

Lower Thames Crossing

6.3 Environmental Statement Appendices

Appendix 14.6 – Flood Risk Assessment - Part 2

APFP Regulation 5(2)(a) and (5)(2)(e)

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Lower Thames Crossing

Appendix 14.6 – Flood Risk Assessment - Part 2

List of contents

	Page number
1 Introduction	1
1.1 Context	1
1.2 Form of assessment	1
1.3 Basis of assessment.....	1
1.4 Overview of planning environment.....	1
2 National planning policy and legislation	5
2.1 National policy documents and legislation	5
2.2 EU Floods Directive and the Flood Risk Regulations	5
2.3 Flood and Water Management Act 2010	6
2.4 National Planning Policy Framework	6
2.5 National Policy Statement for National Networks.....	8
2.6 Overarching National Policy Statement for Energy.....	10
2.7 National Flood and Coastal Erosion Risk Management Strategy for England	12
2.8 The Environment Agency’s approach to groundwater protection.....	13
3 Regional planning policy	16
3.1 Regional planning documents.....	16
3.2 Thames river basin management plan – Part 1	16
3.3 Thames Catchment Flood Management Plan.....	18
3.4 North Kent Rivers Catchment Flood Management Plan	19
3.5 South Essex Catchment Flood Management Plan	20
3.6 Thames Estuary 2100 (TE2100) Plan.....	22
4 Local planning policy.....	27
4.1 Introduction.....	27
4.2 Kent	27
4.3 Thurrock and Essex.....	36
4.4 Havering	44
5 Summary	50
5.1 National planning.....	50
References	57

List of tables

	Page number
Table 1.1 FRA Catchments.....	1
Table 2.1 Discharge to groundwater – position statements	13
Table 3.1 TE2100 Plan policies	23
Table 3.2 Action zone 5 – Middle Estuary.....	24
Table 3.3 Action zone 6 – Lower Estuary Marshes.....	24
Table 3.4 Action zone 6 – Lower Estuary Marshes.....	25
Table 4.1 Kent County Council SuDS Policy	34
Table 5.1 Summary – National policy	50
Table 5.2 Summary – regional planning context.....	52
Table 5.3 Summary – Local policy.....	54

List of plates

	Page number
Plate 1.1 Form of the FRA	2
Plate 1.2 Form of Part 2 of the FRA.....	3
Plate 1.3 Planning policy overview	4

List of text boxes

	Page number
Text box 2.1 EU Floods Directive and the Flood Risk Regulations	6
Text box 2.2 National Planning context – FWMA.....	6
Text box 2.3 National planning context – NPPF	8
Text box 2.4 National planning context – NN NPS	10
Text box 2.5 Overarching National Policy Statement for Energy	11
Text box 2.6 Risk Management Strategy – FCERM	13
Text box 2.7 Environment Agency’s approach to groundwater protection	14
Text box 3.1 Regional planning context – Thames RBMP.....	17
Text box 3.2 Regional planning context – Thames CFMP	19
Text box 3.3 Regional planning context – North Kent Rivers CFMP.....	20
Text box 3.4 Regional planning context – South Essex CFMP.....	21
Text box 3.5 Regional planning context – TE2100 Plan	26
Text box 4.1 Local planning context – Kent.....	35
Text box 4.2 Local planning context – Thurrock and Essex.....	43
Text box 4.3 Local planning context Havering	48

1 Introduction

1.1 Context

- 1.1.1 This document forms Part 2 of the Flood Risk Assessment (the FRA) for the A122 Lower Thames Crossing (the Project).
- 1.1.2 The FRA forms Appendix 14.6 of the Environmental Statement (ES) (Application Document 6.3).

1.2 Form of assessment

- 1.2.1 The FRA is presented in nine principal parts and one affiliated part. These Parts and a brief description of their contents are detailed in Plate 1.1.
- 1.2.2 For the purposes of the FRA, the Project has been divided into five discrete flood risk catchments (EFR-1 to EFR-5). These catchments are listed in Table 1.1 and are shown in Drawing 00100.

Table 1.1 FRA Catchments

Catchment	Title
EFR-1	South of River Thames
EFR-2	North Portal to Chadwell St Mary
EFR-3	A13 junction
EFR-4	Ockendon Link
EFR-5	North Section

- 1.2.3 All drawings referenced in this document can be found in Part 9 of the FRA.
- 1.2.4 The key points raised in this document are presented in ‘Text boxes’.

1.3 Basis of assessment

- 1.3.1 The FRA is based on the design as presented in the Development Consent Order application.
- 1.3.2 The FRA includes an assessment of flood risk for both the construction phase and operational phases of the Project.

1.4 Overview of planning environment

- 1.4.1 The following sections of this document summarise current planning policy, legislation and guidance notes relating to flood risk, and comment on the extent to which each document affects this Project. They also provide an overview of the authorities responsible for the development of each supporting flood risk management document.
- 1.4.2 These sections are presented in Plate 1.2 and an overview of planning policy is presented in Plate 1.3.

Plate 1.1 Form of the FRA

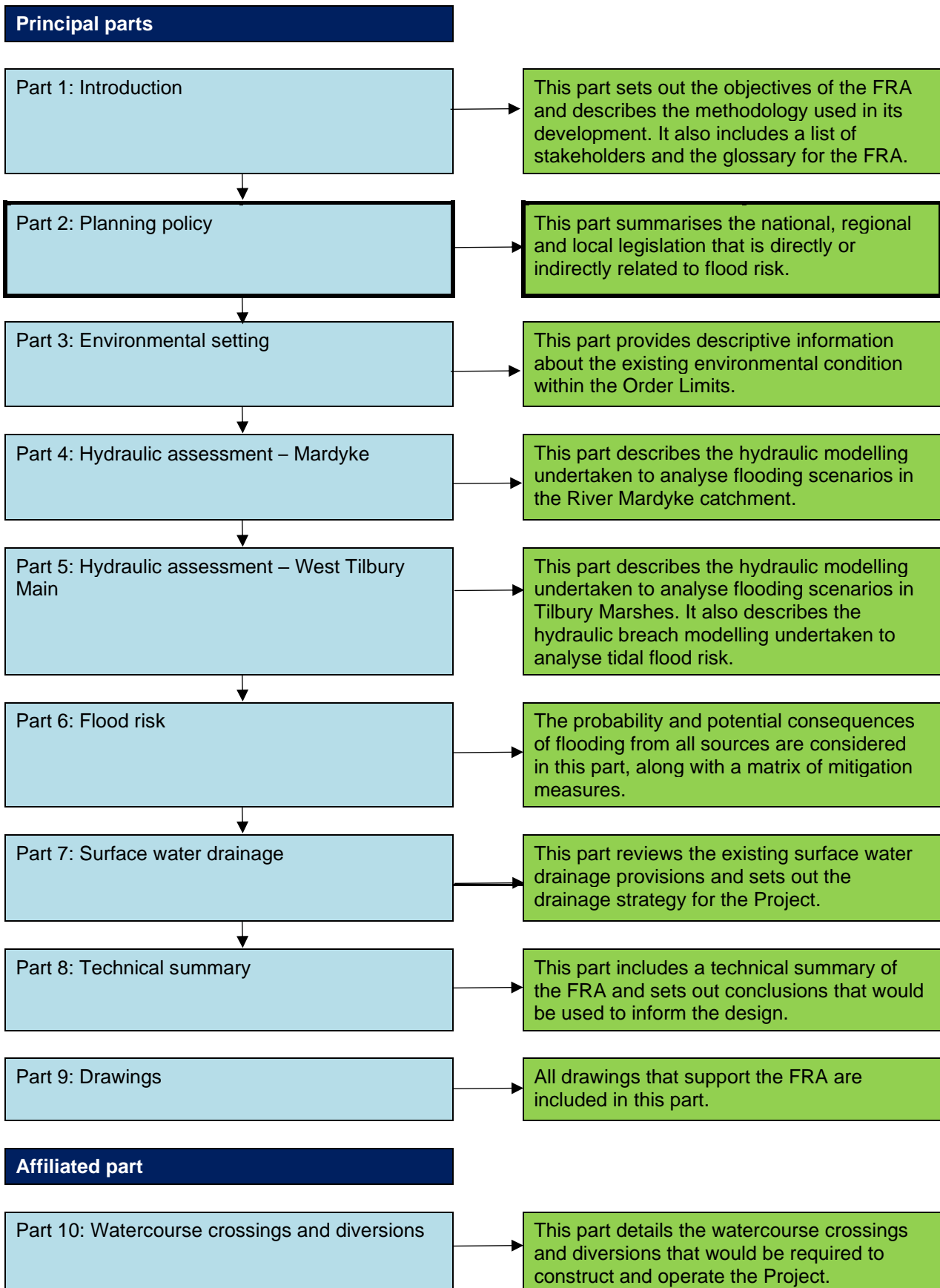


Plate 1.2 Form of Part 2 of the FRA

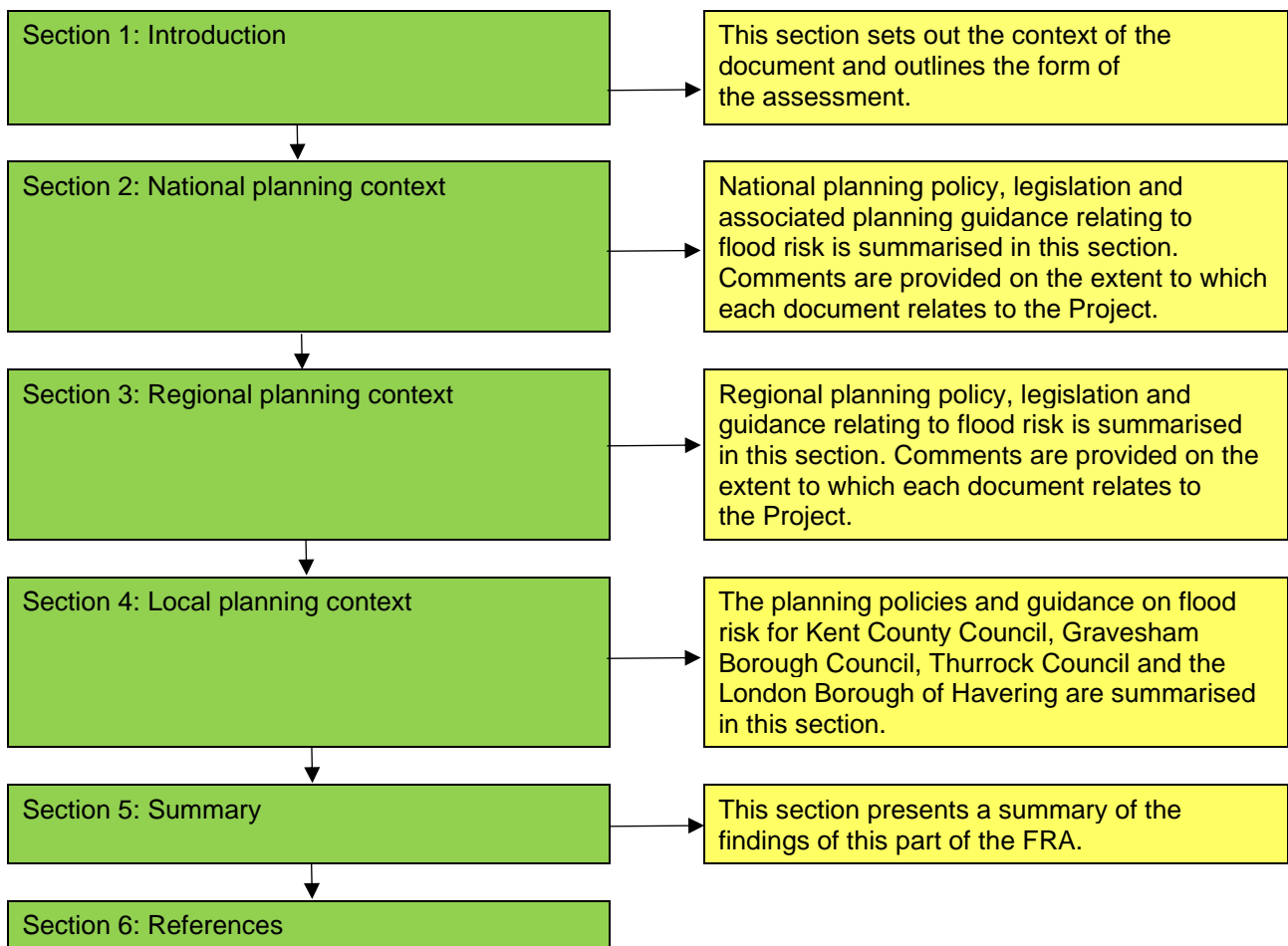


Plate 1.3 Planning policy overview

<p>Overarching policy</p> <ul style="list-style-type: none"> Policy and strategy 	<p>Environment Agency, Ministry of Housing, Department for Levelling Up, Housing & Communities, Department for Transport and Defra</p> <ul style="list-style-type: none"> EU Floods Directive Flood Risk Regulations Flood and Water Management Act National Planning Policy Framework (NPPF) and associated Planning Practice Guidance National Policy Statement for National Networks (NN NPS) The Overarching National Policy Statement for Energy (NPS EN-1) National flood and coastal erosion risk management strategy for England The Environment Agency's approach to groundwater protection 				
<p>Regional planning policy</p> <ul style="list-style-type: none"> Regional/local strategy 	<p>Local plans</p> <ul style="list-style-type: none"> Brentwood Borough Council Gravesham Borough Council London Borough of Havering Maidstone Borough Council Thurrock Council Tonbridge and Malling Borough Council 	<p>Catchment Flood Management Plans and Local Flood Risk Management Strategies</p> <ul style="list-style-type: none"> South Essex Catchment Flood Management Plan North Kent Rivers Catchment Flood Management Plan Thurrock Local Flood Risk Management Strategy (LFRMS) River Basin Management Plan Thames River Basin District 	<p>Strategic flood risk assessments</p> <ul style="list-style-type: none"> Kent Thameside Thurrock Havering Essex 		
<p>Delivery</p> <ul style="list-style-type: none"> FRA 	<p>Main rivers and the sea</p> <ul style="list-style-type: none"> Environment Agency 	<p>Watercourses</p> <ul style="list-style-type: none"> North Kent Marshes Internal Drainage Board Gravesham Borough Council Kent County Council Thurrock Council Essex County Council London Borough of Havering 	<p>Surface water</p> <ul style="list-style-type: none"> Gravesham Borough Council Kent County Council Thurrock Council Essex County Council London Borough of Havering Water Companies 	<p>Groundwater</p> <ul style="list-style-type: none"> Kent County Council Thurrock Council Essex County Council Gravesham Borough Council London Borough of Havering 	
	<p>Highways</p> <ul style="list-style-type: none"> National Highways Gravesham Borough Council Kent County Council Thurrock Council Essex County Council London Borough of Havering 	<p>Water supply and sewer network</p> <ul style="list-style-type: none"> Water and sewerage companies 	<p>Flood defences</p> <ul style="list-style-type: none"> Environment Agency Thames Estuary TE2100 Plan 	<p>Waterbodies</p> <ul style="list-style-type: none"> Reservoirs Lakes Ponds 	

2 National planning policy and legislation

2.1 National policy documents and legislation

2.1.1 The following national policy documents and legislation are summarised in this section:

- a. EU Floods Directive and the Flood Risk Regulations (2007/60/EC)
- b. Flood Risk Regulations 2009 (FRR)
- c. Flood and Water Management Act 2010 (FWMA)
- d. National Planning Policy Framework (Department for Levelling Up, Housing and Communities, 2021a) (DLUHC) (NPPF)
- e. National Policy Statement for National Networks (Department for Transport, 2014) (NN NPS)¹
- f. National Flood and Coastal Erosion Risk Management Strategy for England (Environment Agency, 2021b) (FCERM)
- g. The Environment Agency's approach to groundwater protection (Environment Agency, 2018)

2.2 EU Floods Directive and the Flood Risk Regulations

2.2.1 The EU Floods Directive (2007/60/EC) aims to provide a consistent approach to flood risk management across all of Europe². This is now in force through the EU Withdrawal Act 2018. Under these Regulations, there are a series of requirements which take place as part of a six-year cycle in the following order:

- a. At the beginning of the cycle, Lead Local Flood Authorities (LLFAs) need to prepare or review their Preliminary Flood Risk Assessments (PFRAs) and their determination and identification of areas of potentially significant flood risk (flood risk areas). LLFAs have a duty to prepare or review their flood hazard and flood risk maps for each of their flood risk areas.
- b. By the end of the cycle, LLFAs must prepare flood risk management plans in order to manage significant flood risk in their flood risk areas. These flood risk management plans should set objectives for flood risk management and outline measures for achieving these objectives.
- c. PFRAs, flood hazard and flood risk maps, and flood risk management plans are published by the Environment Agency.

¹ Major utilities diversions are required as part of the Project, and the National Policy Statement for Energy Networks (NPS-EN) sets out the relevant policies for these. A review of the NPS-EN is presented in Appendix A2 of the Planning Statement (Application Document 7.2). This review has concluded that no additional policy requirements for flood risk were required above those reflected within the NPS-EN.

² The UK is no longer a member of the European Union (EU). EU legislation, as it applied to the UK on 31 December 2020, is now a part of UK domestic legislation, under the control of the UK's Parliaments and Assemblies, and is published on legislation.gov.uk. It is being kept up to date on legislation.gov.uk in the same way as other forms of domestic legislation.

- 2.2.2 The Flood Risk Regulations 2009 transpose the EU Floods Directive into law in England and Wales.

Text box 2.1 EU Floods Directive and the Flood Risk Regulations

The purpose of the Flood Risk Regulations is to transpose the EU Floods Directive into domestic law and to implement its provisions. In particular, it places duties on the Environment Agency and local authorities to prepare FRAs, flood risk maps and flood risk management plans.

2.3 Flood and Water Management Act 2010

- 2.3.1 The Flood and Water Management Act 2010 is primary legislation drawn up to address actions identified by the Pitt Review (2008).
- 2.3.2 The FWMA places duties on the Environment Agency, local authorities, developers and other bodies to manage flood risk.
- 2.3.3 Under the provisions of the FWMA, local authorities take on the role of LLFAs.
- 2.3.4 The LLFAs are responsible for developing, maintaining and applying a strategy for local flood risk management in their areas, and for maintaining a register of flood risk assets. They also have lead responsibility for managing the risk of flooding from surface water, groundwater and ordinary watercourses.
- 2.3.5 The Project falls under the jurisdiction of three LLFAs:
- Kent County Council
 - Thurrock Council³
 - London Borough of Havering

Text box 2.2 National Planning context – FWMA

The FWMA places duties on the Environment Agency, local authorities, developers and other bodies to manage flood risk.

Consultations have been undertaken with the Environment Agency and the LLFAs during development of the FRA.

2.4 National Planning Policy Framework

- 2.4.1 The NPPF sets out the Government's planning policies for England and how these should be applied.
- 2.4.2 The NPPF is the overarching legislation for the assessment of flood risk, and outlines the requirements to mitigate those risks during the planning process.
- 2.4.3 Paragraphs 159, 160 and 161 of the NPPF set out Government policy on development and flood risk.

³ For the purposes of the Project, Essex County Council is performing the role of LLFA on behalf of Thurrock Council.

- 2.4.4 Paragraph 159 requires that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk. Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.
- 2.4.5 Paragraph 160 requires that strategic policies should be informed by a strategic flood risk assessment (SFRA) and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities.
- 2.4.6 Paragraph 161 requires that all plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change. This is to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by:
- a. Applying the Sequential Test and then, if necessary, the Exception Test.
 - b. Safeguarding land from development that is required, or likely to be required, for current or future flood management.
 - c. Using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding.
 - d. Seeking opportunities to relocate development to more sustainable locations where climate change is expected to increase flood risk.
- 2.4.7 The NPPF is supported by Planning Practice Guidance (PPG) (DLUHC, 2021b). The PPG provides guidance on a broad range of planning issues. The guidance category that advises how to take account of flood risk is presented in Flood risk and coastal change (DLUHC, 2022). This guidance sets out the main steps to be followed and the tests to be satisfied before planning permission can be granted for development in areas of flood risk.
- 2.4.8 The PPG states that the Environment Agency is a statutory consultee for developments in areas at risk of flooding.
- 2.4.9 The PPG also states that essential infrastructure in Flood Zone 3a should be designed and constructed to remain operational and safe in times of flood. The guidance also notes that essential infrastructure in Flood Zone 3b should have passed the Exception Test and be designed and constructed to:
- a. Remain operational and safe for users in times of flood
 - b. Result in no net loss of floodplain storage
 - c. Not impede water flows and not increase flood risk elsewhere
- 2.4.10 The NPPF is supported by guidance from the Environment Agency on how to factor in the potential impacts of climate change (Flood risk assessments: climate change allowances, Environment Agency, 2021).

Text box 2.3 National planning context – NPPF

The NPPF provides guidance for local planning authorities and decision makers in drawing up plans and making decisions regarding planning applications. The principal policies related to flood risk are:

- Inappropriate development in areas at risk of flooding should be avoided.
- Strategic policies should be informed by a strategic FRA and should manage flood risk from all sources.
- All plans should apply a sequential, risk-based approach to the location of development.

The NPPF is supported by Planning Practice Guidance, which provides additional guidance to local planning authorities to ensure the effective implementation of the planning policy.

The FRA has been prepared in accordance with the requirements for the NPPF and supporting guidance.

2.5 National Policy Statement for National Networks

- 2.5.1 The NN NPS sets out the need for, and Government’s policies to deliver, development of Nationally Significant Infrastructure Projects (NSIPs) on the national road and rail networks in England.
- 2.5.2 The NPPF clarifies that it is not intended to contain specific policies for NSIPs where particular considerations may apply. For transport NSIPs, the NN NPS provides planning policy, as well as guidance and imposing requirements on matters such as good scheme design and the treatment of environmental impacts. The overall strategic aims of the NPPF and NN NPS are consistent insofar as both documents aim to achieve sustainable development.
- 2.5.3 The NPSNN states that applications for projects of one hectare or greater, or in a Critical Drainage Area (CDA), in Flood Zone 1 or projects in Flood Zones 2 and 3 should be accompanied by flood risk assessment. This should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account.
- 2.5.4 Paragraph 5.94 of the NN NPS requires that when preparing a flood risk assessment, the applicant should:
- a. Consider the risk of all forms of flooding arising from the project, in addition to the risk of flooding to the project, and demonstrate how these risks will be managed and, where relevant, mitigated, so that the development remains safe throughout its lifetime
 - b. Take the impacts of climate change into account, clearly stating the development lifetime over which the assessment has been made
 - c. Consider the vulnerability of those using the infrastructure including arrangements for safe access and exit

- d. Include the assessment of the remaining risk (residual risk) after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular project
- e. Consider if there is a need to remain operational during a worst-case flood event over the development's lifetime
- f. Provide the evidence for the Secretary of State to apply the Sequential Test and Exception Test, as appropriate

2.5.5 Paragraph 5.96 of the NN NPS notes that if the Environment Agency has concerns about the proposal on flood risk grounds, the Applicant is encouraged to discuss these concerns with the Environment Agency and look to agree ways in which the proposal might be amended, or additional information provided, which would satisfy the Environment Agency's concerns, preferably before the application for development consent is submitted. Furthermore, paragraph 5.101 notes that if the Environment Agency continues to have concerns and objects to the grant of development consent on the grounds of flood risk, the Secretary of State can grant consent, but would need to be satisfied before deciding whether to do so that all reasonable steps have been taken by the Applicant and the Environment Agency to try and resolve the concerns.

2.5.6 The NPSNN notes in paragraph 5.98 that when flood risk is a factor in determining an application for planning consent, the provisions of the Sequential Test should be applied as part of site selection process and that the provisions of the Exception Test should be satisfied where development in Flood Zone 3 is necessary. Paragraph 5.107 of the NN NPS goes on to state that the Exception Test provides a method of managing flood risk while still allowing necessary development to occur, but also notes in paragraph 5.107 that it is only appropriate for use where the Sequential Test alone cannot deliver an acceptable site.

2.5.7 Paragraph 5.102 of the NPSNN notes that the Secretary of State should expect that reasonable steps have been taken to avoid, limit and reduce the risk of flooding to the proposed infrastructure and others. However, the nature of linear infrastructure means that there will be cases where:

- a. Upgrades are made to existing infrastructure in an area at risk of flooding
- b. Infrastructure in a flood risk area is being replaced
- c. Infrastructure is being provided to serve a flood risk area
- d. Infrastructure is being provided connecting two points that are not in flood risk areas, but where the most viable route between the two passes through such an area

2.5.8 Paragraph 5.103 of the NN NPS states that 'the design of linear infrastructure and the use of embankments may mean that linear infrastructure can reduce the risk of flooding for the surrounding area. In such cases, the Secretary of State should take account of any positive benefit to placing linear infrastructure in a flood-risk area'.

- 2.5.9 Paragraph 5.104 of the NN NPS states that ‘where linear infrastructure has been proposed in a flood risk area, the Secretary of State should expect reasonable mitigation measures to have been made, to ensure that the infrastructure remains functional in the event of predicted flooding’.
- 2.5.10 Paragraph 5.109 of the NN NPS notes that, ‘in addition, any project that is classified as ‘essential infrastructure’ and proposed to be located in Flood Zone 3a or 3b should be designed and constructed to remain operational and safe for users in times of flood; and any project in Zone 3b should result in no net loss of floodplain storage and not impede water flows’.
- 2.5.11 The NN NPS also mentions that an FRA should take account of the policy on climate change adaptation as outlined in paragraphs 4.36 to 4.47 of the NN NPS.
- 2.5.12 The NN NPS refers to the NPPF for further guidance on flood risk assessment.

Text box 2.4 National planning context – NN NPS

The overall strategic aims of the NN NPS and NPPF are consistent insofar as they both seek to achieve sustainable development.

The NPSNN contains specific policies for NSIPs where particular considerations may apply. In addition, the NN NPS provides guidance and imposes requirements on matters such as good scheme design, as well as the treatment of environmental impacts.

The FRA has been prepared in accordance with the relevant provisions of the NN NPS.

2.6 Overarching National Policy Statement for Energy

- 2.6.1 The Overarching National Policy Statement for Energy (NPS EN-1) is part of a suite of National Planning Statements (NPSs) issued by the Secretary of State for Energy and Climate Change⁴. It sets out the Government’s policy for delivery of major energy infrastructure, including flood risk policy. A further five technology-specific NPSs for the energy sector complete the suite
- 2.6.2 NPS EN-1 was published in 2011 and was written around the provisions of the Infrastructure Planning Commission (IPC). The IPC was a non-departmental public body responsible for examining nationally significant infrastructure projects in England and Wales. The IPC was abolished in 2011 and since April 2012 its function has been performed by the Infrastructure Planning Unit within the Planning Inspectorate.
- 2.6.3 An updated version of NPS EN-1 has been published in draft format. This draft brings the statement up to date in legislative terms but its requirements for flood risk are broadly similar.

⁴ The Department for Energy and Climate Change has undergone several changes and amalgamations and is now referred to as the Department for Business, Energy and Industrial Strategy

- 2.6.4 NPS EN-1 also makes multiple references to Planning Policy Statements (PPSs), which were published by the Department for Communities and Local Government. The PPSs have been replaced by the NPPF, including PPS25 which relates to development and flood risk.
- 2.6.5 The aims of NPS EN-1 on development and flood risk are to ensure that flood risk from all sources of flooding is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new energy infrastructure is, exceptionally, necessary in such areas, the policy aims to make it safe without increasing flood risk elsewhere and, where possible, by reducing flood risk overall.
- 2.6.6 NPS EN-1 states that applications for energy projects of 1 hectare or greater in Flood Zone 1 and all proposals for energy projects located in Flood Zones 2 and 3 in England should be accompanied by a flood risk assessment. This should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account.
- 2.6.7 In determining an application for development consent, the Secretary of State should be satisfied that where relevant:
- a. The application is supported by an appropriate FRA.
 - b. The Sequential Test has been applied as part of site selection.
 - c. A sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk.
 - d. The proposal is in line with any relevant national and local flood risk management strategy.
 - e. Priority has been given to the use of sustainable drainage systems (SuDS).
 - f. Flood risk areas of the project are appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed over the lifetime of the development.
- 2.6.8 The NPS EN-1 notes that essential energy infrastructure which has to be located in flood risk areas should be designed to remain operational when floods occur. In addition, any energy projects proposed in Flood Zone 3b (functional floodplain) should only be permitted if the development will not result in a net loss of floodplain storage, and will not impede water flows.

Text box 2.5 Overarching National Policy Statement for Energy

The overall strategic aims of the NPS EN-1 and NPPF are consistent insofar as they both seek to achieve sustainable development.

Although much of the legislation referred to in NPS EN-1 has been superseded, the policies on flood risk remain valid.

2.7 National Flood and Coastal Erosion Risk Management Strategy for England

- 2.7.1 The FWMA 2010 places a statutory duty on the Environment Agency to develop a National FCERM.
- 2.7.2 This strategy describes what needs to be done by all risk management authorities involved in flood and coastal erosion risk management for the benefit of people and places.
- 2.7.3 This strategy seeks to better manage the risks and consequences of flooding from rivers, the sea, groundwater, reservoirs, ordinary watercourses, surface water and sewers and coastal erosion.
- 2.7.4 This strategy's long-term vision has three ambitions, underpinned by evidence about future risk and investment needs. They are:
- a. Climate resilient places: working with partners to bolster resilience to flooding and coastal change across the nation, both now and in the face of climate change.
 - b. Today's growth and infrastructure resilient in tomorrow's climate: making the right investment and planning decisions to secure sustainable growth and environmental improvements, as well as resilient infrastructure.
 - c. A nation ready to respond and adapt to flooding and coastal change: ensuring local people understand their risk to flooding and coastal change, and know their responsibilities and how to take action.
- 2.7.5 Risk management authorities will work with partners to:
- a. Put greater focus on providing timely and quality planning advice that helps avoid inappropriate development in areas at risk of flooding and coastal change
 - b. Leave the environment in a better state by contributing to environmental net gain for new development proposals
 - c. Ensure that spending on flood and coastal resilience contributes to job creation and sustainable growth in local places
 - d. Mainstream property flood resilience measures and to 'build back better' after flooding to reduce damages and enable faster recovery for local communities
 - e. Provide expert advice on how infrastructure providers can ensure their investments are more resilient to future flooding and coastal change avoiding disruption to peoples' lives and livelihoods
- 2.7.6 As one of the flood risk authorities, National Highways is required to demonstrate alignment with the provisions of the FCERM.

Text box 2.6 Risk Management Strategy – FCERM

The FCERM sets out a vision for the nation to be ready for, and resilient to, flooding and coastal change.

Part 6 of the FRA demonstrates how the Project aligns with the provisions of the FCERM.

2.8 The Environment Agency’s approach to groundwater protection

- 2.8.1 The Environment Agency’s approach to groundwater protection (Environment Agency, 2018) contains position statements which provide information about the Environment Agency’s approach to managing and protecting groundwater. These position statements detail how the Environment Agency delivers Government policy for groundwater and adopts a risk-based approach where legislation allows. Many of the approaches set out in the position statements are not statutory but may be included in, or referenced by, statutory guidance and legislation.
- 2.8.2 Developers and operators are expected to provide adequate information when submitting proposals so the potential impact on groundwater resources and quality can be adequately assessed. They are also expected to assess and mitigate the potential impact on groundwater throughout the planning, construction, operation and decommissioning phases of the development or operation.
- 2.8.3 Section G of the document includes several position statements relating to the discharge of liquid effluents into the ground and outlines where permits may be required for discharge to groundwater.
- 2.8.4 Position statements relevant to the Project include, but are not limited to, those listed in Table 2.1.

Table 2.1 Discharge to groundwater – position statements

Position Statement C4 – Transport developments
<p><i>When planning proposals are brought forward for major new road, rail or airport developments the Environment Agency will require that:</i></p> <ul style="list-style-type: none"> • <i>drainage is via sustainable drainage systems (SuDS) designed and maintained to current good practice standards, including the provision of suitable treatment or pollution prevention measures. The point of discharge of such systems should normally be outside SPZ1 [source protection zone 1] and ideally outside SPZ2.</i> • <i>where there is an existing or unavoidable need to discharge in SPZ1, the Environment Agency requires a detailed risk assessment to demonstrate that pollution of groundwater will not occur.</i> <p><i>See also position statement G1.</i></p>

Position Statement G10 – Developments posing an unacceptable risk of pollution

The Environment Agency will normally object to new developments that pose an unacceptable risk of pollution to groundwater from sewage effluent, trade effluent or contaminated surface water.

This applies if the source of pollution is an individual discharge or the combined effects of several discharges, or where the discharge will cause pollution by mobilising contaminants already in the ground. In all cases the Environment Agency will normally object to any proposal to discharge untreated sewage to ground and will use its notice powers to ensure treatment of any existing discharges.

Position Statement G11 – Discharges from areas subject to contamination

Discharges of surface water run-off to ground at sites affected by land contamination, or from sites used for the storage of potential pollutants are likely to require an environmental permit.

This applies especially to sites where storage, handling or use of hazardous substances occurs (for example, garage forecourts, coach and lorry parks/turning areas and metal recycling/vehicle dismantling facilities). These sites will need to be subject to risk assessment with acceptable effluent treatment provided.

See also position statement C4.

Position Statement G13 – Sustainable drainage systems

The Government's expectation is that sustainable drainage systems (SuDS) will be provided in new developments wherever this is appropriate. The Environment Agency supports this expectation.

Where infiltration SuDS are to be used for surface run-off from roads, car parking and public or amenity areas, they should:

- be suitably designed*
- meet Government's non-statutory technical standards for sustainable drainage systems – these standards should be used in conjunction with the National Planning Policy Framework and Planning Practice Guidance*
- use a SuDS management treatment train – that is, use drainage components in series to achieve a robust surface water management system that does not pose an unacceptable risk of pollution to groundwater*

Where infiltration SuDS are proposed for anything other than clean roof drainage in a SPZ1, a hydrogeological risk assessment should be undertaken, to ensure that the system does not pose an unacceptable risk to the source of supply.

This position statement G13 needs to be read in conjunction with position statement G10.

Note: These position statements identify where risk assessments for infiltration SuDS will be required. Further details on SuDS design requirements are given in Part 7 of the FRA.

Text box 2.7 Environment Agency's approach to groundwater protection

Section G of the Environment Agency's approach to groundwater protection includes position statements relating to the discharge of liquid effluents into the ground and outlines where permits may be required for discharge to groundwater.

Position Statement C4 'Transport developments' states that when planning proposals are brought forward for major new roads, the Environment Agency will require that drainage is via SuDS, designed and maintained to current good practice standards, including the provision of suitable treatment or pollution prevention measures.

Position Statement G10 'Developments posing an unacceptable risk of pollution' mentions that the Environment Agency will normally object to new developments that pose an unacceptable risk of pollution to groundwater from sewage effluent, trade effluent or contaminated surface water.

Position Statement G11 (Discharges from areas subject to contamination) states that discharges of surface water runoff to ground at sites affected by land contamination, or from sites used for the storage of potential pollutants, are likely to require an environmental permit.

Position Statement G13 'Sustainable drainage systems' outlines the requirements of infiltration SuDS for surface runoff from roads. Where infiltration SuDS are proposed in a SPZ1, a hydrogeological risk assessment should be undertaken, to ensure that the system does not pose an unacceptable risk to the source of supply.

Part 7 of the FRA includes details on the use of SuDS. Groundwater is discussed in detail in the Hydrogeological Risk Assessment (Appendix 14.5 in Application Document 6.3).

3 Regional planning policy

3.1 Regional planning documents

3.1.1 The following regional planning documents are summarised in this section:

- a. Thames River Basin Management Plan – Part 1 (Thames RBMP) (Environment Agency, 2015)
- b. Thames Catchment Flood Management Plan (Thames CFMP) (Environment Agency, 2009a)
- c. North Kent Rivers Catchment Flood Management Plan (North Kent Rivers CFMP) (Environment Agency, 2009b)
- d. South Essex Catchment Flood Management Plan – Summary Report (South Essex CFMP) (Environment Agency, 2009c)
- e. Thames Estuary 2100 (TE2100) Plan (Environment Agency, 2012)

3.2 Thames river basin management plan – Part 1

3.2.1 The purpose of a river basin management plan is to provide a framework for protecting and enhancing the benefits provided by the water environment. To achieve this, and because water and land resources are closely linked, it also informs decisions on land-use planning. The Thames RBMP (Environment Agency, 2015) contains four sets of information that bodies responsible for managing land and water should pay attention to:

- a. Baseline classification of water bodies: one of the main purposes of the Thames RBMP is to prevent water bodies deteriorating. Deterioration from the baseline is not permitted, except in very specific circumstances that are described in the Thames RBMP.
- b. Statutory objectives for protected areas: the Thames RBMP highlights the areas of land and bodies of water that have specific uses that need special protection.
- c. Statutory objectives for water bodies: the Thames RBMP sets out legally binding objectives for each quality element in every water body, including an objective for the water body as a whole.
- d. Summary programme of measures to achieve statutory objectives: the Thames RBMP provides a framework for action and future regulation.

3.2.2 The Thames RBMP sets out the current quality of water bodies in the district and describes the objectives for making further improvements to the ecological and chemical quality. Thurrock lies in the South Essex catchment of the Thames RBMP. The Thames RBMP outlines the compliance with wider environmental objectives and targets (e.g. those set out by the Water Framework Directive) by considering whether water bodies and protected areas are suitably protected and that the implementation of any scheme, where feasible, enhances existing water bodies.

- 3.2.3 The Thames River Basin District covers an area of 16,200km² from Oxfordshire in the north to Surrey in the south, and from Gloucester in the west to the Thames Estuary in the east. The district is split into 17 management catchments⁵, the following three of which would be traversed by the Project:
- a. Medway
 - b. Essex South
 - c. Roding, Beam and Ingrebourne
- 3.2.4 The Environment Agency's Catchment Data Explorer (Environment Agency, 2022) includes maps showing the extents of the catchment areas.
- 3.2.5 South of the River Thames, the Project would fall within the Medway management catchment. The priority issues identified in the Medway catchment are physical modifications to the river, water quality, and water flows and availability. Future measures within the catchment include maintaining a Healthy Catchment project aimed at: improving water quality by tackling aggravated erosion; river restoration to make low-flow river channels, which would allow the ecosystem to be more resilient; and improving species diversity by increasing the complexity of aquatic habitats.
- 3.2.6 North of the River Thames, the Project would fall within the Essex South management catchment and Roding, Beam and Ingrebourne management catchment. The priority issues in both of these catchments are pollution and poor water quality from urban and agricultural runoff, and physical modifications due to urbanisation and flood protection. A future aim is to promote and encourage the use of SuDS in new developments and retrofitting to existing sites within the catchment to reduce the impacts of urban diffuse pollution and phosphate runoff from fertilisers and herbicides. Ideas for additional measures include flood management using natural processes, climate change adaptation, reconnecting people to the environment, improved recreation access and enhanced habitats. The future aim for these catchments could be the development and implementation of a water body wide culvert awareness and removal programme, promoting alternatives to culverting, influencing planning policy and encouraging sustainable development without culverts.

Text box 3.1 Regional planning context – Thames RBMP

The Project would fall within the following management catchments:

- Medway
- Essex South
- Roding, Beam and Ingrebourne

The priority issues identified in the Medway catchment are physical modifications to the river, water quality, and water flows and availability.

⁵ Management catchment: an amalgamation of a number of river water body catchments that provide a management unit at which level some actions are applied.

The priority issues for the Essex South and the Roding, Beam and Ingrebourne catchments are pollution and poor water quality from urban and agricultural runoff, and physical modifications due to urbanisation and flood protection.

To align with the objectives of the Thames RBMP, the use of culverts would be minimised and the use of SuDS would be adopted where possible. The way in which these two objectives have been achieved is described in Part 6, Part 7 and Part 10 of the FRA.

3.3 Thames Catchment Flood Management Plan

- 3.3.1 A catchment flood management plan is a high-level strategic planning document that provides an overview of the main sources of flood risk and how these can be managed in a sustainable framework for the next 50 to 100 years. The Environment Agency engages stakeholders within the catchment to produce policies in terms of sustainable flood management solutions, while also considering local land-use changes and the effects of climate change.
- 3.3.2 The Thames CFMP assesses flood risk within the Thames catchment, which includes the London Borough of Havering. The Thames CFMP considers all sources of flooding but acknowledges a lack of available data in relation to surface water and groundwater flooding. The Thames CFMP finds that 1,000 to 2,000 homes within the London Borough of Havering have a 1% annual probability of river flooding⁶. Thurrock and Gravesend are not mentioned in the report since they are outside of the Thames CFMP boundary.
- 3.3.3 The Thames CFMP states that the Environment Agency wants to continue to maintain the existing flood defences and when redevelopment takes place, replace and improve them so that they are more effective against the impacts of climate change. The Environment Agency will also be seeking to remove culverts and other structures that cause significant conveyance problems. With its partners, the Environment Agency will look for opportunities to reduce flood risk by recreating river corridors in urban areas. The Environment Agency note that opening up culverts and recreating river corridors through redevelopment will result in more space for the river to flow, more floodplain where water can be stored and reduced flood risk. Regeneration is cited as a key means through which flood risk can be reduced.

⁶ Table 1 in Thames CFMP Summary Report (Environment Agency, 2009a).

Text box 3.2 Regional planning context – Thames CFMP

A CFMP is a high-level strategic planning document that provides an overview of the main sources of flood risk.

The Thames CFMP (Environment Agency, 2009a) identifies that 1,000 to 2,000 homes in the London Borough of Havering area have a 1% annual probability of fluvial flooding. Most of these homes are understood to lie in areas that would not be affected by the Project.

The use of culverts in the London Borough of Havering would only be included where alternatives are not viable or practical (e.g. extension of the Western Mardyke culvert under the M25). Further details of culverts are included in Part 10 of the FRA.

3.4 North Kent Rivers Catchment Flood Management Plan

- 3.4.1 For the purposes of the North Kent Rivers CFMP, the North Kent Rivers catchment has been divided into six distinct sub-areas which have similar physical characteristics, sources of flooding and levels of risk. The North Kent Rivers CFMP establishes the most appropriate approach to managing flood risk for each of the sub-areas. The North Kent Rivers CFMP then allocates one of six generic flood risk management policies to each sub-area. To select the most appropriate policy, the plan has considered how social, economic and environmental objectives are affected by flood risk management activities under each policy option.
- 3.4.2 The Project road would cross the North Kent Marshes sub-area (Policy 3) and the North Kent Downs sub-area (Policy 1). Policy 1 applies to areas of little or no flood risk where the Environment Agency will continue to monitor and advise. This policy will tend to be applied in those areas where there are very few properties at risk of flooding. It reflects a commitment to work with the natural flood processes as far as possible. Policy 3 applies to areas of low to moderate flood risk where the Environment Agency is generally managing existing flood risk effectively. This policy will tend to be applied where the risks are currently appropriately managed and where the risk of flooding is not expected to increase significantly in the future.
- 3.4.3 The North Kent Marshes sub-area (Policy 3) includes many smaller watercourses that flow from the North Kent Downs to the Thames Estuary. Policy 3 supports economic, social and environmental development by maintaining the current level of risk but accepting that the impacts of flooding will increase with time due to climate change. One of the proposed actions to implement the preferred approach is the development of a System Asset Management Plan. This plan should aim to reduce flood risk now or in the future in the urban areas while reducing maintenance costs. For example, by combining outfalls in the rural areas. Another proposed action is to encourage the take-up of flood resilience measures by people living within the floodplain, to maintain outfalls for elvers and fishing interest and to ensure flood risk management does not adversely affect conservation interest in the marshes.

- 3.4.4 The North Kent Downs sub-area (Policy 1) covers the upper reaches of several smaller watercourses in the North Kent Downs and plains. It includes the large towns along the Thames such as Gravesend. Flood risk is low in this area. No flood damage has been identified within this sub-area. According to the North Kent Rivers CFMP, no people or property are affected by flooding. The local authorities and water companies will need to continue to maintain drainage assets in urban areas to prevent local flood risk from surface water and minor drains.

Text box 3.3 Regional planning context – North Kent Rivers CFMP

The North Kent Rivers CFMP is divided into six distinct sub-areas which have similar physical characteristics, sources of flooding and levels of risk. This CFMP establishes the most appropriate approach to managing flood risk for each of the sub-areas and then allocates one of six generic flood risk management policies to each sub-area. The Project would traverse two of the sub-areas:

- North Kent Marshes (Policy 3)
- North Kent Downs (Policy 1)

Policy 1 covers the upper reaches of several smaller watercourses in the North Kent Downs and plains. It includes the large towns along the Thames such as Gravesend. Flood risk is low in this area. According to the North Kent Rivers CFMP, no people or property are affected by flooding.

Policy 3 includes many smaller watercourses that flow from the North Kent Downs to the Thames Estuary. Policy 3 supports economic, social and environmental development by maintaining the current level of risk but accepting that the impacts of flooding will increase with time due to climate change.

The Project would take account of the objectives of the two policy areas in order to ensure that they are not compromised.

3.5 South Essex Catchment Flood Management Plan

- 3.5.1 The South Essex CFMP identifies that both surface water flooding and the residual flood risk associated with tidal sources are issues for the Thurrock area. Surface water flooding is usually associated with heavy rainfall over a short period, particularly when the ground is already saturated or when flow channels become blocked or tide locked.
- 3.5.2 The South Essex catchment has been divided into nine distinct sub-areas. Like the North Kent Rivers CFMP, the South Essex CFMP establishes the most appropriate approach to managing flood risk for each of the sub-areas. The CFMP then allocates one of six generic flood risk management policies to each sub-area. To select the most appropriate policy, the plan has considered how social, economic and environmental objectives are affected by flood risk management activities under each policy option.

- 3.5.3 The Project would cross the Thames urban tidal sub-area (Policy 4), and the Crouch catchment and River Mardyke/Horndon catchment sub-area (Policy 6). Policy 4 applies to areas of low, moderate or high flood risk where the Environment Agency is already managing the flood risk effectively but where the Environment Agency may need to take further action to keep pace with climate change. Policy 6 applies to areas of low to moderate flood risk where the Environment Agency will take action with others to store water or manage runoff in locations that provide overall flood risk reduction or environmental benefits.
- 3.5.4 Historically, the Thames urban tidal sub-area (Policy 4) has relied on a pumped drainage system to control river and surface water flood risk. The failure of the system would lead to an unacceptable level of risk in the sub-area. The preferred approach is to manage the probability of river flooding by storing water on the floodplain upstream in the Crouch catchment and River Mardyke/Horndon catchment sub-area. Proposed actions to implement the preferred approach are to produce flood awareness plans for the public, develop emergency response plans to manage flood risk from the defences failing or being overwhelmed, as well as creating storage areas, natural or engineered, along the river corridor upstream of this sub-area. Planners should be encouraged to develop policies to prevent inappropriate development in the floodplain using measures set out in the NPPF. The South Essex CFMP also encourages partners to develop a Surface Water Management Plan (SWMP) for Tilbury. The Environment Agency's key partner in the context of the South Essex CFMP are Essex County Council and Thurrock Council.
- 3.5.5 Throughout the Crouch catchment and River Mardyke/Horndon catchment sub-area, there is low risk to people and property, which are scattered in isolated locations. When the South Essex CFMP was undertaken, 129 properties were at risk from the 1% annual probability river flood. Most of the properties at risk (80) were in the River Mardyke/Horndon catchment.
- 3.5.6 In these largely rural areas, the aim is to manage flood risk by maximising the potential of the floodplain to retain water to benefit locations elsewhere in the catchment. Reducing bank and channel maintenance will increase the ability of the floodplain to store water by improving the flow between the river and its floodplain. Storing water on these floodplains can reduce flood risk to settlements downstream. However, where flood risk may be more concentrated, such as in towns and villages, existing actions to manage flooding may be continued. Within the River Mardyke/Horndon catchment, planners must prevent development that affects the ability of the floodplain to retain water.
- 3.5.7 The South Essex CFMP also draws attention to the impact commercial chalk quarrying may have on groundwater levels within Thurrock.

Text box 3.4 Regional planning context – South Essex CFMP

The South Essex catchment has been divided into nine distinct sub-areas. The South Essex CFMP establishes the most appropriate approach to managing flood risk for each of the sub-areas. The South Essex CFMP then allocates one of six generic flood risk management policies to each sub-area. The Project would traverse two of the sub-areas:

- Thames urban tidal sub-area (Policy 4)
- Crouch catchment and River Mardyke/Horndon catchment sub-area (Policy 6)

Policy 4 applies to areas of low, moderate or high flood risk where the Environment Agency is already managing the flood risk effectively but where the Environment Agency may need to take further actions to keep pace with climate change.

Policy 6 applies to areas of low to moderate flood risk where the Environment Agency will take action with others to store water or manage runoff in locations that provide overall flood risk reduction or environmental benefits.

The South Essex CFMP identifies that, in addition to the residual flood risk associated with tidal sources, surface water flooding is also an issue for the Thurrock area. It is usually associated with short duration, high intensity rainfall when the ground is already saturated or when flow channels become blocked or tide locked.

The South Essex CFMP recommends managing flood risk by maximising the potential of the floodplain to retain water.

The Project would take account of the objectives of the two policy areas in order to ensure that they are not compromised.

3.6 Thames Estuary 2100 (TE2100) Plan

Introduction

3.6.1 The TE2100 Plan sets out the Environment Agency's recommendations for flood risk management for London and the Thames Estuary through to the end of the century and beyond, with a range of short, medium and long-term actions. The TE2100 Plan primarily looks at tidal flooding and is designed to be adaptable to a changing climate, even if climate change accelerates beyond current predictions.

3.6.2 It should be noted that the TE2100 Plan is not a statutory document.

Policy units

3.6.3 For the purposes of the TE2100 Plan, the Thames Estuary has been divided into 23 geographical areas which share similar flooding characteristics and assets at risk; these areas are known as policy units. Each unit has been assessed to determine the appropriate level of flood risk management. Five policies have been developed to indicate the level of flood risk management for each policy unit. These policies are the starting point for developing the TE2100 programme of activities at estuary-wide and local scale. The policies also provide a single framework for considering different options and assist with prioritisation of flood risk management activities. The five policies are detailed in Table 3.1.

Table 3.1 TE2100 Plan policies

Policy	Level of flood risk management
P1	No active intervention (including flood warning and maintenance). Continue to monitor and advise.
P2	Reduce existing flood risk management actions (accepting that flood risk will increase over time).
P3	Continue with existing or alternative actions to manage flood risk. Continue to maintain flood defences at their current level, accepting that the likelihood and/or consequences of a flood will increase because of climate change.
P4	Take further action to keep up with climate and land-use change so that flood risk does not increase.
P5	Take further action to reduce the risk of flooding (now or in the future).

- 3.6.4 Policy units with similar characteristics and requiring a similar type and range of actions have been grouped together into action zones. There are eight local action zones (action zones 1 to 8) and an estuary-wide zone (action zone 0). For each action zone there is a description explaining the features of each policy unit and the action plan for each zone which shows:
- What actions are required
 - Who will undertake these actions
 - How this will be done
- 3.6.5 The policy units and action zones through which the Project would be routed are briefly summarised in Table 3.2 to Table 3.4. The tables outline the existing flood risk management system for each policy unit that the Project would cross and the actions that would to be taken according to the TE2100 Plan.
- 3.6.6 South of the River Thames, the Project would cross North Kent Marshes policy unit (Lower Estuary Marshes – action zone 6). The recommended flood risk management policy for this area is P3. Most of the area to the east of Gravesend is rural, where Policy P3 is proposed. Those parts of Gravesend that are urban fall under Policy P4.
- 3.6.7 North of the River Thames, the Project would straddle Purfleet, Grays and Tilbury policy unit (Middle Estuary – action zone 5); the recommended policy is P4. This would most likely be achieved through a combination of floodplain management techniques and maintaining, and where possible improving, flood defences. Moving northwards, the Project would cross East Tilbury and Mucking Marshes policy unit (Lower Estuary Marshes – action zone 6). The recommended policy for this area is P3 is to:
- Continue with existing or alternative actions to manage flood risk.
 - Continue to maintain flood defences at their current level, accepting that the likelihood and/or consequences of a flood will increase because of climate change.
- 3.6.8 Despite its proximity to the River Thames, the area immediately around Coalhouse Point is not included in the TE2100 Plan.

Table 3.2 Action zone 5 – Middle Estuary

Action zone 5 – Middle Estuary	
Policy unit	Purfleet, Grays & Tilbury
Flood risk management policy	P4
Existing flood risk management system	Tidal flood defences downriver of the Thames Barrier Tilbury Dock floodgate Local fluvial flood defences on the Mardyke Local fluvial defences at Tilbury Town Drainage system outfalls including West Thurrock and West Tilbury marshes
Pertinent recommendations	The TE2100 Plan recommendations for the Middle Estuary zone are to maintain, enhance and replace the river defence walls and active structures. This recommendation is ongoing up to the 22 nd century. The TE2100 Plan also recommends that an agreed programme for managing flooding from other sources in the defended tidal floodplain be established in the first 25 years of the TE2100 Plan.
Local issues	In addition to the above, the TE2100 Plan recognises that drainage systems in the Purfleet, West Thurrock and Tilbury areas will require upgrading as the sea level rises and because storm rainfall is expected to increase. Suggested mitigation measures include improved outfalls and drainage channels, additional pumping capacity, additional flood storage and new or improved local flood defences.

Table 3.3 Action zone 6 – Lower Estuary Marshes

Action zone 6 – Lower Estuary Marshes	
Policy unit	East Tilbury and Mucking Marshes
Flood risk management policy	P3
Existing flood risk management system	Tidal flood defences on the Thames Drainage system outfalls including Mucking Creek and East Tilbury Marshes
Needs/actions per policy unit	No defence raising is envisaged in the TE2100 Plan, but defence maintenance and repair will be needed. Maintain the existing defence alignment but provide secondary defences for key assets, including East Tilbury, as flood risk would otherwise increase. To agree a programme of floodplain management including flood warning, emergency planning, and localised flood protection and resilience to vulnerable key sites in the Lower Estuary Marshes.

Action zone 6 – Lower Estuary Marshes	
Local issues	<p>As the tidal flood defences will not be raised, flood risk will increase. The TE2100 Plan includes a secondary defence for East Tilbury and the adjacent railway line, although this will require appraisal and justification. The plan also recommends that new and improved defences should be designed so that all defences have continuous public access, including adequate access points.</p> <p>There is a fluvial drainage system for the marshes. Fluvial flood risk is likely to rise as the sea level rises and fluvial flows increase. Potential mitigation measures include outfall improvement, flood storage and local flood defences.</p>

Table 3.4 Action zone 6 – Lower Estuary Marshes

Action zone 6 – Lower Estuary Marshes	
Policy unit	North Kent Marshes
Flood risk management policy	P3
Existing flood risk management system	Tidal flood defences on the Thames Drainage system discharging to the River Thames.
Needs/actions per policy unit	<p>No defence raising is envisaged in the TE2100 Plan, but defence maintenance and repair will be needed.</p> <p>Maintain the existing defence at their current level, accepting that the likelihood and/or consequences of a flood will increase because of climate change.</p> <p>To agree a programme of floodplain management including flood warning, emergency planning, and localised flood protection and resilience to vulnerable key sites in the Lower Estuary Marshes.</p>
Local issues	<p>The existing tidal defence system is likely to be retained except where the defences are realigned to create intertidal habitat, or because of erosion. However, justification for maintaining the line may prove difficult in the eastern part of this policy unit, and the alternative would be to provide secondary defences for the communities on the edge of the floodplain.</p> <p>Defences should be in keeping with the rural landscape. This is currently achieved by the existing grassed embankments, but opportunities should be taken to enhance the landscape including, for example, different embankment profiles and earthworks that break up the generally straight lines of the defences. Any defence improvement provides opportunities to enhance both tidal and freshwater habitats.</p> <p>As the sea level rises and storm rainfall increases, there will be a greater need for an efficient drainage system. The drainage system will therefore require upgrading as the sea level rises to maintain a satisfactory level of storm drainage.</p>

New barrier

- 3.6.9 One of the estuary-wide options of the TE2100 Plan is to construct a new barrier. The barrier would be designed to resist the highest surge tides predicted under the Government’s current climate change guidance.
- 3.6.10 Two locations are being considered for a new barrier:
- a. Option 3.1 Tilbury location
 - b. Option 3.2 Long Reach location
- 3.6.11 At present, the recommended location for the barrier is Option 3.2 but Option 3.1 has not been discounted⁷.

Text box 3.5 Regional planning context – TE2100 Plan

The TE2100 Plan sets out recommendations for flood risk management for London and the Thames Estuary through to the end of the century and beyond, with a range of short, medium and long-term actions.

North of the River Thames, the Project would cross action zone 5 – Middle Estuary. The TE2100 Plan recommendations for action zone 5 are to maintain, enhance and replace the river defence walls and active structures. The TE2100 Plan also recommends that an agreed programme for managing flooding from other sources in the defended tidal floodplain be established.

South of the River Thames, the Project would also cross action zone 6 – Lower Estuary Marshes. No defence raising is envisaged in the TE2100 Plan, but defence maintenance and repair will be needed.

A general awareness of the provisions of the TE2100 Plan would be considered during development of the Project. As the work recommended by the TE2100 Plan is currently conceptual, the potential benefits cannot be incorporated into the FRA.

⁷ It is understood that this recommendation is currently under review and other locations for the new barrier are being considered.

4 Local planning policy

4.1 Introduction

- 4.1.1 Local planning authorities are required to produce Local Development Frameworks, which are a portfolio of Local Development Documents that collectively deliver the spatial planning strategy for the authority area. The Local Development Documents undergo a Sustainability Appraisal, which assists planning authorities in ensuring their policies fulfil the principles of sustainability. Strategic Flood Risk Assessments (SFRAs) are one of the documents to be used as the evidence base for planning decisions and are a component of the Sustainability Appraisal process.
- 4.1.2 The following local planning authorities have jurisdiction over parts of the Project:
- a. Brentwood Borough Council
 - b. Essex County Council
 - c. Gravesham Borough Council
 - d. Kent County Council
 - e. London Borough of Havering
 - f. Maidstone Borough Council
 - g. Thurrock Council
 - h. Tonbridge and Malling Borough Council
- 4.1.3 Essex County Council is acting as LLFA on behalf of Thurrock Council.
- 4.1.4 London Borough of Havering is acting as LLFA for Brentwood Borough Council.
- 4.1.5 Kent County Council is the LLFA for Gravesham Borough Council, Maidstone Borough Council, and Tonbridge and Malling Borough Council.

4.2 Kent

Planning documents

- 4.2.1 The following documents have been reviewed to assess the flood risk aspects of the planning environment in Kent:
- a. Updating the SFRA (Kent Thameside Delivery Board, 2009)
 - b. Thameside Stage 1 Surface Water Management Plan (Thameside SWMP) (Kent County Council, 2013)
 - c. Kent Local Flood Risk Management Strategy 2017–2023 (Kent LFRMS) (Kent County Council, 2017)
 - d. Gravesham Local Plan Core Strategy (Gravesham Borough Council, 2014)

- e. Maidstone Borough Local Plan (Maidstone Borough Council, 2017)
- f. Local Development Framework: Core Strategy (Tonbridge and Malling Borough Council, 2007)
- g. Drainage and Planning Policy (Kent County Council, 2019)
- h. The Kent Design Guide: Making It Happen – Sustainability (Drainage Systems) (Kent County Council, n.d.)

Kent Thameside – Updating the Strategic Flood Risk Assessment

- 4.2.2 Kent Thameside is the area of Dartford and Gravesham to the north of the A2. An SFRA was carried out for this area in 2005 and updated in 2009 (Kent Thameside Delivery Board, 2009).
- 4.2.3 The Kent Thameside SFRA showed the different zones of flood risk in Kent Thameside particularly for potential development sites, to inform the application of the Sequential and Exception Tests. It also includes a series of recommendations to reduce/manage the residual flood risk.
- 4.2.4 Some of the recommendations include provision of less fragile defences in critical areas, land raising, non-habitable ground floors, secondary defences (such as flood storage), flood bunds and drainage improvements, temporary barriers, flood resilient design, and flood warning and emergency procedures. Other recommendations mention that when the opportunity arises, flood gates should be replaced with solid defences and the provision of new gates to enable access to the foreshore should be discouraged.
- 4.2.5 The SFRA update has identified which potential development sites are outside Flood Zones 2 and 3, and what land uses are considered appropriate for each site based on the guidance specified in the historical PPS25⁸.

Thameside Stage 1 Surface Water Management Plan

- 4.2.6 An SWMP is a framework through which key local partners, who have a responsibility for surface water and drainage in their area, work together to understand the causes of surface water flooding and agree the most cost-effective way of managing that risk. The purpose of the Thameside SWMP (Kent County Council, 2013) is to make sustainable surface water management decisions that are evidence based, risk based, future proofed and inclusive of stakeholder views. This process develops a long-term action plan to manage surface waters and helps meet the requirements of the Flood Risk Regulations 2009 and the FWMA.
- 4.2.7 Surface water presents a risk throughout Thameside. The plan splits the study area into four drainage areas. The Project road would fall within the drainage areas referred to as Gravesend DA02 (Gravesend Town) and Gravesham Rural DA03 (covering the rural outskirts of Gravesham and the North Downs).

⁸ PPS25 has been withdrawn and superseded by the NPPF.

- 4.2.8 The Thameside SWMP outlines that the risk management authorities (Kent County Council, Gravesham Borough Council, Environment Agency and Southern Water) for both drainage areas should develop and implement a targeted maintenance schedule so that the highway gullies, drains and other drainage assets (including SuDS), watercourses and sewers operate effectively and to their design capacity.
- 4.2.9 The Thameside SWMP indicates certain areas that have been highlighted as being at high risk in the Gravesend drainage area (DA02) and need further investigation. The Thameside SWMP did not show any significant risks that need further investigation in the Gravesham Rural (DA03) drainage area.

Kent Local Flood Risk Management Strategy 2017–2023

- 4.2.10 The Kent LFRMS (Kent County Council, 2017) has been produced to meet the requirements of the FWMA, which designates upper-tier authorities (like Kent) as the LLFA. The FWMA requires LLFAs to prepare, implement and manage an LFRMS to set out how local flood risks will be managed in the county, who will deliver them and how they will be funded.
- 4.2.11 The objectives for this strategy reflect the need to progress with the improvements achieved to date and to address the challenges that Kent faces. The objectives are set out below:
- a. Understanding flood risks: monitoring, recording and investigating flooding and flood risk helps to identify opportunities to reduce flood risk and provide information to improve the general understanding of flood risk.
 - b. Reduce the risk of flooding: work in partnership to reduce the risk of flooding on people and businesses in Kent through the delivery of cost-effective flood risk management projects and programmes.
 - c. Resilient planning: ensure that development and spatial planning in Kent takes account of flood risk issues and plans to effectively manage any impacts.
 - d. Resilient communities: ensure residents and businesses of Kent have access to appropriate data and information to understand flood risk in their area, how it is managed and by whom.
- 4.2.12 The strategy sets out an action plan to deliver these objectives. This action plan identified aims and actions that break the objectives down into discrete packages which continue to deliver flood risk management or address the challenges that we have identified in this LFRMS.
- 4.2.13 The findings of the strategy that relate to the Project and its immediate surroundings are detailed below:
- a. The strategy highlights that the coastal areas of Kent, such as Gravesend, are at risk of coastal and tidal flooding. The strategy notes that flood defences are in place to reduce the tidal flood risk.
 - b. The strategy notes that Kent County Council does not consider the surface water flood risk in Gravesend to constitute a nationally significant flood risk.

- c. The strategy recognises that ordinary watercourses are a significant source of flood risk in Kent. There are many areas with a large number of ordinary watercourses in a concentrated area in Kent, for instance the North Kent Marshes. The strategy notes that these watercourses perform a vital role in land drainage and flood risk management in flat impermeable areas.
- d. The strategy notes that groundwater presents a significant source of flooding in parts of Kent as there are large areas of permeable aquifers. The areas at most risk of groundwater flooding lie across the North Downs (i.e. beyond the extents of the Project).

4.2.14 Under the resilient planning objective, the action plan places particular emphasis on the use of SuDS.

Gravesham Local Plan Core Strategy

Introduction

4.2.15 This Core Strategy (Gravesham Borough Council, 2014) sets out the council's long-term spatial vision for the borough up to 31 March 2028.

4.2.16 This strategy sets out how much housing, employment and retail development Gravesham needs and what infrastructure will be needed to enable this development to take place. It includes policies to ensure development is of a high quality, avoids environmentally sensitive locations, respects and improves the existing built environment and meets the needs of existing and future population.

Flood risk

4.2.17 The Core Strategy notes that parts of the borough alongside the River Thames are within areas where there is a high risk of flooding. The main concern is the risk of tidal flooding from North Sea storm surges that would affect the River Thames. Most of the areas alongside the river have a high standard of protection by defences.

4.2.18 Given the risk of tidal flooding in Gravesham, the Core Strategy notes that the council will seek to prioritise the maintenance, improvement or replacement of flood defence infrastructure over other land uses. In addition to meeting their own flood defence and flood management needs, new developments will be expected to take advantage of opportunities to reduce the causes and impacts of flooding from all sources where it is technically and financially feasible to do so.

4.2.19 The Core Strategy also notes that the overarching approach to flood risk needs to take the proposals included in the TE2100 Plan into account. The core plan makes the following observations on the TE2100 Plan:

- a. The TE2100 Plan shows that there are unlikely to be major changes to the existing system of defences over the plan period. However, it is likely that there will be changes in the longer term.
- b. All the options included in the TE2100 Plan allow for a new flood defence to the north-east of Gravesend and some of the options include a new

Thames flood barrier, either at Long Reach, Dartford, or between Gravesend and Tilbury.

- c. The proposed flood defence to the north-east of Gravesend comprise a new north-south flood defence across the marshes.
- d. As the alignment and form of the proposed defences are not yet known and given this land has a significant biodiversity value of the area, Gravesham Borough Council's approach is that this area should remain undeveloped over the plan period.

Sustainable drainage systems

- 4.2.20 The Core Strategy recognises the benefits of incorporating SuDS to reduce flood risk and strongly supports their use. It also recognises other benefits for incorporating SuDS such as enhancing water quality, providing a sympathetic environmental setting for development and providing a wildlife habitat.

Core strategy policies

- 4.2.21 In order to achieve its strategic objective, the council has developed a number of Core Strategy policies. Those relating to flood risk are detailed below.
- 4.2.22 Policy CS18 of the Core Strategy relates to climate change and stipulates the following:
- a. With the exception of the previously developed sites along the Thames Riverside and those other regeneration sites that have already been evaluated in accordance with the Sequential and Exception Tests at the application stage, development will be directed sequentially to those areas at least risk of flooding.
 - b. Proposals in areas at risk of flooding must be accompanied by a flood risk assessment and a flood risk management plan (if required) to demonstrate that they are adequately defended and safe over their lifetime. Planning permission will be refused for schemes that do not pass the Sequential and Exception Tests.
 - c. The council will prioritise the maintenance, improvement or replacement of flood defence infrastructure over other land uses where relevant. In addition to meeting their own flood defence and management needs, the council will expect new development to take advantage of opportunities to reduce the causes and impacts of flooding from all sources where it is technically and financially feasible.
- 4.2.23 Policy CS19 of the core strategy relates to development and design principles and stipulates the following:
- a. The design and layout of new development will take advantage of opportunities to build in resilience to the effects of climate change. This will include protection against flood risk, where relevant, delivering carbon reduction, provision for low carbon and renewable energy, and minimising energy consumption and water.

Tonbridge and Malling Borough Council Core Strategy

- 4.2.24 The Tonbridge and Malling Borough Council's Core Strategy (2007) sets out the Council's vision, aims and objectives which will determine the future pattern of development in the Borough over the period up until 2021 and the way in which the social, economic and environmental needs of the area can be delivered in the most sustainable way. An updated plan is currently being prepared but has not yet been released.
- 4.2.25 The strategy refers to the Government Policy evolving at the time of writing (PPS25, Department for Communities and Local Government, 2009). This policy indicates that Local Planning Authorities should seek to avoid flood risk to people and property where possible and manage it elsewhere by adopting a risk based approach to development. The risk based approach is one that seeks to avoid inappropriate development in flood risk areas, minimise runoff from new development and manage flood pathways and flood storage.
- 4.2.26 The strategy also notes that the sequential approach to determining the suitability of land for development in flood risk areas is central to the provisions of PPS25. For the sequential approach, PPS25 states that authorities must be able to demonstrate, in identifying sites for development, that there are no alternative sites available in areas with a lower probability of flooding that would be appropriate for the type of development proposed. Departures from the sequential approach will only be justified in exceptional circumstances where it is necessary to meet wider aims of sustainable development.
- 4.2.27 The strategy notes that some redevelopment sites within built-up areas are at medium to high risk of flooding. In these cases the economic, social, environmental and regeneration benefits of redevelopment have to be weighed, as part of the PPS25 Sequential Test, against the actual risk of flooding. In these locations the Council's aim should be to minimise and manage any flood risk in the detailed design of such developments.
- 4.2.28 The Core Strategy states that Policy CP10 will apply to all forms of development other than changes of use or minor householder development. Policy CP10 requires that:
- a. Within the floodplain development should first seek to make use of areas at no or low risk to flooding before areas at higher risk, where this is possible and compatible with other policies aimed at achieving a sustainable pattern of development.
 - b. Development which is acceptable (in terms of PPS25) or otherwise exceptionally justified within areas at risk of flooding must:
 - i. Be subject to a flood risk assessment.
 - ii. Include an appropriately safe means of escape above flood levels anticipated during the lifetime of the development.
 - iii. Be designed and controlled to mitigate the effects of flooding on the site and the potential impact of the development on flooding elsewhere in the floodplain.

- 4.2.29 PPS25 was withdrawn in 2012 but its provisions were incorporated into NPPF and associated guidance. The approaches described above are therefore broadly current.

Maidstone Borough Local Plan

- 4.2.30 Maidstone Borough Local Plan sets the framework for development in the Borough until 2031.
- 4.2.31 The plan includes two overarching policies for dealing with flood risk:
- a. Policy H1: Housing site allocations
 - b. Policy H2: Broad locations for housing growth
- 4.2.32 Both of these policies require that:
- a. A flood risk assessment is undertaken for developments larger than 1ha in area in Flood Zone 1 and for all development in Flood Zones 2 and 3.
 - b. Appropriate surface water and robust flood mitigation measures are implemented where development that lies in Flood Zones 2 or 3.
- 4.2.33 The plan sets out strategic policies by location basis. The requirements for dealing with flood risk in these policies is generic in nature and contain elements of policy H1 and H2.

Kent County Council – Drainage and Planning Policy

Introduction

- 4.2.34 The Drainage and Planning Policy (Kent County Council, 2019) sets out how Kent County Council, as LLFA and statutory consultee, will review drainage strategies and surface water management provisions associated with major development. It is consistent with the Non-statutory technical standards for sustainable drainage (Defra, 2015⁹) and sets out Kent County Council's policy requirements for sustainable drainage.

Planning policy and guidance for drainage

- 4.2.35 This policy sets out the sources of planning policy relevant to the management of surface water. These policies form the basis of Kent County Council's assessment of any submitted drainage strategy. The drainage strategy will need to demonstrate how the development meets these requirements.

Drainage consultation

- 4.2.36 The policy notes that consultation with Kent County Council should occur throughout the planning process. The policy also notes that Kent County Council will be notified of the submission of a major planning application by the local planning authorities within Kent.

⁹ The 2015 version of the Non-Statutory Technical Standards for Sustainable Drainage was current when this document was published. It was updated in 2021.

- 4.2.37 A drainage strategy should be submitted to the relevant local planning authority along with any planning application for major development. The policy notes that such a strategy will be released to Kent County Council and reviewed for adequacy. This review will assess the strategy for compliance with this policy, national planning policy, compliance with the non-statutory technical standards, local planning requirements and drainage design.
- 4.2.38 The policy notes that detailed information will be required to demonstrate that a drainage design is appropriate and will operate effectively. Furthermore, the policy notes that key information that may be needed to demonstrate the feasibility or applicability of a design philosophy should be evidenced. The policy includes a table indicating the submission requirements for each stage of planning.
- 4.2.39 Most major development would normally include some aspect of highway construction or improvement, which may be adopted or require approval by Kent County Council as the Highway Authority. Highway drainage matters may be reviewed within the consultation by Kent County Council as the LLFA.
- 4.2.40 Third parties, including but not limited to the Environment Agency, Internal Drainage Boards, the highways authority, the sewerage company and adjacent landowners, could have an effect on the design of a drainage system. The policy notes that consultation with relevant third parties is essential early in the design process. This information should be provided as part of the consultation process.

Policies for sustainable drainage

- 4.2.41 The plan sets out Kent County Council’s policies for sustainable drainage. These policies reflect the requirements of the LFRMS, SWMPs and Local Planning Authority Local Plans. The policies are identified in Table 4.1.

Table 4.1 Kent County Council SuDS Policy

Policy	Title
SuDS Policy 1	Follow the drainage hierarchy
SuDS Policy 2	Deliver effective drainage design
SuDS Policy 3	Maintain Existing Drainage Flow Paths & Watercourses
SuDS Policy 4	Seek to Reduce and Avoid Existing Flood Risk
SuDS Policy 5	Drainage sustainability and resilience
SuDS Policy 6	Sustainable Maintenance
SuDS Policy 7	Safeguard Water Quality
SuDS Policy 8	Design for Amenity and Multi-Functionality
SuDS Policy 9	Enhance Biodiversity

Kent Design Guide: Making It Happen – Sustainability (Drainage Systems)

- 4.2.42 Kent Design Guide (Kent County Council, n.d.) provides general guidance regarding highway drainage. Surface water from the highway must be collected by means of gullies and gully connection, channel and grating systems or combined drainage and kerb systems, and must be discharged through pipes of not less than 150mm diameter to an adequate sewer, drain, ditch, swale, watercourse, wetland or lagoon or, where sufficient permeability is obtainable, to soakaways. Where the receiving drainage system is likely to become overloaded by additional runoff, or where regulation of discharge is required, the use of attenuation features such as a balancing container, storage system or pond may be necessary.
- 4.2.43 When calculating areas to be drained, allowance must be made for all parts of a highway, including carriageways, footways, footpaths, paved areas and verges. Where footpaths run remotely from the carriageway, gullies or channels connected to the highway drainage system must be provided to prevent surface water discharging into adjacent property or down a flight of steps. Surface water within the highway boundary must be contained within the highway drainage system and not allowed to run onto adjacent property without Kent County Council's approval or that of the adjacent landowner.
- 4.2.44 For catchments over 1ha or any site where there is risk of flooding of a highway or adjacent properties, the designs will need to be modelled using a computerised drainage package. An assessment will be required to determine the flood path of a 1 in 100-year event. The flood path or Flood Storage Area must not affect the operation of the highway or adjacent property.
- 4.2.45 The document makes extended reference to the highway drainage systems specifications and key elements of SuDS implementation.

Text box 4.1 Local planning context – Kent

Several documents have been reviewed to understand planning policy associated with flooding and drainage in Kent. The principal documents are summarised below.

Kent Thameside SFRA (2009) shows the different zones of flood risk. It makes a series of recommendations to reduce/manage the residual flood risk. Some of the recommendations include provision of less fragile defences in critical areas, land raising, non-habitable ground floors, secondary defences (such as flood storage), flood bunds and drainage improvements, temporary barriers, flood resilient design, and flood warning and emergency procedures. Other recommendations mention that when the opportunity arises, flood gates should be replaced with solid defences.

Thameside SWMP (Kent County Council, 2013) has been split into four drainage areas, two of which cover part of the Project. The Thameside SWMP states that a targeted maintenance schedule should be implemented for both these drainage areas.

Kent LFRMS (Kent County Council, 2017) highlights the coastal areas of Kent, and in particular Gravesend, as being at risk of coastal and tidal flooding. Flood defences are in place to reduce the risk. The Kent LFRMS also indicates that surface water flood risk in Gravesend does not constitute a nationally significant flood risk.

The Gravesham Local Plan Core Strategy (Gravesham Borough Council, 2014) notes that the main flood risk is tidal flooding from the North Sea storm surges that would affect the River Thames. It also notes that, although most of the areas alongside the river have a high standard of protection, there is still a risk of flooding because of the possibility of flood defence failure or overtopping during extreme events.

Kent County Council's Drainage and Planning Policy sets out how the council, as LLFA and statutory consultee, will review drainage strategies and surface water management designs. The drainage strategy is included in Part 7 of the FRA.

The Tonbridge and Malling Borough Council's Core Strategy promotes a risk-based, sequential approach to flood risk and provides requirements for development in in floodplains.

The Maidstone Borough Local Plan include policies that require flood risk assessments to be undertaken and that appropriate surface water and robust flood mitigation measures need to be implemented.

4.3 Thurrock and Essex

Planning documents

- 4.3.1 The following documents have been reviewed to assess the flood risk aspects of the planning environment in Thurrock and Essex:
- a. Thurrock Strategic Flood Risk Assessment – Level 1 Report (Thurrock Level 1 SFRA) (Thurrock Council, 2018)
 - b. Thurrock Preliminary Flood Risk Assessment (Thurrock PFRA) (Thurrock Council, 2011)
 - c. Core Strategy and Policies for Management of Development (Thurrock Core Strategy) (Thurrock Council, 2015a)
 - d. Thurrock Local Flood Risk Management Strategy (Thurrock LFRMS) (Thurrock Council, 2015b)
 - e. Thurrock Design Guide: Design Strategy SPD (Thurrock Design Guide) (Thurrock Council, 2017)
 - f. Thurrock Surface Water Management Plan (Thurrock SWMP) (Thurrock Council, 2014)
 - g. Brentwood Local development Plan: 2016–2033 (Brentwood Borough Council, 2022)

- 4.3.2 As noted above, Essex County Council has been acting as LLFA on behalf of Thurrock Council. On account of this involvement, the following documents have also been reviewed to assess the flood risk aspects of the planning environment in Essex:
- a. Local Flood Risk Management Strategy (Essex LFRMS) (Essex County Council, 2018)
 - b. The Sustainable Drainage Systems Design Guide For Essex (Essex County Council, 2021)

Thurrock Level 1 Strategic Flood Risk Assessment

- 4.3.3 The Thurrock Level 1 SFRA (Thurrock Council, 2018) provides an overview of the risk of flooding from all sources across the Thurrock administrative area and should be used to assist in the development of policy formulation, strategic planning, development management and flood risk management. The Thurrock Level 1 SFRA has been created as an update to the original SFRA report (Thurrock Council, 2009).
- 4.3.4 Historically, Thurrock has experienced tidal flooding on a large scale due to its location on the Thames Estuary. The greatest overall flood risk from the Thames Estuary occurs when tidal surges coincide with particularly high-tide levels and/or fluvial flooding in the upper reaches of the catchment. As the flood risk associated with fluvial mechanisms is relatively minor, compared with the tidal influence, the risk from the River Thames is defined as tidal.
- 4.3.5 The Thames Tidal Defences provide a substantial standard of protection, up to the 0.1% Annual Exceedance Probability (one in 1,000 year event) for much of the Thames frontage. This includes linear walls, flood gates and barriers upstream of connecting tributaries. The standard of protection offered to the Mardyke catchment is slightly lower in the upper reaches, which are proportionate to the amount of urban development in the surrounding areas.
- 4.3.6 Almost all the flood defences in Thurrock are maintained by the Environment Agency aside from a few privately-owned defences, such as a culverted channel owned by Network Rail north of Tilbury. Most flood defences are Grade 2 or 3 (Grade 1 being the best classification and Grade 5 the worst).
- 4.3.7 Tilbury is at risk of flooding from surface water through several routes, including surface water runoff collecting in the low-lying marshland, pumped outfalls, gravity systems and their tidal interaction, and the underground sewer network. In Thurrock, the Project would encroach on the outskirts of East Tilbury CDA at the west. This CDA has been identified in the Thurrock LFRMS, which is briefly described in paragraphs 4.3.18 to 4.3.20. However, there are no records of surface water flooding from Thurrock Highways within this CDA. The Project would not intersect with any other CDAs in Thurrock.
- 4.3.8 There are no sewer flood incidents within the Order Limits, according to the DG5 dataset and relevant mapping in Thurrock Level 1 SFRA.

- 4.3.9 The Thurrock Level 1 SFRA shows areas along the River Mardyke at risk from reservoir flooding associated with the Sticking Hill reservoir. The Project would cross parts of this this reservoir flood risk area. It is assumed that UK reservoirs are regularly inspected, and essential safety work is carried out. Therefore, the SFRA highlights that these reservoirs present a minimal risk.
- 4.3.10 According to a historic flood map included in the Thurrock Level 1 SFRA, there are remote flooding incidents at nearby locations that the Project would straddle. However, the source of the events is not identified in the mapping. Caution should be applied when using historical records as this information is largely anecdotal and does not always include a record of the antecedent conditions that gave rise to the flooding or reference to a flood return period.
- 4.3.11 The impact of climate change described in the Thurrock Level 1 SFRA has been reviewed and assessed as appropriate for the Project's FRA. Details on climate change requirements are given in Part 6 of the FRA.
- 4.3.12 Breach modelling results included in the Thurrock Level 1 SFRA have been reviewed and assessed in Part 5 of the FRA, particularly where river modelling has been undertaken.
- 4.3.13 The Thurrock Level 1 SFRA highlights that SuDS should be used to reduce and manage surface water runoff to and from proposed developments as near to source as possible in accordance with the provisions of the Non-statutory technical standards for sustainable drainage systems (Defra, 2015)

Thurrock Preliminary Flood Risk Assessment

- 4.3.14 The Thurrock PFRA (Thurrock Council, 2011) is a high-level screening exercise that compiles information on significant local flood risk from past and future floods, based on readily available and derivable information. The scope of the Thurrock PFRA is to consider flooding from the following sources: surface runoff, groundwater and ordinary watercourses, and any interaction these have with main rivers and the sea.
- 4.3.15 The Thurrock PFRA states that Thurrock Council has experienced several past surface water flood events. However, they have not been deemed to have had 'significant harmful consequences'¹⁰ to human health, economic activity, environment or cultural heritage. The flood events are related to foul and surface water flooding, with lack of maintenance of the drainage system the main cause of flooding.

¹⁰ There is no national definition of what constitutes 'significant harmful consequences', but consequences of historic flooding can be estimated using the Environment Agency's National Receptors Database, which identifies and maps all the property and critical infrastructure within Thurrock (Thurrock Council, 2011).

Thurrock Core Strategy and Policies for Management of Development

- 4.3.16 The Thurrock Core Strategy (Thurrock Council, 2015a) is part of the wider Local Development Framework for Thurrock. It is a strategic document providing broad guidance on the scale and distribution of development and the provision of supporting infrastructure. It sets out the spatial vision, spatial objectives, the spatial development strategy and policies for Thurrock to 2026, together with a monitoring and implementation framework. The strategy also notes that some of the policies cover spatial development issues in relation to climate change and flood management.
- 4.3.17 Thematic Policy CSTP27 – Management and Reduction of Flood Risk sets out the management and reduction of flood risk within the borough. The policy notes that a large proportion of Thurrock’s urban areas are located within Flood Zone 3, translating to approximately 11,000 properties (record until January 2015) at risk of flooding. Policy CSTP27 goes on to note that the changing climate, combined with increased development pressures, will continue to make flood risk a key consideration for Thurrock into the future. More details about the assessment of the forms of flooding relevant to the borough are given in Thurrock’s SFRA.

Thurrock Local Flood Risk Management Strategy

- 4.3.18 The Thurrock LFRMS (Thurrock Council, 2015b) was produced in accordance with the FWMA, where Thurrock Council is an LLFA. The Thurrock LFRMS develops a strategic overview of flooding focusing on local flood risk while acknowledging fluvial flooding. The aim of the strategy is to manage flood risk in a way that will benefit people, property and the environment, while remaining consistent with national policies and strategies.
- 4.3.19 The Thurrock LFRMS defines 14 CDAs within Thurrock, spread across Thurrock but primarily in urban areas. For each CDA, Thurrock Council has set out actions to reduce the risks or effects of surface water flooding. The Project would encroach on the outskirts of the East Tilbury CDA at the west. Pluvial modelling has shown that small sections of the industrial estate located to the south-west of East Tilbury may be inundated in a severe rainfall event.
- 4.3.20 There is a range of flood defences in Thurrock, both tidal and fluvial. Tidal defences mainly consist of raised reinforced concrete walls, steel walls or earth embankments. Fluvial flood defences include small watercourse channels that provide local protection. Most flood defences are Grade 2 or 3 (Grade 1 being the best classification and Grade 5 the worst). Many of the defences that are in very poor condition (Grade 5) are close to Tilbury. Other defences of note are the Tilbury and Fobbing Barriers and Mardyke Sluice, along with the Tilbury Flood Storage Area. These flood defences are important flood infrastructure, reducing the risk of flooding to Thurrock.

Thurrock Surface Water Management Plan

- 4.3.21 The Thurrock SWMP (Thurrock Council, 2014) was published to increase knowledge of local flood risk and to support the establishment of feasible measures to mitigate surface water flooding where possible.

- 4.3.22 Modelling was undertaken for the SWMP, which was used to assess surface water flood risk in Thurrock and identify CDAs.
- 4.3.23 The action plan from the SWMP was used as the basis for the Flood Strategy Programme and Strategic Investment Plan.
- 4.3.24 In order to better understand surface water flooding in Thurrock, additional assessment through an update to the 2014 SWMP was undertaken. The results from the updated SWMP modelling were used alongside the Environment Agency's long term flood maps for surface water (Environment Agency, 2019) to assess and map surface water risk.
- 4.3.25 The modelling identified a number of CDAs in Thurrock. The alignment of the Project road follows a path that avoids all the CDAs identified in the SWMP.

Thurrock Design Guide: Design Strategy SPD

- 4.3.26 The main aim of the Thurrock Design Guide (Thurrock Council, 2017) is to improve the overall design quality standards of development in Thurrock. In order to achieve this, Thurrock Council will:
- a. Provide clear guidance on their expectations regarding the design approach to be adopted in Thurrock.
 - b. Work proactively with the development industry to bring forward proposals in a timely and effective way, having regard to statutory policy requirements.
 - c. Lead by example through the design and implementation of council-led development projects in Thurrock.
- 4.3.27 The design strategy requires developers to demonstrate how sustainable drainage measures have been incorporated into new development. Through this requirement, Thurrock Council will ensure that runoff is held and absorbed without overloading storm water drain networks. The design strategy notes that an assessment of the hydrology of the site, along with landform, geology, drainage and flood risk, should reveal the scope for integrating SuDS into development with the measures that will work best for the site.
- 4.3.28 The drainage strategy also requires that developers undertake an FRA for development proposed in areas at risk of flooding.

Brentwood Local development plan

General

- 4.3.29 The development plan presents Brentwood Borough Council's vision for how the borough will develop over the next 17 years, from 2016 to 2033. It outlines the Council's strategic priorities and sets out a Spatial Strategy and supporting policies for achieving this vision.
- 4.3.30 Fluvial flood risk in Brentwood is not extensive and is largely limited to areas in very close proximity to local watercourses. Risk of flooding from surface water presents a more extensive zone of risk than the fluvial flood zones.
- 4.3.31 The plan includes policies for flood risk and sustainable drainage. These policies are detailed below.

Strategic Policy NE09: Flood Risk

- 4.3.32 Strategic Policy NE09 sets out the borough's approach to flood risk. The requirements of Policy NE09 are set out below.
- 4.3.33 New development will be required to avoid areas of flood risk by applying the Sequential and, where necessary, the Exception Tests in accordance with national policy and guidance.
- 4.3.34 A site specific Flood Risk Assessment must assess all sources of flooding. It should demonstrate how flood risk will be managed over the development's lifetime, taking climate change into account. A site specific FRA is required, in accordance with national policy guidance.
- 4.3.35 Where proposals satisfy the Sequential and Exception Tests design proposals should ensure that:
- a. The most vulnerable land uses are located in areas within the site that are at lowest risk of flooding.
 - b. Development will be safe for its lifetime taking account of the vulnerability of its users
 - c. Flood risk will not increase elsewhere.
 - d. Development would not constrain the natural function of the flood plain, either by impeding flow or reducing storage capacity.
 - e. Appropriate mitigation measures are incorporated to address any residual flood risk safely, including safe access and egress for all likely users of the development.
 - f. Where necessary incorporate flood resistant and flood resilient design measures such that, in the event of a flood, the development could be quickly brought back into use without significant refurbishment
 - g. Incorporate sustainable drainage systems in line with policy BE05 Sustainable Drainage, unless there is clear evidence that this would be inappropriate.
 - h. Where possible, the development will reduce flood risk overall.
 - i. Safe access and escape routes are included where appropriate, as part of an agreed emergency response plan, where required.
 - j. Where the site is additionally located within a CDA, development should minimise and mitigate surface water runoff in line with Policy BE05 Sustainable Drainage.

Policy BE05: Sustainable Drainage

- 4.3.36 Strategic Policy BE05 sets out the borough's approach to sustainable drainage. The requirements of Policy BE05 are set out below.
- 4.3.37 All developments should incorporate appropriate SuDS for the disposal of surface water, in order to avoid any increase in surface water flood risk or adverse impact on water quality

- 4.3.38 Development within areas identified as a CDA on the policies map, should optimise the use of SuDS by providing an individually designed mitigation scheme to address the site-specific issues and risk, as informed by a site specific Flood Risk Assessment
- 4.3.39 Greenfield developments, major development and all development within a CDA must achieve a greenfield runoff rate. Where it is demonstrated that this is not possible on brownfield developments then a runoff reduction of 50% minimum should be achieved. The technical approach should be justified in the Drainage Strategy.
- 4.3.40 Applicants are required to submit a surface water Drainage Strategy and a Flood Risk Assessment for all major development as well as for all development within a CDA. The Drainage Strategy must include a SuDS Management Plan setting out the long-term management and maintenance arrangements.
- 4.3.41 When discharging surface water to a public sewer, developers will be required to provide evidence that capacity exists in the public sewerage network to serve their development.
- 4.3.42 Development proposals should be designed to include permeable surfaces wherever possible. Proposals for impermeable paving, including on small surfaces such as front gardens and driveways, will be strongly resisted unless it can be suitably demonstrated that this is not technically feasible or appropriate.

Essex Local Flood Risk Management Strategy

- 4.3.43 This Essex LFRMS (Essex County Council, 2018) sets out Essex County Council's measures to reduce the impact of local flooding to the community. The strategy sets out the way in which Essex County Council undertake the following measures:
- a. Investigating floods
 - b. Mapping local routes for water
 - c. Looking after watercourses
 - d. Planning for future floods
 - e. Influencing new development and drainage
 - f. Building flood defences

The Sustainable Drainage Systems Design Guide For Essex

- 4.3.44 This Sustainable Drainage Systems Design Guide For Essex (Essex County Council, 2021) provides guidance on the planning, design and delivery of attractive and high-quality SuDS schemes that offer multiple benefits to the environment and community alike. Key principles outlined in the guide include the management of development site runoff in accordance with the drainage hierarchy, with discharges to any surface waterbody restricted to the one in one-year greenfield rate. The guide also stipulates that consideration must be given to water quality and including climate change resilience.

Text box 4.2 Local planning context – Thurrock and Essex

Several documents have been reviewed to understand planning policy associated with flooding and drainage in Thurrock. These documents and their principal findings are summarised below.

Thurrock Level 1 SFRA provides an overview of the risk of flooding from all sources across the Thurrock administrative area. The SFRA notes that the greatest overall flood risk is from the Thames Estuary. The SFRA also notes that Thames Tidal Defences provide a substantial standard of protection.

The Thurrock PFRA is a high-level screening exercise that compiles information on significant local flood risk from past and future floods. The PFRA highlights the two major flooding incidents in South Essex: one in 1928 and one in 1953. In the 1953 event, flood levels at Tilbury reached 1.8m above its predicted level and inundation depths were approximately two to three metres. The report also notes that flood defences were improved in response to these major floods.

The Thurrock Core Strategy (Thurrock Council, 2015a) is part of the wider Local Development Framework for Thurrock. Thematic Policy CSTP27 sets out the management and reduction of flood risk within the borough. The Project would avoid the larger populated areas and is not expected to exacerbate the flood risk they are currently exposed to.

The Thurrock LFRMS presents a way to manage flood risk that will benefit people, property and the environment, while remaining consistent with national policies and strategies. It notes that the Project would encroach on the outskirts of one of the 14 CDAs defined in the report and that the industrial estate to the south-west of the Project is susceptible to surface water flooding. The LFRMS notes that there is a range of tidal and fluvial flood defences in Thurrock. It also notes that many of the defences are in very poor condition.

The Brentwood local development plan notes that fluvial flood risk in Brentwood is not extensive but the risk flooding from surface water presents is more extensive. The plan includes policies for flood risk and sustainable drainage.

Essex County Council's measures to reduce the impact of local flooding to the community is set out in the Essex LFRMS. Guidance on the planning, design and delivery of SuDS schemes for Essex is set out in the Sustainable Drainage Systems Design Guide For Essex.

4.4 Havering

Planning documents

- 4.4.1 The following documents have been reviewed to assess the flood risk aspects of the planning environment in the London Borough of Havering and Brentwood Borough Council:
- a. Havering Local Plan 2016–2031 (London Borough of Havering, 2021)
 - b. SuDS Developer Guide (London Borough of Havering, 2015a)
 - c. Level 1 Strategic Flood Risk Assessment (London Borough of Havering, 2016)
 - d. Multi-Agency Flood Plan for the London Borough of Havering (Havering Emergency Planning and Business Continuity Service, 2017)
 - e. London Sustainable Drainage Action Plan (Greater London Authority, 2016b)
 - f. The London Plan (Greater London Authority, 2021)

Havering Local Plan 2016–2031

- 4.4.2 The Havering Local Plan 2016–2031 (London Borough of Havering, 2021) sets out the London Borough of Havering’s vision and strategy for future growth and sustainable development up to 2031.
- 4.4.3 The key policy regarding flood risk is Policy 32.
- 4.4.4 Policy 32 of the Plan notes that the Council will support development that seeks to avoid flood risk to people and property and manages residual risk by applying the Sequential Test and, if necessary, the Exception Test as set out in the NPPF.
- 4.4.5 Policy 32 also notes states that the Council will seek to reduce the risk from surface water flooding by requiring development proposals to:
- a. Reduce surface water runoff by providing sustainable drainage systems (SuDS), unless there are practical reasons for not doing so; and
 - b. Ensure that proposals for SuDS apply the London Plan drainage hierarchy achieving greenfield runoff rates, where feasible, and include clear arrangements for ongoing maintenance over the lifetime of the development.
- 4.4.6 The policy also states the Council will expect developments to identify reasonable opportunities for flood risk reduction measures and resilient design and construction and not increase the risk of flooding.
- 4.4.7 The Local Plan also states that SuDS should be designed appropriately for the local site characteristics. The SuDS Developer Guide (London Borough of Havering, 2015a) provides detailed guidance on the optimal integration of SuDS in the design of developments. The Havering LFRMS 2015 (London Borough of Havering, 2015b) sets out what runoff rates are expected to be achieved by implementing SuDS.

SuDS Developer Guide

- 4.4.8 The use of SuDS for developments within the London Borough of Havering is required by local planning policy and should be reviewed as an opportunity to provide benefits to both developers and the wider community. Applications for major development, or for development within an area of flood risk, will need to include details of the proposed SuDS to be incorporated within the development or any information required to demonstrate why SuDS are considered inappropriate for a development. The site drainage will then be considered as part of the planning process.
- 4.4.9 The SuDS Developer Guide (London Borough of Havering, 2015a) provides an indication of common characteristics that can be expected to be encountered across the London Borough of Havering. However, design of SuDS is heavily dependent on site-specific characteristics, so the viability of SuDS needs to be considered on a site-by-site basis.

Havering Level 1 Strategic Flood Risk Assessment

- 4.4.10 The primary objective of the Havering Level 1 SFRA (London Borough of Havering, 2016) is to inform the emerging Havering Local Plan in respect of the development and review of policies related to flood risk management and policies for the allocation of land for future development.
- 4.4.11 The wider objectives of the Havering Level 1 SFRA are to:
- a. Inform the development of policy that will underpin decision making within the Borough, particularly within areas that are affected by flooding
 - b. Assist the development management process by providing a more informed response to development proposals which may be affected by flooding
 - c. Identify and implement strategic solutions to flood risk
 - d. Support the Borough in their role as Lead Local Flood Authority
 - e. Support and inform the Borough's emergency planning response to flooding
- 4.4.12 To assess flood risk within the London Borough of Havering, the following actions were undertaken to inform the Level 1 SFRA:
- a. The identification of flood risk zones 1, 2, 3a and 3b
 - b. Identification of locations of flood risk from other sources
 - c. Identification of locations at risk of surface water flooding
 - d. Assessment of the impact of climate change upon flood risk within the London Borough of Havering
 - e. Identification of areas protected by existing flood defences and that could be at risk should they fail

- 4.4.13 The Level 1 SFRA makes a number of planning policy recommendations for adoption by London Borough of Havering when considering development and flood risk. It also provides guidance for actions that local communities could take to reduce flood damage and for emergency planning for infrastructure and vulnerable institutions within flood risk areas.
- 4.4.14 The Level 1 SFRA notes that the London Borough of Havering strongly advocate the use of SuDS. Policy 5.13 of the London Plan (Greater London Authority, 2016a)¹¹ and Policy DC48 of the Core Strategy and Development Control Policies (London Borough of Havering, 2008) require the use of SuDS unless there are practical reasons for not doing.
- 4.4.15 The Level 1 SFRA recommends that the London Borough of Havering should encourage developers to consider flood resilience in their developments to permit a quick recovery post-flooding.
- 4.4.16 The Mardyke enters Thurrock from Havering but only a small part of the overall catchment is within the London Borough of Havering. In this respect the Level 1 SFRA notes that the Borough should consider consulting with Thurrock Council should they receive planning applications for development within the Mardyke catchment in order for Thurrock Council to be able to assess the potential impact downstream¹².

Multi-Agency Flood Plan for the London Borough of Havering

- 4.4.17 The multi-agency flood plan (Havering Emergency Planning and Business Continuity Service, 2017) seeks to provide a coordinated multi-agency response framework to mitigate the impact of a large-scale flood event in the London Borough of Havering. It includes a community-level assessment of flood risk, which includes risk from rivers, tides, reservoirs and defences. The plan does not include flood risks from foul sewers, burst water mains and private lakes.

London Sustainable Drainage Action Plan

- 4.4.18 The aim of the London Sustainable Drainage Action Plan (Greater London Authority, 2016b) is to set a long-term strategy and series of actions for increasing the implementation of sustainable drainage across London. The main points raised in the action plan are summarised below.
- 4.4.19 The transport sector has many and varied opportunities to introduce sustainable drainage and, importantly, is a sector with regular, if limited, funding for capital and maintenance works. This action plan recognises that most of the transport sector's linear assets (roads and railways) offer limited scope for sustainable drainage and that major road underpasses can often be prone to flooding.

¹¹ This version of the London Plan was current at the time the Level 1 SFRA was published. It has since been replaced by an updated London Plan published in 2021.

¹² In response to this statement, Essex County Council was consulted regarding the modification to the proposed retention ponds along the M25. These ponds lie in the London Borough of Havering but discharge to watercourse that flow into Thurrock. Further details of the ponds is provided in Part 7 of the FRA.

- 4.4.20 While acknowledging the above constraints, many linear assets (roads and railways) have large tracts of land alongside them, such as road verges, footways and trackside vegetation. In the case of rail and road routes through outer London, there are often areas of parkland, Green Belt or farmland alongside several miles of road or railway. The action plan acknowledged the potential for rainwater to be diverted into such areas for sustainable drainage and that this could reduce flood risk to the transport asset and potentially to the wider neighbourhood. The action plan also notes that there are also many opportunities to design sustainable drainage into traffic-calming measures, examples of which are increasing in London.
- 4.4.21 Diffuse pollution from transport infrastructure is a factor affecting the quality of London's rivers. Major roads are likely to generate pollutants that can be washed into receiving drains and water bodies during heavy rainfall. The action plan notes that ability to treat surface water from road or rail corridors using infiltration or bio-retention sustainable drainage techniques is therefore a good opportunity to reduce the pollution loading for watercourses and groundwater.
- 4.4.22 The action plan also notes that it is worth investigating whether there are any limits on the amount of certain types of sustainable drainage that should be implemented. For example, a concentration of infiltration techniques could lead to long-term changes in ground moisture levels, and lots of small-scale storage tanks requiring pumps to release rainwater following a storm will have a greater energy requirement.

The London Plan

- 4.4.23 The London Plan (Greater London Authority, 2021) forms part of the development plan for the London Borough of Havering.
- 4.4.24 The key policy of the new London Plan in terms of flood risk is Policy SI 12, Flood risk management, and Policy SI 13, Sustainable drainage.
- 4.4.25 The provisions of the Policy SI 12 are summarised below:
- a. Current and expected flood risk from all sources across London should be managed in a sustainable and cost-effective way in collaboration with the Environment Agency, the LLFAs, developers and infrastructure providers.
 - b. Development plans should use the Mayor's Regional Flood Risk Appraisal and their SFRA, as well as LFRMSs, where necessary, to identify areas where particular and cumulative flood risk issues exist and develop actions and policy approaches aimed at reducing these risks.
 - c. Development proposals that require specific FRAs should ensure that flood risk is minimised and mitigated, and that residual risk is addressed.
 - d. Developments plans and development proposals should contribute to the delivery of the measures set out in the TE2100 Plan.
 - e. Development proposals for utility services should be designed to remain operational under flood conditions and buildings should be designed for quick recovery following a flood.

- f. Development proposals adjacent to flood defences will be required to protect the integrity of flood defences and allow access for future maintenance and upgrading.
- g. Natural flood management methods should be employed in development proposals due to their multiple benefits, including increasing flood storage and creating recreational areas and habitat.

4.4.26 The provisions of the Policy SI 13 are summarised below:

- a. LLFAs should identify areas where there are particular surface water management issues, and aim to reduce these risks.
- b. Development proposals should aim to achieve greenfield runoff rates and ensure that surface water runoff is managed as close to its source as possible. There should also be a preference for green over grey features.
- c. Development proposals for impermeable surfacing should normally be resisted unless they can be shown to be unavoidable, including on small surfaces such as front gardens and driveways.
- d. Drainage should be designed and implemented in ways that promote multiple benefits including increased water use efficiency, improved water quality, and enhanced biodiversity, urban greening, amenity and recreation.

Text box 4.3 Local planning context Havering

The Havering Local Plan 2016–2031 sets out the London Borough of Havering’s vision and strategy for future growth and sustainable development up to 2031. Policy 32 of the plan sets out the council’s approach to flood risk. This policy states that the council will support development that seeks to avoid flood risk to people and property and manages residual risk by applying the Sequential Test and, if necessary, the Exception Test as set out in the NPPF. The policy also states that the council will seek to reduce the risk from surface water flooding by requiring development proposals to include SuDS.

The SuDS Developer Guide states that the use of SuDS for developments within the London Borough of Havering is required by local planning policy and that planning applications for major development need to include details of proposed SuDS to be incorporated within the development.

The primary objective of the Havering Level 1 SFRA is to inform the emerging Havering Local Plan in respect of the development and review of policies related to flood risk management and policies for the allocation of land for future development. The principal findings from the assessment, in terms of their bearing on the Project, relate to the impact that development will have on flooding downstream catchments (Thurrock), groundwater, allowance for climate change and the promotion of SuDS.

Policy 32 of the Havering Local Plan states that the council will seek to reduce the risk from surface water flooding by requiring development proposals to reduce surface water runoff by providing SuDS, unless there are practical reasons for not doing so.

The Multi-Agency Flood Plan for the London Borough of Havering seeks to provide a coordinated multi-agency response framework to mitigate the impact of a large-scale flood event in the London Borough of Havering.

The aim of the London Sustainable Drainage Action Plan is to set a long-term strategy and series of actions for increasing sustainable drainage implementation across London. The action plan recognises that most of the transport sector's linear assets offer limited scope for sustainable drainage. While acknowledging this constraint, the action plan notes that many linear assets have large tracts of land alongside them that offer the potential for rainwater to be diverted into such areas for sustainable drainage.

The London Plan includes policies on flood risk management (Policy SI 12) and sustainable drainage (Policy SI 13). Policy SI 12 seeks to address current and future flood issues and minimise risks in a sustainable and cost-effective way. Policy SI 13 requires LLFAs to identify areas where there are particular surface water management issues and aim to reduce these risks. In addition, SI 13 seeks to establish aspirational requirements for sustainable drainage.

5 Summary

5.1 National planning

5.1.1 Table 5.1 summarises national planning policy that is directly or indirectly related to flood risk.

Table 5.1 Summary – National policy

Policy/guidance	Key points
Flood Risk Regulations 2009	The purpose of the Flood Risk Regulations is to transpose the EU Floods Directive into domestic law and to implement its provisions. In particular, it places duties on the Environment Agency and local authorities to prepare FRAs, flood risk maps and flood risk management plans.
FWMA Act 2010	The FWMA places duties on the Environment Agency, local authorities, developers and other bodies to manage flood risk. Consultations have been undertaken with the Environment Agency and the LLFAs during development of the FRA.
NPPF (DLUHC, 2021a)	<p>The NPPF provides guidance for local planning authorities and decision makers in drawing up plans and making decisions regarding planning applications. The principal policies related to flood risk are below:</p> <ul style="list-style-type: none"> • Inappropriate development in areas at risk of flooding should be avoided. • Strategic policies should be informed by a strategic FRA and should manage flood risk from all sources. • All plans should apply a sequential, risk-based approach to the location of development. <p>The NPPF is supported by Planning Practice Guidance which provides additional guidance to local planning authorities to ensure the effective implementation of the planning policy.</p> <p>The FRA has been prepared in accordance with the requirements for the NPPF and supporting planning guidance (DLUHC 2021b and DLUHC 2022).</p>
NN NPS (Department for Transport, 2014)	<p>The overall strategic aims of the NN NPS and the NPPF are consistent insofar as they both seek to achieve sustainable development.</p> <p>The NPSNN contains specific policies for NSIPs where particular considerations may apply. In addition, the NN NPS provides guidance and imposes requirements on matters such as good scheme design, as well as the treatment of environmental impacts.</p> <p>The FRA has been prepared in accordance with the relevant provisions of the NN NPS.</p>
NSP EN-1 (Department for Energy and Climate Change, 2011)	<p>The overall strategic aims of the NPS EN-1 and NPPF are consistent insofar as they both seek to achieve sustainable development.</p> <p>Although much of the legislation referred to in NPS EN-1 has been superseded, the policies on flood risk remain valid.</p>

Policy/guidance	Key points
FCERM (Environment Agency, 2021b)	<p>The FCERM sets out a vision for the nation to be ready for, and resilient to, flooding and coastal change.</p> <p>The FRA demonstrates how the Project aligns with the provisions of the FCERM.</p>
Environment Agency’s approach to groundwater protection (Environment Agency, 2018)	<p>Section G of the Environment Agency’s approach to groundwater protection includes position statements relating to the discharge of liquid effluents into the ground and outlines where permits may be required for discharge to groundwater.</p> <p>Position Statement C4 (Transport developments) states that when planning proposals are brought forward for major new roads, the Environment Agency will require that drainage is via SuDS, designed and maintained to current good practice standards, including the provision of suitable treatment or pollution prevention measures.</p> <p>Position Statement G10 (Developments posing an unacceptable risk of pollution) mentions that the Environment Agency will normally object to new developments that pose an unacceptable risk of pollution to groundwater from sewage effluent, trade effluent or contaminated surface water’.</p> <p>Position Statement G11 (Discharges from areas subject to contamination) states that discharges of surface water runoff to ground at sites affected by land contamination, or from sites used for the storage of potential pollutants are likely to require an environmental permit.</p> <p>Position Statement G13 (Sustainable drainage systems) outlines the requirements of infiltration SuDS for surface runoff from roads. Where infiltration SuDS are proposed in a SPZ1, a hydrogeological risk assessment should be undertaken, to ensure that the system does not pose an unacceptable risk to the source of supply.</p> <p>Part 7 of the FRA includes details on the use of SuDS. Groundwater is discussed in detail in the Hydrogeological Risk Assessment (Appendix 14.5 in Application Document 6.3).</p>

5.2 Regional policy

5.2.1 Table 5.2 summarises regional planning policy that is directly or indirectly related to flood risk.

Table 5.2 Summary – regional planning context

Policy/guidance	Key points
<p>Thames RBMP (Environment Agency, 2015)</p>	<p>The Project would fall within the Mardyke management catchment and the Roding, Beam and Ingrebourne management catchment. The priority issues for these two catchments are pollution and poor water quality from urban and agricultural runoff and physical modifications due to urbanisation and flood protection. A future aim is to promote and encourage the use of SuDS in new developments and retrofitting to existing sites within the catchment to reduce the impacts of urban diffuse pollution and phosphate runoff from fertilisers and herbicides.</p> <p>The Thames RBMP states that a future aim for both management catchments could be the development and implementation of a water body wide culvert awareness and removal programme.</p> <p>To align with the purposes of the Thames RBMP, the use of culverts would be minimised and the use of SuDS would be adopted where possible. The way in which these two objectives have been achieved are described in Part 6, Part 7 and Part 10 of the FRA.</p>
<p>Thames CFMP (Environment Agency, 2009a)</p>	<p>A CFMP is a high-level strategic planning document that provides an overview of the main sources of flood risk.</p> <p>The Thames CFMP identifies that 1,000 to 2,000 homes in the London Borough of Havering area have a 1% annual probability of fluvial flooding.</p> <p>The use of culverts in the London Borough of Havering would only be included where alternatives are not viable or practicable (e.g. extension of the Western Mardyke culvert under the M25). However, measures are being undertaken as part of the Project to reduce fluvial flood risk in the London Borough of Havering. Further details of culverts are included in Part 10 of the FRA.</p>
<p>North Kent Rivers CFMP (Environment Agency, 2009b)</p>	<p>The North Kent Rivers CFMP is divided into six distinct sub-areas which have similar physical characteristics, sources of flooding and levels of risk. This CFMP establishes the most appropriate approach to managing flood risk for each of the sub-areas and then allocates one of six generic flood risk management policies to each sub-area. The Project would traverse two of the sub-areas:</p> <ul style="list-style-type: none"> • North Kent Marshes (Policy 3) • North Kent Downs (Policy 1) <p>Policy 1 covers the upper reaches of several smaller watercourses in the North Kent Downs and plains. It includes the large towns along the Thames such as Gravesend. Flood risk is low in this area. According to the North Kent Rivers CFMP, no people or property are affected by flooding.</p> <p>Policy 3 includes many smaller watercourses that flow from the North Kent Downs to the Thames Estuary. Policy 3 supports economic, social and environmental development by maintaining the current level of risk but accepting that the impacts of flooding will increase with time due to climate change.</p> <p>The Project would take account of the objectives of the two policy areas in order to ensure that they are not compromised.</p>

Policy/guidance	Key points
<p>South Essex CFMP (Environment Agency, 2009c)</p>	<p>The South Essex catchment has been divided into nine distinct sub-areas. The South Essex CFMP establishes the most appropriate approach to managing flood risk for each of the sub-areas. The South Essex CFMP then allocates one of six generic flood risk management policies to each sub-area. The Project would traverse two of the sub-areas:</p> <ul style="list-style-type: none"> • Thames urban tidal sub-area (Policy 4) • Crouch catchment and River Mardyke/Horndon catchment sub-area (Policy 6) <p>Policy 4 applies to areas of low, moderate or high flood risk where the Environment Agency is already managing the flood risk effectively but where the Environment Agency may need to take further actions to keep pace with climate change.</p> <p>Policy 6 applies to areas of low to moderate flood risk where the Environment Agency will take action with others to store water or manage runoff in locations that provide overall flood risk reduction or environmental benefits.</p> <p>The South Essex CFMP identifies that, in addition to the residual flood risk associated with tidal sources, surface water flooding is also an issue for the Thurrock area. It is usually associated with short duration, high intensity rainfall when the ground is already saturated or when flow channels become blocked or tide locked.</p> <p>The South Essex CFMP recommends managing flood risk by maximising the potential of the floodplain to retain water.</p> <p>The Project would take account of the objectives of the two policy areas in order to ensure that they are not compromised.</p>
<p>TE2100 Plan (Environment Agency, 2012)</p>	<p>The TE2100 Plan sets out recommendations for flood risk management for London and the Thames Estuary through to the end of the century and beyond, with a range of short, medium and long-term actions.</p> <p>North of the River Thames, the Project would cross action zone 5 – Middle Estuary. The TE2100 Plan recommendations for action zone 5 are to maintain, enhance and replace the river defence walls and active structures. The TE2100 Plan also recommends that an agreed programme for managing flooding from other sources in the defended tidal floodplain be established.</p> <p>South of the River Thames, the Project would also cross action zone 6 – Lower Estuary Marshes. No defence raising is envisaged in the TE2100 Plan, but defence maintenance and repair will be needed.</p> <p>A general awareness of the provisions of the TE2100 Plan would be considered during development of the Project. As the work recommended by the TE2100 Plan is currently conceptual, the potential benefits cannot be incorporated into the FRA.</p>

5.3 Local policy

5.3.1 Table 5.3 summarises local planning policy that is directly or indirectly related to flood risk.

Table 5.3 Summary – Local policy

Policy/guidance	Key points
Kent	<p>Several documents have been reviewed to understand planning policy associated with flooding and drainage in Kent. The principal documents are summarised below.</p> <p>Kent Thameside SFRA shows the different zones of flood risk. It makes a series of recommendations to reduce/manage the residual flood risk. Some of the recommendations include provision of less fragile defences in critical areas, land raising, non-habitable ground floors, secondary defences (such as flood storage), flood bunds and drainage improvements, temporary barriers, flood resilient design and flood warning and emergency procedures. Other recommendations mention that when the opportunity arises, flood gates should be replaced with solid defences.</p> <p>The Thameside SWMP has been split in four drainage areas, two of which cover part of the Project. The Thameside SWMP states that a targeted maintenance schedule should be implemented for both these drainage areas.</p> <p>Kent LFRMS highlights the coastal areas of Kent, in particular Gravesend, as being at risk of coastal and tidal flooding. Flood defences are in place to reduce the risk. The Kent LFRMS also indicates that surface water flood risk in Gravesend does not constitute a nationally significant flood risk.</p> <p>The Gravesham Local Plan Core Strategy notes that the main flood risk is tidal flooding from the North Sea storm surges that would affect the River Thames. It also notes that, although most of the areas alongside the river have a high standard of protection, there is still a risk of flooding because of the possibility of flood defence failure or overtopping during extreme events.</p> <p>The Maidstone Borough Local Plan requires developers to prepare flood risk assessments and to implement appropriate surface water and robust flood mitigation measures.</p> <p>The Tonbridge and Malling Borough Council Core Strategy promotes application of PPS25 to assess flood risk. The strategy also includes a policy for development in floodplains.</p> <p>Kent County Council’s Drainage and Planning Policy sets out how the council, as LLFA and statutory consultee, will review drainage strategies and surface water management provisions associated with major development (such as the Project). One of the five objectives set out in the Kent LFRMS specifically states the importance of ensuring that development in Kent takes account of flood risk issues and plans to effectively manage any impacts.</p>

Policy/guidance	Key points
Thurrock and Essex	<p>Several documents have been reviewed to understand planning policy associated with flooding and drainage in Thurrock. These documents and their principal findings are summarised below.</p> <p>Thurrock Level 1 SFRA provides an overview of the risk of flooding from all sources across the Thurrock administrative area. The SFRA notes that the greatest overall flood risk is from the Thames Estuary. The SFRA also notes that Thames Tidal Defences provide a substantial standard of protection.</p> <p>The Thurrock PFRA is a high-level screening exercise that compiles information on significant local flood risk from past and future floods. The PFRA highlights the two major flooding incidents in South Essex: one in 1928 and one in 1953. In the 1953 event, flood levels at Tilbury reached 1.8m above its predicted level and inundation depths were approximately two to three metres. The report also notes that flood defences were improved in response to these major floods.</p> <p>The Thurrock Core Strategy (Thurrock Council, 2015a) is part of the wider Local Development Framework for Thurrock. Thematic Policy CSTP27 sets out the management and reduction of flood risk within the borough. The Project would avoid the larger populated areas and is not expected to exacerbate the flood risk they are currently exposed to.</p> <p>The Thurrock LFRMS presents a way to manage flood risk that will benefit people, property and the environment, while remaining consistent with national policies and strategies. It notes that the Project would encroach on the outskirts of one of the 14 CDAs defined in the report and that the industrial estate to the south-west of the Project is susceptible to surface water flooding. The LFRMS notes that there is a range of tidal and fluvial flood defences in Thurrock. It also notes that many of the defences are in very poor condition.</p> <p>The Brentwood local development plan notes that areas subject to fluvial flooding in the borough are limited and areas subject to surface water flooding in the borough are comparatively widespread. The plan includes detailed policies for flood risk and sustainable drainage.</p>
Havering	<p>Several documents have been reviewed to understand planning policy associated with flooding and drainage in Thurrock. These documents and their principal findings are summarised below.</p> <p>The Havering Local Plan 2016–2031 (London Borough of Havering, 2021) sets out the London Borough of Havering’s vision and strategy for future growth and sustainable development. The policy requires that the Sequential Test and, if necessary, the Exception Test are applied to development proposals. The policy also requires the implementation of SuDS on all development proposals.</p> <p>The primary objective of the Havering SFRA (2016) is to inform the emerging Havering Local Plan (London Borough of Havering, 2016) in respect of the development and review of policies related to flood risk management and policies for the allocation of land for future development. The principal findings from the assessment, in terms of their bearing on the Project, relate to the impact that development will have on flooding downstream catchments (Thurrock), groundwater, allowance for climate change and the promotion of SuDS.</p>

Policy/guidance	Key points
	<p>The SuDS Developer Guide (2015a) states that the use of SuDS for developments within the London Borough of Havering is required by local planning policy and that planning applications for major development need to include details of proposed SuDS to be incorporated within the development.</p> <p>The Havering SFRA Update takes account of updated guidance on climate change allowances from the Environment Agency. This requires the uplift factors to be applied to consider the location, design life and vulnerability classification of development.</p> <p>The Multi-Agency Flood Plan for the London Borough of Havering (Havering Emergency Planning and Business Continuity Service, 2017) seeks to provide a coordinated multi-agency response framework to mitigate the impact of a large-scale flood event in the London Borough of Havering.</p> <p>The London Plan (Greater London Authority, 2021) includes policies on flood risk management (Policy SI 12) and sustainable drainage (Policy SI 13). Policy SI 12 seeks to address current and future flood issues and minimise risks in a sustainable and cost-effective way. Policy SI 13 requires LLFA's to identify areas where there are particular surface water management issues and aim to reduce these risks. In addition, SI 13 seeks to establish aspirational requirements for sustainable drainage.</p> <p>The aim of the London Sustainable Drainage Action Plan (Greater London Authority, 2016b) is to set a long-term strategy and series of actions for increasing sustainable drainage implementation across London. It recognises that most of the transport sector's linear assets offer limited scope for sustainable drainage. While acknowledging this constraint, the action plan notes that many linear assets have large tracts of land alongside them that offer the potential for rainwater to be diverted into such areas for sustainable drainage.</p>

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