of flooding each year
High	Areas with a greater than 3.3% chance of flooding each year

**Table 3.2:** Environment Agency surface water flood risk area definitions<sup>30</sup>

<sup>28</sup> Environment Agency Risk of Flooding from Rivers and the Sea mapping; <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>

<sup>29</sup> Environment Agency Risk of Flooding from Surface Water mapping; <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>

<sup>30</sup> Environment Agency Flood Zone definitions; <https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables>



The model was constructed using a 2m topographic grid based on LiDAR data with corrections made around large structures such as bridges and railway embankments to better replicate flow paths. Ground levels were raised by 0.3m at the location of buildings to represent an average threshold before internal property flooding occurs. Roads were lowered to reflect how water flows along them more readily and varied ground roughness values were employed to take account of land use.

Various rainfall events were modelled to represent differing storm severities, durations and regional variations across the UK. These were adjusted to take into account the effects of formal drainage systems, which are not specifically modelled themselves, and to differentiate the ways in which water infiltrates into the ground in rural and urban areas.

The output map areas show overall risk of surface water flooding and include details on depths and velocities. Risks are categorised into four bands; Very High; High; Medium; and Low, the definitions of which are outlined in Table 3.2.

As with the mapping for fluvial flood zones the areas shown are based on national modelling with a significant number of simplifications and assumptions. They cannot be used to determine the risk for individual properties and should only be used for spatial planning to assess whether an area is at risk and to what extent.

### **3.3 Groundwater Flood Risk Areas**

Groundwater flood risk aligns directly with the underlying soils, geology and hydrogeological conditions and the British Geological Survey (BGS) have produced datasets to show risks across the country.

The Environment Agency utilised this data to create “Areas Susceptible to Groundwater Flooding” hazard maps showing the likelihood of groundwater flooding which is issued to LLFA’s as the body responsible for the management of groundwater flooding. Maps have a spatial resolution of 50m and are updated bi-annually. They are available online to use in GIS via a WMS layer.

A detailed assessment of the groundwater flood risk in Tendring is outside of the scope of this addendum, however the hazard maps have been reviewed as part of the analysis of wider flood risk within the SHLAA Stage 1 and 2 assessments.

### **3.4 Hydraulic Modelling Studies**

As the authority responsible for managing fluvial flood risk the Environment Agency have undertaken a range of modelling studies concerning the Main Rivers and

estuaries within the district of Tendring. These include the models and their outputs that were received from the Environment Agency to facilitate this addendum, as shown in Table 3.3 and Appendix 3.

As many models pre-date the 2016 climate change allowance updates the flood areas shown do not reflect these changes. Models will be updated to include this during periodic refreshments, generally undertaken every 5 years. Section 4 of this addendum details how the current model extents relate to the new climate change allowances and how they should be used when assessing fluvial flood risk.

Model Area	Model Type	Model Software	Output Format	Model Year
Holland Brook and Pickers Ditch	Fluvial	1D ISIS	ISIS proprietary files	2006
Jaywick Ditch	Fluvial	2D TUFLOW	Proprietary modelling files	2015
Kirby Brook	Fluvial	2D TUFLOW	GIS shapefile	2010
Ramsey River	Fluvial	2D TUFLOW	GIS shapefile	2010
Salary Brook	Fluvial	1D ISIS	ISIS proprietary files	2006
Colne Estuary	Combined Fluvial and Tidal	2D TUFLOW	GIS shapefile	2011
Stour Estuary	Combined Fluvial and Tidal	2D TUFLOW	GIS shapefile	2011

**Table 3.3:** Environment Agency hydraulic models covering Tendring district

## 4.0 FLUVIAL FLOOD RISK

### 4.1 Introduction

This section outlines the fluvial flood risk in the district of Tendring using the information detailed in Sections 3.1 and 3.4. It defines the Fluvial Flood Zones which have created using the Environment Agency Main River models listed in Table 3.3. The fluvial Flood Zones for Tendring can be found in Appendix 4, with Appendix 5 showing the Flood Zones and rated SHLAA sites.

As all currently available model versions were created prior to the 2016 update of fluvial climate change allowances further details are given for each to allow their outputs to be used when assessing fluvial flood risk within their areas. It should be noted that the EA have no requirement to produce flood outlines incorporating

climate change, though this is incorporated into model updates when they are refreshed periodically.

Information surrounding flood warning services and existing flood defences does not fall within the scope of this report. The majority of flood defences within the Tendring area provide protection for tidal flooding and have not changed significantly since the creation of the existing SFRA and as such this should be consulted when assessing the impacts of these on strategic planning decisions, or when determining planning applications, until an updated SFRA is produced.

## **4.2 Fluvial and Coastal Flood Risk**

Fluvial flood risk is defined as the risk of flooding from main rivers. It occurs when intense or prolonged rainfall is unable to be contained by drainage channels and water spills out onto adjacent areas. The risk of fluvial flooding is primarily determined by the rainfall duration, topography, proximity to a drainage channel and prior ground conditions.

This type of flooding tends to involve high depths of water with high velocities nearer the main river channels which decrease with distance. Water tends to rise and dissipate more slowly than other types of flooding and as such some measures can be taken to minimise its impact once it commences. Appropriate planning and development decisions, such as adjusting site layouts to accommodate flooding, can have a significant impact on who and what is impacted within a development.

As all models pre-date the current climate change updates the following assessments of each have been undertaken to assess their usability for planning and development decision making. This involved matching the existing fluvial flood zones 2 and 3 with the model output extents to determine which modelled event aligned with the flood zones. A selection of depths chosen from random points along the relevant model output were increased by the relevant climate change value and then compared to the other model outputs events to determine which, if any, best aligned with the new climate change percentages.

It should be noted that the updated climate change increases relate to flood flows and not depths. Due to channel variations the two are not directly related, with depth increasing at a slower rate than a given flow increase; for example a 10% increase in flood flow relates to a <10% increase in flood depth. As such this methodology provides an overestimation of flood extents, though it is still only a very crude extrapolation analysis. It should be used only to provide guidance for future planning decisions in lieu of updated or more accurate modelling information.

Table 4.1 summarises these results for the available models. It should be noted that values for 20%, 35% and 65% are shown, with 35% applying to both Upper End and Higher Central scenarios.

The subsequent sections outline the fluvial flood risk for the above model areas within the district of Tendring. Where no model exists, or no model output grid data was available for analysis in this addendum, the existing flood zones should be used to determine whether a site is influenced by Flood Zone 2 or 3. Site specific modelling and flood risk information support will then be required in these areas to ensure the new climate change allowances can be incorporated appropriately into planning decisions.

EA model area	Associated model scenario		Model outputs best relating to the new fluvial climate change allowances		
	FZ2	FZ3	FZ3 + 20%	FZ3 + 35%	FZ3 + 65%
Holland Brook and Pickers Ditch	No flood extent grid model output files available for analysis				
Jaywick Ditch	No flood extent grid model output files available for analysis				
Kirby Brook	Model extents differ to Flood Zone areas, FZ3 assumed to match 100yr model output		<b>200yr</b> (average 17% depth increase)	<b>1000yr</b> (average 45% depth increase)	No matching model output
Ramsey River	<b>1000yr</b>	<b>100yr</b>	No matching model output	No matching model output	The <b>100yr CC</b> model provides an average 56% depth increase
Salary Brook	No flood extent grid model output files available for analysis				
Colne Estuary	<b>1000yr</b>	<b>200yr</b>	Models are tidally driven – no new coastal climate change values exist so Flood Zones 2 and 3 still apply for these areas		
Stour Estuary	<b>1000yr</b>	<b>200yr</b>	Models are tidally driven – no new coastal climate change values exist so Flood Zones 2 and 3 still apply for these areas		

**Table 4.1:** EA Fluvial models and new climate change allowances summary

#### 4.2.1 Kirby Brook

The Kirby Brook section of Main River was subject to a fluvial modelling study by Capita Symonds on behalf of the EA in 2010. The primary model outputs relate to the channel south of Kirby Cross and west of Frinton-on-Sea to its outflow into the north sea north-east of Holland-on-Sea.

Analysis of the Environment Agency modelling shows that the 200 year flood extent constitutes an average 17% increase on the Flood Zone 3 depths. As such it should be considered as an appropriate reference for decisions planning decisions concerning the 20% Higher Central (2040-69) climate change scenario.

The 1000 year modelled event constitutes an average 45% increase on the Flood Zone 3 flood depths. As such it can be considered as a viable approximation of both the 35% Upper End (2040-69) and Higher Central (2070-2115) climate change scenarios.

### **4.2.2 Ramsey River**

The Ramsey River section of Main River was subject to a fluvial modelling study by Capita Symonds on behalf of the EA in 2010. The primary outputs cover the section of channel south of Bradfield Heath to its outflow into the Stour estuary west of Wrabness.

Analysis of the Environment Agency modelling shows that the 100 year plus climate change flood extent constitutes an average 56% increase on the Flood Zone 3 depths. As such it should be considered as an appropriate reference for decisions planning decisions concerning the 20% Higher Central (2040-69) climate change scenario.

The 1000 year modelled event constitutes an average 45% increase on the Flood Zone 3 flood depths. As such it can be considered as a general guide to the 65% Upper End (2070-2115) climate change scenario.

### **4.2.3 Other Main Rivers and Major Watercourses**

No updated climate change analysis was able to be undertaken on the remaining main rivers and their tributaries. Until further analyses can be undertaken, or updated modelling is produced the information within the existing SFRA regarding the flood extents, major flow controls and key features remains relevant, though for **guidance purposes only**.

Where a site contains or borders Flood Zones 2 or 3 further site specific modelling and flood risk information will need to be provided to ensure that the updated climate change allowances are incorporated in any relevant planning decisions.

## **4.3 Fluvial Flood Defences**

The impact of changes to the flood zones is outside of the scope of this addendum report. Climate change increases and their resultant flood depth increase have the

potential to impact the standard of protection offered by defences and whether they may be overtopped.

Where potential development locations benefit from such a defence detailed site specific investigations and modelling should be undertaken to assess the risks of overtopping.

#### **4.4 Effects of Climate Change on Fluvial Flood Risk**

The current guidance on fluvial climate change allowances is detailed in Section 2.5.4.1 and states a 35% and 65% increase for the next 50-100 years for the higher central and upper end scenarios respectively. This constitutes a significant increase from the previous 20% required by Planning Policy Statement 25.

As such predicted flow volumes and associated flood depths are greater, which increases risk and reduces usable space where potential developments contain or abut a main river.

The impact of the updated climate change values on existing EA fluvial models is shown in Table 4.1. In order for climate change to be incorporated into planning policy and decision making process updated or site specific modelling will be necessary to ensure it is appropriately considered and to assure appropriate development, sustainability and the minimising of flood risk.

#### **4.5 Effects of EA Policy on Fluvial Flood Risk**

The objectives and measures for the Combined Essex Catchment contained within the Anglian Flood Risk Management Plan (FRMP) should be referred to during all planning policy and decision making activities. The key measures of the Anglian FRMP are outlined in Section 2.5.3 of this report.

### **5.0 FLOOD RISK FROM OTHER SOURCES**

#### **5.1 Introduction**

This section assesses the risk of flooding from surface water and groundwater. Historic flooding events and sewer flooding have not been considered as they are not within the scope of this report. As such the existing SFRA document should be consulted when considering these matters in planning policy and development proposal decisions.

## 5.2 Surface Water Flood Risk

Surface water flooding occurs when intense or prolonged rainfall occurs and the soil or other surfacing is unable to absorb it causing water to flow over the land surface. The risk of flooding is primarily determined by the rainfall intensity and duration, topography, surface types and prior ground conditions.

This type of flooding tends to involve lower depth but higher velocity flows which arise and dissipate quickly. As such it is hard to stop once it occurs and it is best mitigated through prior installation of protective measures. Appropriate planning and development decisions, such as the implementation of SuDS, can have a significant impact on the depths, extents and risks of surface water flooding.

Surface water flood risk is determined using the Environment Agency Risk of Flooding from Surface Water mapping. Further details on this data source can be found in Section 3.2 of this report.

Appendix 6 shows the 1%AEP Surface Water Flood risk for the district of Tendring with the 0.1% risk shown in Appendix 7. Due to the resolution of the model used to create the mapping and the assumptions it contains this mapping cannot be used to determine flood risk to specific properties. As such it should be used only to highlight where surface water flood risk may be relevant to a potential development and whether further investigations and specific mitigation measures may be required.

The 0.1% and 1% flooding risk mapping has been used to inform the risk of surface water flooding to all of the Tendring 2017 SHLAA Sites, further details of which can be found in Section 6. Appendices 8 and 9 show the sites with the 1% and 0.1% AEP events respectively with the flood risk rated SHLAA sites.

## 5.3 Groundwater Flooding

Groundwater flooding occurs when seasonal or very prolonged rainfall occurs causing the water table to rise above the ground surface. The risk of flooding is primarily determined by the underlying geological conditions.

This type of flooding tends to involve lower depth, lower velocity flows which arise and dissipate slowly. As such some measures can be taken once it commences, though due to the subsurface origin of the water, the specific occurrence of it can be hard to predict. Groundwater flooding is rare in areas without porous bedrock, though the potential risks of it should be taken into account when designing and assessing developments as the influences of groundwater may impact the effectiveness of other flood mitigation measures.



The risk of flooding from groundwater is determined using the Environment Agency Areas Susceptible to Groundwater Flooding mapping. Further details on this data source can be found in Section 3.3 of this report.

Appendix 7 shows the groundwater flood risk for the district of Tendring. Due to the resolution of the model used to create the mapping and the assumptions it contains this mapping cannot be used to determine flood risk to specific properties. As such it should be used only to highlight where surface water flood risk may be relevant to a potential development and whether further investigations and specific mitigation measures may be required

This mapping has been used to inform the risk of groundwater flooding to all of the Tendring 2017 SHLAA, further details of which can be found in Section 10. Appendix 11 shows the groundwater flood risk maps with the flood risk rated SHLAA sites.

## **6.0 SEQUENTIAL TEST RESULTS**

### **6.1 Overview**

A Strategic Flood Risk Assessment is a planning tool used to support the strategic spatial planning process and highlight flood risk at potential development locations. It considers all sources of flooding and the impacts of climate change and should inform local planning policies surrounding flood risk and sustainability. In addition the SFRA provides information to allow the SHLAA sites to be subjected to the sequential and exception tests, as required under Paragraph 101 of the NPPF.

This addendum does not constitute a full or replacement of the existing Tendring SFRA and it must still be used in conjunction with this document. The development vulnerability classifications and sequential and exception test approaches were transferred from PPS to the NNPF and as such the details of these contained within the SFRA remain relevant.

This addendum provides an update on policy and legislation changes since the original document and summarises the results of Stage 1 and 2 assessments of the Tendring 2017 SHLAA sites. Full details of these assessments can be found in the separate Tendring Sequential Test Report published in May 2017.

### **6.2 SHLAA Site Assessment Methodology**

To determine the flood risk for the Tendring 2017 SHLAA sites a two-stage methodology was employed. Further details on the data utilised can be found in Section 4:



Stage 1:

- Allocate the Flood Zone for each site according to the EA fluvial flood map for planning. General comments will be made on the risk of flooding from surface water and groundwater.
- All sites that fall within Flood Zone 1 are considered to have passed the test (Low Risk sites).

Stage 2:

- All sites in Flood Zone 2 are subjected to a Stage 2 Assessment, taking into consideration the land use vulnerability classification of the proposed development.
- All sites highlighted within Flood Zone 3 automatically require an exception test (High Risk sites).
- Sites containing smaller sections of Flood Zones 2 and 3 or areas of significant surface water flooding are highlighted, with general comments provided on planning considerations (Medium Risk sites)

All sites that pass Stage 1 assessments (Low Risk sites) are assessed against the Environment Agency Risk of Flooding from Surface Water mapping. The percentage of the site at risk is given and categories into low, medium and high, with summary mitigation measures and planning recommendations listed.

Following this approach all SHLAA sites are given a flood risk classification, which has been used to visually represent the site on mapping to aid initial risk analysis. Table 6.1 below details the categories and symbology used. A map showing the classified sites can be found in Appendix 1.

Risk Category	Definition	Map Symbology
High	Sites containing Flood Zone 3	<b>Red border and hatching</b>
Medium	Sites containing smaller sections of Flood Zones 2 and 3 or areas of significant surface water flooding	<b>Orange border and hatching</b>
Low	Sites within Flood Zone 1	<b>Green border and hatching</b>

**Table 6.1:** SHLAA site risk categories and map representation

The complete tabulated results of the assessments can be found in Appendix 12. Those sites with medium and high risk are highlighted separately in the subsequent sections.

### **6.3 Sites with Medium Flood Risk**

This section details the sites that have identified flood risks from either surface water or groundwater, or contain small sections of Flood Zones 2 or 3 that are not significant enough to trigger a Stage 2 assessment. The risk of flooding at each site has been deemed great enough to warrant more specific consideration of it at the planning stage.

In total 11 sites were assessed to have a medium flood risk. Table 6.2 shows summary information for these locations.

### **6.4 Sites with High Flood Risk**

This section details the sites that were identified as containing significant sections of Flood Zone 2 or 3 during the Stage 1 analysis. In total 18 sites were assessed to have a high flood risk which are summarised in Table 6.3. Detailed mapping and site specific recommendations and planning considerations for each site can be found in Appendix 13.

The recommendations given within the Stage 2 assessment for these sites should be used to inform the site specific flood risk assessments for each site when they are considered through the planning process.

## **7.0 GUIDANCE FOR FUTURE DEVELOPMENTS**

The provision of specific guidance concerning future developments is outside of the scope of this addendum and should be considered during a full update of the SFRA. However, the following general recommendations are given until such an update is completed;

1. All updated drainage guidance such as the CIRIA SuDS Manual (C753) and the latest version of the ECC SuDS Guidance should be considering during the consideration of all planning applications.
2. The impact of climate change on fluvial flood defences has not been considered in this addendum report. Where potential development locations benefit from such a defence detailed site specific investigations and modelling should be undertaken to assess the risks of overtopping.

## Tendring District Council Strategic Flood Risk Addendum

ECC ref	SHLAA ref	Site Address	Proposed Land use	NPPF Vulnerability Classification	Size (ha)	Fluvial Zone			Surface water, RoFSW (H, M, L) <sup>31</sup>	Sequential Test met/comments ( other eg Potential Groundwater risk <sup>32</sup> )
						1	2	3		
56	HD4	Land to the West of Haltermann Carless Refinery, Parkeston	Employment	Less vulnerable	15		X		Very low risk	Flood zone 2 present within or adjacent to the site.
67	UC2.7	Land at the Farm, Kirby Road, Walton-on-Naze CO14 8QS	Residential	More vulnerable	2.1		X		10% low risk, 10% medium risk, 10% high risk	Flood zone 2 present within or adjacent to the site.
77	UE2.7	Land North West of Martello Caravan Park, North of Lowe Chase, Walton-on-Naze	Residential	More vulnerable	5.26		X	X	5% low risk	Flood zone 2 present within or adjacent to the site.
80	UE2.10	Land off First Avenue, Frinton-on-Sea CO13 9LW	Residential	More vulnerable	2.97		X	X	10% high risk	Flood zone 2 present within or adjacent to the site.
104	UE4.7 CFS006	Mistley Place Park, North of New Road, Mistley CO11 1LU	Residential	More Vulnerable	7.7		X		Low Risk	Potential surface water low risk flood flows across the centre of the site. <5% of the site is in FZ2.
144		land at Progress Way Little Clacton	Residential	More Vulnerable	3.3	X	X	X	Medium risk (10% of site in high risk area)	Site contains EA Main River and 20% is in FZ 2 and 3.
167		3Parcels land Newhall Farm Horsley Cross Bromley Rd Lt Bromley Ardleigh Rd Little Bromley	Residential	More Vulnerable	?	X	X	X	Medium Risk	Centre of the site appears to have a watercourse that is effected by FZ 3 and 1 in 30 SW.
171		Broad Area 1: Land East of Colchester between A133 and A120, Elmstead Market/Ardleigh	Residential	More Vulnerable	282	X	X		Medium Risk	1% in FZ2 and FZ3. 1% at risk of 1 in 30 SW
201	OTH17	Land off Bromley Road, Parsons Heath, Nr Colchester	Residential	More vulnerable	7.88		X	X	Medium risk	A small part of the site is in flood zones 2 and 3.
223	1021415	Land at Starena Lodge, Off Clacton Road, Weeley	Residential	More vulnerable	6.81		X		High risk	Flood zone 2 present within or adjacent to the site.
246	UE1.11	Land between railway line and Holland-on-Sea CO15 4BG (Sladbury's Lane site)	TBC	Assumed More Vulnerable	78		X	X	Medium risk	Flood zones 2 and 3 present within or adjacent to the site.400m away from a recorded flood incident.

**Table 6.2:** Summary information for the 11 medium flood risk sites

<sup>31</sup> Low - >1:1000 RoFSW, Medium – >30 -100yr RoFSW, High - <30yr RoFSW

<sup>32</sup> Consider groundwater level monitoring to assess groundwater flood risk (for medium and high risk areas) and recommendations during planning submission

## Tendring District Council Strategic Flood Risk Addendum

ECC ref	SHLAA ref	Site Address	Proposed Land use	NPPF Vulnerability Classification	Size (ha)	Fluvial Zone			Surface water, RoFSW (H, M, L) <sup>33</sup>	Sequential Test met/comments ( other eg Potential Groundwater risk <sup>34</sup> )
						1	2	3		
16	UE1.1	Land off Lotus Way, Jaywick CO15 2JE	Residential	More Vulnerable	7.48		X	X	<1% high risk (spot), 3% Medium risk, <10% low risk	Sequential test not met. Location and number of housing or mitigation should be considered in Stage 2.
33		27-45 Garden Road, Jaywick	Residential	More Vulnerable	0.306			X	Very low risk	Sequential test not met. Only consider appropriate uses in stage 2
35		Land Adjacent to Burrs Road, Clacton and Sladbury's Lane	Not provided – assumed residential	Assumed More Vulnerable		X	X	X	Pickers ditch along boundary of site.	Sequential test not met. Adjacent to Pickers Ditch so location and number of housing or mitigation should be considered in Stage 2.
46	UC3.13	Former Bernard Uniforms Factory, Main Road, Harwich CO12 3NT	Residential	More vulnerable	0.56			X	5% medium risk, 5% high risk	Sequential test not met. Location and number of housing or mitigation should be considered in Stage 2.
49	UC3.17	Navyard Wharf, Kings Quay Street, Harwich CO12 3JJ	Mixed use	Assumed More Vulnerable	4.38			X	Very low risk	Sequential test not met. Location and number of housing or mitigation should be considered in Stage 2.
52	UC3.3, HD8	Land East of Pond Hall Farm, Harwich	Mixed use	Assumed More Vulnerable	38.3			X	15% low risk, 5% medium risk, 5% high risk	Sequential test not met. Location and number of housing or mitigation should be considered in Stage 2.
57	UC3.9, HD6, 1021459, 1021477	Land South of Low Road, Dovercourt	Mixed use	Assumed More Vulnerable	16.107			X	10% low risk	Sequential test not met. Location and number of housing or mitigation should be considered in Stage 2.
68	UC2.8	Martello Caravan Park, Kirby Road, Walton-on-Naze	Residential	More vulnerable	13.13		X	X	5% low risk, 5% high risk	Flood zone 2 present within or adjacent to the site. Location and number of housing or mitigation should be considered.
87	CFS003	North Street, Walton-on-Naze	Residential	More Vulnerable	0.205			X	Low Risk	Sequential test not met. Location and number of housing or mitigation should be considered.
88	CFS003	Land at Mill Lane, Walton-on-Naze	Residential	More Vulnerable	0.34			X	High Risk 5%	Sequential test not met. Location and number of housing or mitigation should be considered in Stage 2.
90	UC2.9	Former Town Hall Site, Public Conveniences and Depot, Mill Lane, Walton-on-Naze	Mixed	Assumed More Vulnerable	0.14			X		Sequential test not met. Location and number of housing or mitigation should be considered.
93	UC4.1	Thorn Quay Warehouse, High Street, Mistley CO11 1HE	Residential	More Vulnerable	0.24			X	Very Low Risk	Small percentage of the site is in flood zones 2 and 3. Location and number of housing or mitigation should be considered in Stage 2
102	UE4.9	Mistley Marine, Mistley Boatyard, Anchor Lane, Mistley	Residential	More Vulnerable	1.76			X	Low	Location and number of housing or mitigation should be considered in Stage 2.

<sup>33</sup> Low - >1:1000 RoFSW, Medium – >30 -100yr RoFSW, High - <30yr RoFSW

<sup>34</sup> Consider groundwater level monitoring to assess groundwater flood risk (for medium and high risk areas) and recommendations during planning submission

## Tendring District Council Strategic Flood Risk Addendum

114	UC4.5	Former James & Stone Shipyard, Copperas Road, Brightlingsea	Mixed	Assumed More Vulnerable	0.52			X	Medium/Low. (15% of the site has a high risk of point flooding).	Location and number of housing or mitigation should be considered in Stage 2.
165		3 parcels of land Newhall Farm Horsley Cross Bromley Rd Lt Bromley Ardleigh Rd Little Bromley	Residential	More Vulnerable		X	X	X	Medium Risk	Location and number of housing or mitigation should be considered in Stage 2.
173		Broad Area 3: Middle Bit	Residential	More Vulnerable		X	X	X	Low Risk	Flow path in the middle of the site in FZ3. Location and number of housing or mitigation should be considered.
256		Site to East of Chapelfields, Harwich Road, Wix CO11 2RY	Residential	More vulnerable	0.7		X	X	High risk	Exception Test Required. Location and number of housing or mitigation should be considered in Stage 2.
257		Land to rear of White Hart Inn, Harwich Road, Wix CO11 2SA	Residential	More vulnerable	0.5		X	X	High risk	Exception Test Required. Location and number of housing or mitigation should be considered in Stage 2.

**Table 6.3:** Summary information for the 18 high flood risk sites

## **8.0 APPENDICES**