

# Lower Thames Crossing

## 6.3 Environmental Statement Appendices

### Appendix 14.6 – Flood Risk Assessment - Part 1

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

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## 6.3 Environmental Statement Appendices

### Appendix 14.6 – Flood Risk Assessment - Part 1

#### List of contents

	Page number
<b>1 Executive summary</b> .....	<b>1</b>
<b>2 Introduction</b> .....	<b>2</b>
2.1 Context .....	2
2.2 Form of assessment .....	2
2.3 Basis of assessment .....	2
2.4 Introduction to the Flood Risk Assessment.....	2
<b>3 Background</b> .....	<b>5</b>
3.1 Flood risk assessments for development consent .....	5
3.2 Project description .....	6
<b>4 Methodology</b> .....	<b>9</b>
4.1 Informing the FRA.....	9
4.2 Methodology .....	9
<b>5 Stakeholders and design guidance</b> .....	<b>12</b>
5.1 Stakeholders .....	12
5.2 Design guidance .....	12
<b>References</b> .....	<b>13</b>
<b>Glossary</b> .....	<b>14</b>

### List of tables

	<b>Page number</b>
Table 2.1 FRA catchments .....	2
Table 4.1 Site-specific FRA checklist.....	10

### List of plates

	<b>Page number</b>
Plate 2.1 Form of the FRA .....	3
Plate 2.2 Form of Part 1 of the FRA.....	4
Plate 3.1 Lower Thames Crossing route.....	8
Plate 4.1 Informing the FRA.....	9

### List of text boxes

	<b>Page number</b>
Text box 4.1 Methodology.....	11

# 1 Executive summary

- 1.1.1 The Flood Risk Assessment (the FRA) for the A122 Lower Thames Crossing (the Project) is presented in 10 parts, each of which covers a specific element of the assessment. The FRA has been prepared to assess flood risk to the Project and caused by the Project. The FRA also demonstrates how flood risk will be managed over the operational life of the Project.
- 1.1.2 The FRA has been undertaken in accordance with the provisions of the following documents:
- a. National Planning Policy Framework (NPPF) (Department for Levelling Up Housing and Communities (DLUHC), 2021)
  - b. National Policy Statement for National Networks (NPSNN) (Department for Transport, 2014)
  - c. Overarching National Policy Statement for Energy (NPS EN-1) (Department of Energy and Climate Change, 2011)
  - d. Design Manual for Roads and Bridges (DMRB) LA 113 (Highways England, 2020).
- 1.1.3 Flood risk is a combination of the probability and the potential consequences of flooding from all sources. This includes groundwater, river (fluvial), surface water (pluvial), estuary/coastal (tidal), reservoirs, sewers and watermains.
- 1.1.4 It is normal to adopt a risk-based approach to determine the location of development to avoid flood risk to people and property where possible. With a linear development, such as the Project, it is not always possible to avoid areas of flood risk. Where essential infrastructure has to be developed in flood risk areas, it has to meet the overarching criteria set out in the NPPF, NPSNN, NPS EN-1 and DMRB LA 113<sup>1</sup>. The FRA demonstrates how the Project meets the criteria by being designed 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
  - d. Include for resilience to future climate change
- 1.1.5 To achieve the above, a series of flood mitigation and protection measures would be put in place. The measures have been shaped using the results of hydraulic models constructed for the FRA.
- 1.1.6 Flood resilience measures, which aim to make the Project less vulnerable to the effects of flooding, are also set out in the FRA.
- 1.1.7 An assessment has also been undertaken of the remaining (residual) risk after any proposed flood mitigation, protection and resilience measures have been implemented. The FRA concludes that residual risks can be managed or mitigated to acceptable levels.

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<sup>1</sup> The principal criteria for development in areas of flood risk as set out in the NPPF, NPSNN, NPS EN-1 and DMRB LA 113 are largely harmonised.

## 2 Introduction

### 2.1 Context

- 2.1.1 This document forms Part 1 of the FRA for the Project.
- 2.1.2 The FRA forms Appendix 14.6 of the Environmental Statement (ES) (Application Document 6.3).

### 2.2 Form of assessment

- 2.2.1 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 2.1.
- 2.2.2 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 2.1 and are shown in Drawing 00100.

**Table 2.1 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

- 2.2.3 All drawings referenced in this document can be found in Part 9 of the FRA.
- 2.2.4 The key points raised in this document are presented in 'Text boxes'.

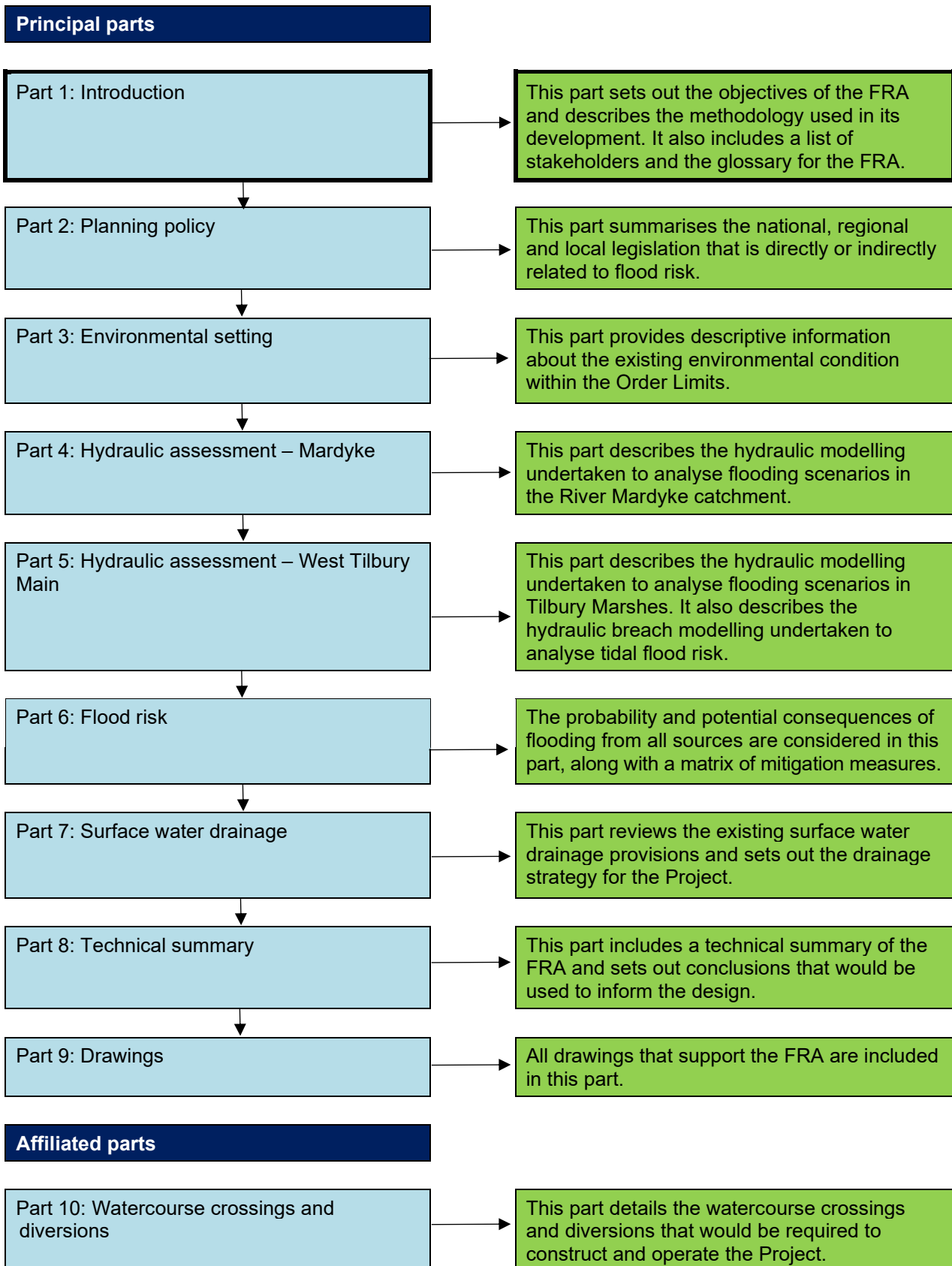
### 2.3 Basis of assessment

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

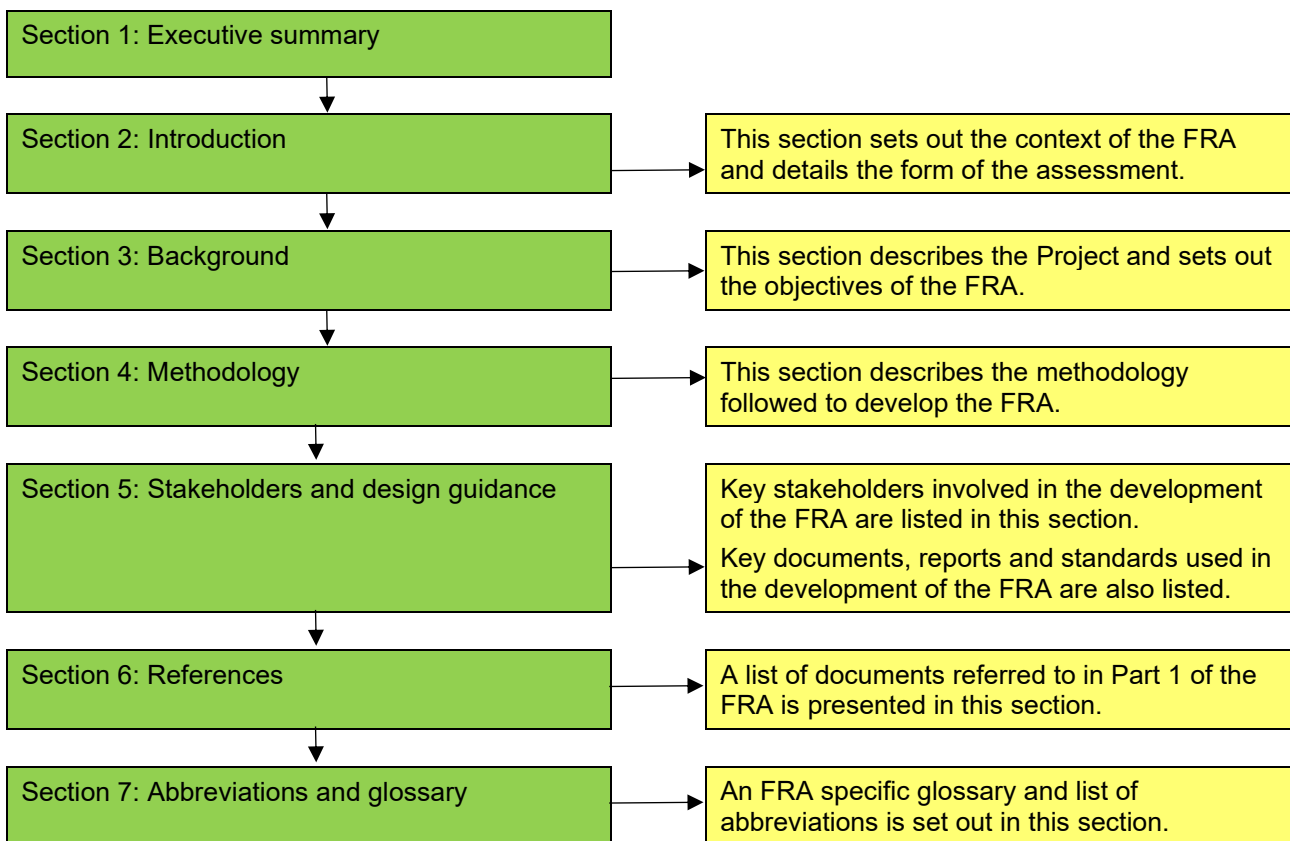
### 2.4 Introduction to the Flood Risk Assessment

- 2.4.1 Part 1 summarises the objectives of the FRA and details the methodology, guidance and standards used in its development. It also lists the stakeholders that were engaged during the preparation of the FRA. The form of Part 1 of the FRA is presented in Plate 2.2.

**Plate 2.1 Form of the FRA**



### Plate 2.2 Form of Part 1 of the FRA



## 3 Background

### 3.1 Flood risk assessments for development consent

#### National Planning Policy Framework

- 3.1.1 The NPPF sets out Government policy on development and flood risk. Paragraph 159 of the NPPF states that:

*‘Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.’*

- 3.1.2 The NPPF requires that the developer should prepare and submit a site-specific FRA to demonstrate that the development shall be free of flood risk for its lifetime without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
- 3.1.3 Further details of the NPPF are detailed in Part 2 and Part 6 of the FRA.

#### National Policy Statement for National Networks

- 3.1.4 The NPSNN 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.
- 3.1.5 The Secretary of State for Transport will use the NPSNN as the primary basis for making decisions on development consent applications for NSIPs in England.
- 3.1.6 The NPSNN includes policies that specifically relate to flood risk. One such policy requires that applications for projects in areas of flood risk should be supported by an FRA.
- 3.1.7 Further details of the NPSNN are detailed in Part 2 and Part 6 of the FRA.

#### Overarching National Policy Statement for Energy (EN-1)

- 3.1.8 The Overarching National Policy Statement for Energy (EN-1) is part of a suite of NPSs issued by the Secretary of State for Energy and Climate Change. It sets out the Government’s policy for delivery of major energy infrastructure.
- 3.1.9 EN-1 includes instructions and guidance regarding the documents needed to support an application for development consent. The supporting documents include preparation of a site-specific FRA.

#### National Highways

- 3.1.10 National Highways sets out its objectives for flood risk in DMRB LA 113. This document states that all projects on motorways and all-purpose trunk roads shall be designed to:
- Remain operational and safe for users in times of flood
  - Result in no net loss of floodplain storage



- c. Not impede water flows
- d. Not increase flood risk elsewhere

3.1.11 DMRB LA 113 also states that a flood risk assessment shall be carried out if a development scope identifies likely significant effect on flood risk.

## 3.2 Project description

3.2.1 The Project would provide a connection between the A2 and M2 in Kent and the M25 south of junction 29, crossing under the River Thames through a tunnel. The Project route is presented in Plate 3.1.

3.2.2 The A122 would be approximately 23km long, 4.25km of which would be in tunnel. On the south side of the River Thames, the Project route would link the tunnel to the A2 and M2. On the north side, it would link to the A13, M25 junction 29 and the M25 south of junction 29. The tunnel portals would be located to the east of the village of Chalk on the south of the River Thames and to the west of East Tilbury on the north side.

3.2.3 Junctions are proposed at the following locations:

- a. New junction with the A2 to the south-east of Gravesend
- b. Modified junction with the A13/A1089 in Thurrock
- c. New junction with the M25 between junctions 29 and 30

3.2.4 To align with NPSNN (Department for Transport, 2014) policy and to help the Project meet the Scheme Objectives, it is proposed that road user charges would be levied in line with the Dartford Crossing. Vehicles would be charged for using the new tunnel.

3.2.5 The Project route would be three lanes in both directions, except for:

- a. link roads
- b. stretches of the carriageway through junctions
- c. the southbound carriageway from the M25 to the junction with the A13/A1089, which would be two lanes

3.2.6 In common with most A-roads, the A122 would operate with no hard shoulder but would feature a 1m hard strip on either side of the carriageway. It would also feature technology including stopped vehicle and incident detection, lane control, variable speed limits and electronic signage and signalling. The A122 design outside the tunnel would include emergency areas. The tunnel would include a range of enhanced systems and response measures instead of emergency areas.

3.2.7 The A122 would be classified as an 'all-purpose trunk road' with green signs. For safety reasons, walkers, cyclists, horse riders and slow-moving vehicles would be prohibited from using it.

- 3.2.8 The Project would include adjustment to a number of local roads. There would also be changes to a number of Public Rights of Way, used by walkers, cyclists and horse riders. Construction of the Project would also require the installation and diversion of a number of utilities, including gas pipelines, overhead electricity powerlines and underground electricity cables, as well as water supplies and telecommunications assets and associated infrastructure.
- 3.2.9 The Project has been developed to avoid or minimise significant effects on the environment. The measures adopted include landscaping, noise mitigation, green bridges, floodplain compensation, new areas of ecological habitat and two new parks.

**Plate 3.1 Lower Thames Crossing route**



## 4 Methodology

### 4.1 Informing the FRA

- 4.1.1 The sources of information used to prepare the FRA are split into the seven broad categories shown in Plate 4.1.
- 4.1.2 Legislation with a bearing on flood risk is included in Part 2 of the FRA along with information from county and unitary authorities. A list of the stakeholders and design guidance used to inform the FRA is included in Section 0. The double-headed arrows in Plate 4.1 indicate a liaison-based relationship, with information flowing in both directions.

**Plate 4.1 Informing the FRA**



### 4.2 Methodology

#### General approach

- 4.2.1 The methodology adopted for the preparation of the FRA is generally regulated by national legislation and, in particular, the NPPF.

## National Planning Policy Framework

- 4.2.2 The NPPF sets out the Government's planning policies for England and how these are expected to be applied. This is supported by planning practice guidance, which is divided into a number of categories (DLUHC, 2021). The guidance category 'Flood risk and coastal change' advises how to account for, and address, the risks associated with flooding in the planning process (DLUHC, 2022).
- 4.2.3 This guidance forms the basis of the methodology used to prepare the FRA.
- 4.2.4 The guidance includes a checklist for site specific flood risk assessments. An outline of this checklist is presented in Table 4.1.

**Table 4.1 Site-specific FRA checklist**

Ref	Checklist item	Requirement	FRA Part
1	Development site and location	Full details of the Application Site are to be provided.	1 and 3
2	Development proposals	A general summary of the development proposals is to be provided.	1
3	Sequential Test	A description of how the Sequential Test has been applied, along with the evidence to demonstrate how the requirements of the test have been met.	6
4	Climate change	A description to explain how flood risk at the site is likely to be affected by climate change.	4, 5 and 6
5	Site specific flood risk	A description of the risk of flooding to and from the Project over its expected lifetime, including appropriate allowances for the impacts of climate change.	6
6	Surface water management	A description of the existing and proposed surface water management arrangements at the site.	6 and 7
7	Occupants and users of the development	A summary of future of the new development.	1
8	Exception Test	A description of how the Exception Test has been applied, along with the evidence to support development in Flood Zones 2 and 3.	6
9	Residual risk	Residual risks that remain after the flood risk management and mitigation measures are implemented are to be provided, along with an explanation of how these risks can be managed to keep the users of the Project safe over its lifetime.	6

- 4.2.5 The items in the checklist are supported by a set of maps and drawings (Part 9) and hydraulic modelling (Parts 4 and 5).
- 4.2.6 Further details of the NPPF and other documents relating to the planning environment are provided in Part 2 of the FRA.

### **Text box 4.1 Methodology**

The principal tasks undertaken to meet the FRA's requirement to show that the development is safe and does not increase flood risk elsewhere are as follows:

- Identification of potential sources of flooding
- Undertake the Sequential and Exception Tests
- Determination of flood risk pre and post development
- Determination of flood mitigation measures
- Determination of flood protection measures
- Determination of flood resilience measures
- Identification and management of residual flood risk

## 5 Stakeholders and design guidance

### 5.1 Stakeholders

- 5.1.1 The methodology adopted in the FRA was informed through consultation with key stakeholders. This ensured that the approach to flood risk adopted in the development of the FRA considered stakeholder needs from an early stage. The following stakeholders were consulted in the preparation and development of the FRA:
- a. Environment Agency
  - a. Essex and Suffolk Water
  - b. Gravesham Borough Council
  - c. Kent County Council (Lead Local Flood Authority) (LLFA)
  - a. London Borough of Havering (LLFA)
  - b. Natural England
  - c. North Kent Marshes Internal Drainage Board
  - d. Southern Water
  - e. Thurrock Council
  - f. Essex County Council
- 5.1.2 London Borough of Havering is acting as LLFA for Brentwood Borough Council.
- 5.1.3 Essex County Council is acting as LLFA on behalf of Thurrock Council.
- 5.1.4 Dialogue with Environment Agency and LLFAs has been a key activity in the development of FRA.
- 5.1.5 Details of the dialogue with the Environment Agency are included in the Statement of Common Ground between National Highways and the Environment Agency (Application Document 5.4). Evidence of an agreement in principle from the Environment Agency for the FRA is included in Annex A.12 of the Statement of Common Ground between National Highways and the Environment Agency (Application Document 5.4).

### 5.2 Design guidance

- 5.2.1 Design guidance and other documents that inform the FRA include standards, guidance and reports from:
- a. Department for Environment, Food and Rural Affairs (Defra)
  - b. Department for Levelling Up, Housing and Communities (DLUHC)
  - c. The Environment Agency
  - d. The Design Manual for Roads and Bridges (DMRB)
  - e. Construction Industry Research and Information Association (CIRIA)

## References

Department of Energy and Climate Change (2011). Overarching National Policy Statement for Energy (NPS EN-1).

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Department for Levelling Up, Housing and Communities (2022). Guidance – Flood risk and coastal change. <https://www.gov.uk/guidance/flood-risk-and-coastal-change>

Department for Transport (2014). National Policy Statement of National Networks. <https://www.gov.uk/government/publications/national-policy-statement-for-national-networks>

Highways England (2020). Design Manual for Roads and Bridges (DMRB), LA 113 - Road drainage and the water environment. <https://www.standardsforhighways.co.uk/dmrb/>



## Glossary

Term	Abbreviation	Explanation
<b>Above Ordnance Datum</b>	<b>AOD</b>	Vertical datum used by the Ordnance Survey as the basis for deriving altitudes on maps.
<b>Alignment</b>		The horizontal (lateral) or vertical (height) position of a road. It can be defined by a series of horizontal tangents and curves or vertical crest and sag curves, and the gradients connecting them.
<b>Annual exceedance probability</b>	<b>AEP</b>	The chance of a flood of a particular magnitude being equalled or exceeded in any one year. For example, the 1% AEP event has a 1% (or (1 in 100) chance of being exceeded in any year.
<b>Areas Susceptible to Groundwater Flooding</b>	<b>ASStGWF</b>	General low-lying areas underlain by permeable rocks
<b>Attenuation</b>		The process of water retention on site and slow release in a controlled flow to surface water
<b>Base flow index derived using HOST classification.</b>	<b>BFIHOST</b>	Base flow index derived using n. It is a measure of catchment responsiveness and is used in the calculation of greenfield runoff rates.
<b>British Geological Survey</b>	<b>BGS</b>	The British Geological Survey is a partly publicly funded body which aims to advance geoscientific knowledge of the United Kingdom landmass and its continental shelf by means of systematic surveying, monitoring and research.
<b>Canal</b>		An artificial waterway constructed to allow the passage of boats or ships inland or to convey water for irrigation.
<b>Climate change</b>		Any change in global temperatures and precipitation over time due to natural variability or to human activity.
<b>Compensatory Flood Storage area</b>	<b>CFSA</b>	An area outside the area of immediate development set aside for floodplain storage lost as a result of the development.
<b>Construction Industry Research and Information Association</b>	<b>CIRIA</b>	A construction industry research and information association.
<b>Core Strategy</b>	<b>CS</b>	Sets out a council's approach to planning.
<b>Critical Drainage Area</b>	<b>CDA</b>	As defined in the Town and Country Planning (General Development Procedure) (Amendment) (No. 2) (England) Order 2006 a Critical Drainage Area is 'an area within Flood Zone 1 which has critical drainage problems and which has been notified... [to]...the local planning authority by the Environment Agency'
<b>Department for Environment, Food and Rural Affairs</b>	<b>Defra</b>	The government department responsible for environmental protection, food production and standards, agriculture, fisheries and rural communities in the UK

Term	Abbreviation	Explanation
<b>Department for Levelling Up, Housing and Communities</b>	<b>DLUHC</b>	The UK Government department for housing, communities, local government in England and the levelling up policy. Formerly called the Ministry of Housing, Communities and Local Government.
<b>Department for Transport</b>	<b>DfT</b>	The government department responsible for the English transport network and a limited number of transport matters in Scotland, Wales and Northern Ireland that have not been devolved.
<b>Design Manual for Roads and Bridges</b>	<b>DMRB</b>	A comprehensive manual containing requirements, advice and other published documents relating to works on motorway and all-purpose trunk roads for which one of the Overseeing Organisations (National Highways, Transport Scotland, the Welsh Government or the Department for Regional Development (Northern Ireland)) is highway authority. For the A122 Lower Thames Crossing the Overseeing Organisation is National Highways.
<b>Detention basin</b>	<b>DB</b>	Shallow depression that detains storm water flows as temporary storage before the water is directed to a surface water outfall. They do not allow infiltration to ground and may be lined to prevent this.
<b>Development Consent Order</b>	<b>DCO</b>	Means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects (NSIP) under the Planning Act 2008.
<b>Development Consent Order</b>	<b>DCO</b>	Means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects (NSIP) under the Planning Act 2008.
<b>Ditch</b>		A small to moderate depression created to channel water.
<b>Drainage catchment</b>		The area contributing surface water flow to the drainage network.
<b>Dyke</b>	-	"A dyke is an elongated naturally occurring ridge or artificially constructed fill or wall, which regulates water levels. Note: Notwithstanding its name, the Mardyke is a main river and not a dyke.
<b>Environment Agency</b>	<b>EN</b>	A non-departmental public body of Defra, established under the Environment Act 1995. It is the leading public body for protecting and improving the environment in England and Wales. The organisation is responsible for wide-ranging matters, including the management of all forms of flood risk, water resources, water quality, waste regulation, pollution control, inland fisheries, recreation, conservation and navigation of inland waterways
<b>Essex County Council</b>	<b>ECC</b>	n/a

Term	Abbreviation	Explanation
<b>Exceedance</b>		Exceedance will occur when the rate of surface water runoff exceeds the inlet capacity of the drainage system, when the receiving water or pipe system becomes overloaded, or when the outfall becomes restricted due to flood levels in the receiving water.
<b>Exception Test</b>		A test to ensure that flood risk is minimised and appropriately addressed.
<b>First flush</b>		The initial runoff from a site or catchment following the start of a rainfall event.
<b>Flood and Water Management Act, 2010</b>	<b>FWMA</b>	A UK Act of Parliament relating to the management of the risk concerning flooding and coastal erosion
<b>Flood Attenuation by Reservoirs and Lakes</b>	<b>FARL</b>	A variable that provides a guide to the degree of flood attenuation attributable to reservoirs and lakes in the catchment above a gauging station and is used in the calculation of greenfield runoff rates.
<b>Flood Estimation Handbook</b>	<b>FEH</b>	The Flood Estimation Handbook and its related software offer guidance on rainfall and river flood frequency estimation and development site runoff rates across the UK.
<b>Flood Risk Assessment</b>	<b>FRA</b>	An assessment of the risk of flooding on a development or caused by the development required as part of the planning application process.
<b>Flood risk</b>		A combination of the probability and the potential consequences of flooding.
<b>Flood Studies Report</b>	<b>FSR</b>	The Flood Studies Report is used in relation to rainfall events in the United Kingdom.
<b>Flood Zone</b>	<b>Flood Zone</b>	Flood Zones show the probability of river and sea flooding, ignoring the presence of existing flood defences.
<b>Floodplain</b>		The area that would naturally be affected by flooding if a river rises above its banks or high tides and stormy seas causing flooding in coastal areas.
<b>Fluvial</b>	<b>Fluvial</b>	Of, relating to, or living in a stream or river
<b>Fluvial flooding</b>	<b>Fluvial flooding</b>	Flooding from a river or watercourse.
<b>Freeboard</b>		Vertical distance between water surface and the soffit of a bridge or top of embankment.
<b>Greenfield runoff</b>		The surface water runoff from a site before development.
<b>Groundwater</b>		Water below ground level
<b>GWMP</b>	<b>GWMP</b>	Ground Water Management Plan
<b>Highways England Drainage Data Management System</b>	<b>HADDMS</b>	Provides technical information about location and condition of drainage infrastructure on the road network.
<b>Highways England Water Risk Assessment Tool</b>	<b>HEWRAT</b>	A tool used to assess the effect of routine runoff on surface water quality.

Term	Abbreviation	Explanation
<b>Hydrology of Soil Types classification</b>	<b>HOST Classification</b>	The Hydrology of Soil types (HOST) classification makes use of the fact that the physical properties of soils, and soil structure in particular, have a major influence on catchment hydrology.
<b>Impermeable surface</b>		A non-porous surface that generates a higher volume of surface water runoff than porous unsaturated surfaces after rainfall.
<b>Infiltration</b>	<b>Infiltration</b>	This is the process by which water on the ground surface enters the soil. Infiltration is governed by gravity and soil capillary action; the associated rate of infiltration varies for soil type and climatic conditions.
<b>Infiltration basin</b>	<b>IB</b>	Shallow depression that detains storm water flows as temporary storage and allows water to percolate through a permeable base, often comprising a filter layer, such as gravel.
<b>Institute of Hydrology</b>	<b>IH</b>	A centre for hydrological research.
<b>Integrated Hydrological Digital Terrain Model</b>	<b>IHDTM</b>	This is a 50m grid interval digital terrain model derived from 1:50,000 scale mapping from Ordnance Survey and Land & Property Services .
<b>Kent County Council</b>	<b>KCC</b>	n/a
<b>LLFA</b>	<b>LLFA</b>	Unitary authorities or county councils responsible for developing, maintaining and applying a strategy for local flood risk management in their areas and for maintaining a register of their flood risk assets.
<b>London Borough of Havering</b>	<b>LBH</b>	n/a
<b>London, Tilbury and Southend line</b>	<b>LTS line</b>	A railway line linking London and the east coast.
<b>Main river</b>		Watercourses that could contribute to extensive flooding across a catchment and/or alleviate flood risk elsewhere. They are defined in the main river map held by Defra.
<b>Mardyke</b>		A main river, mainly in Thurrock, that flows into the River Thames at Purfleet, close to the QEII Bridge.
<b>Marine Management Organisation</b>	<b>MMO</b>	An executive non-departmental public body, sponsored by the Department for Environment, Food & Rural Affairs.
<b>National Highways</b>		A UK government-owned company with responsibility for managing the motorways and major roads in England. Formerly known as Highways England.
<b>National Planning Policy Framework</b>	<b>NPPF</b>	sets out government's planning policies for England and how these are expected to be applied.
<b>National Policy Statement for National Networks</b>	<b>NN NPS</b>	The government's statement of strategic planning policy for major road and rail schemes

<b>Term</b>	<b>Abbreviation</b>	<b>Explanation</b>
<b>Non-motorised user, eg pedestrians, cyclists and horse riders</b>	<b>NMU</b>	Non-motorised user, e.g. pedestrians, cyclists and horse riders
<b>North Portal</b>		The North Portal (northern tunnel entrance) would be located to the west of East Tilbury. Emergency access and vehicle turn-around facilities would be provided at the tunnel portal. The tunnel portal structures would accommodate service buildings for control operations, mechanical and electrical equipment, drainage and maintenance operations.
<b>Off-slip</b>		A slip road by which traffic leaves a major road such as a motorway.
<b>On-slip</b>		A slip road by which traffic joins a major road such as a motorway
<b>Order Limits</b>		The outermost extent of the Project, indicated on the Plans by a red line. This is the Limit of Land to be Acquired or Used (LLAU) by the Project. This is the area in which the DCO would apply.
<b>Ordinary watercourse</b>		A watercourse that does not form part of a main river. The Lead Local Flood Authority in whose area the watercourse lies has powers to consent works to ordinary watercourses and permissive powers to undertake works where necessary..
<b>Orifice plate</b>		A device used for measuring flow rate, for reducing pressure or for restricting flow.
<b>Overarching National Policy Statement for Energy</b>	<b>NPS EN-1</b>	Sets out national policy for the energy infrastructure
<b>Penstock</b>	<b>Penstock</b>	A flat plate, fitted to a pair of guide slots on a headwall or chamber wall, which can be raised and lowered using a screw thread operated by a wheel, in order to control spillages.
<b>Permanent pool</b>	<b>Permanent pool</b>	This is the permanent volume of water that will remain in a retention pond or wetland throughout the year (less any losses to evaporation or infiltration during extended periods of dry weather).
<b>Pluvial</b>	<b>Pluvial</b>	Flows that relate to, or are characterised by, rainfall.
<b>Pluvial flooding</b>	<b>Pluvial flooding</b>	See surface water flooding.
<b>Pollution Control Device</b>	<b>Pollution Control Device</b>	A device or system designed to reduce the risk of pollution.
<b>Positive drainage system</b>	<b>Positive drainage system</b>	A positive drainage system is one that discharges to a watercourse or open water body by gravity.
<b>Preliminary flood risk assessment</b>	<b>PFRA</b>	A summary of the risk of flooding from main rivers, the sea and reservoirs in the river basin districts that are wholly or partly within England.

Term	Abbreviation	Explanation
<b>Project road</b>		The new A122 trunk road, the improved A2 trunk road, and the improved M25 and M2 special roads, as defined in Parts 1 and 2, Schedule 5 (Classification of Roads) in the draft DCO (Application Document 3.1).
<b>Project route</b>		The horizontal and vertical alignment taken by the Project road.
<b>QBAR or QBAR</b>	<b>QBAR or QBAR</b>	The peak rate of flow from a catchment for the mean annual flood (a return period of approximately 1:2.3 years).
<b>QMED or QMED</b>	<b>QMED or QMED</b>	Median of the annual maximum flow series – the flow that has an annual exceedance probability of 50% or a return period of two years.
<b>Ramsar site</b>		An internationally important wildlife site under the 'Convention on Wetlands of International Importance especially as Waterfowl Habitat'.
<b>Receptor</b>		A component of the natural or built environment (such as a human being, water, air, a building or a plant) affected by an impact of the construction and/or operation of a development.
<b>Register of Environmental Actions and Commitments</b>	<b>REAC</b>	The REAC identifies the environmental commitments that would be implemented during the construction and operational phases of the Project if the Development Consent Order is granted, and forms part of the Code of Construction Practice (Application Document 6.3, Appendix 2.2).
<b>Retention pond</b>	<b>RP</b>	A pond that generally retains some water at all times. May have permeable base or banks.
<b>Return period</b>	<b>Return period</b>	The statistical probability of a rainfall event occurring in any given year, which can be expressed as one in X years, or as a percentage annual probability.
<b>Revitalised Flood Hydrograph model</b>	<b>ReFH</b>	A tool used to estimate design and observed flood hydrographs for rural and urbanised ungauged catchments across the UK.
<b>River Basin Management Plan</b>	<b>RBMP</b>	A planning document published by the Department for Environment, Food and Rural Affairs (Defra) and the Environment Agency which sets out how organisations, stakeholders and communities will work together to improve the water environment.
<b>Runoff</b>	<b>Runoff</b>	The flow of water that occurs when excess stormwater, meltwater or other sources flows overland.
<b>Sediment forebay</b>		A pre-treatment feature located upstream of a retention pond, infiltration basin or other form of storage that removes coarse sediments and floating oils.
<b>Sequential Test</b>		A planning principle that seeks to identify, allocate or develop certain types or locations of land before others.

Term	Abbreviation	Explanation
<b>Setting</b>	<b>Setting</b>	This is defined in the NPPF as ‘The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of the asset, may affect the ability to appreciate that significance or may be neutral.’
<b>Sewer flooding</b>	<b>Sewer flooding</b>	Flooding caused by a blockage or overflowing of a sewerage or urban drainage system.
<b>Sites of Special Scientific Interest</b>	<b>SSSI</b>	A conservation designation denoting a protected area in the United Kingdom
<b>Sluice</b>		A sluice is a water channel controlled at its head by a gate.
<b>Soffit</b>		The soffit is the highest point of the internal surface of a pipe or culvert at any cross-section.
<b>Source protection zones</b>	<b>SPZ</b>	EA-defined groundwater sources (2000) such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area.
<b>South Portal</b>		The South Portal of the Project (southern tunnel entrance) would be located to the south-east of the village of Chalk. Emergency access and vehicle turn-around facilities would be provided at the tunnel portal. The tunnel portal structures would accommodate service buildings for control operations, mechanical and electrical equipment, drainage and maintenance operations.
<b>Special Protection Area</b>	<b>SPA</b>	Protected areas for birds in the UK classified under the Conservation of Habitats and Species Regulations 2017
<b>Standard-period Average Annual Rainfall</b>	<b>SAAR</b>	Rainfall averages for UK over the 30-year 1961-1990, interpolated to a 1 km grid
<b>Strategic Flood Risk Assessment</b>	<b>SFRA</b>	A required part of the local planning process, as set out in Planning Policy Statement 25, produced by the Department for Communities and Local Government. SFRAs are primarily produced by local planning authorities, in consultation with the Environment Agency, and are intended to form the basis for preparing appropriate policies for flood risk management at the local level.
<b>Surface water flooding</b>	<b>Surface water flooding</b>	Surface water flooding occurs when a heavy downpour of rain saturates the urban drainage system/ground and the excess water cannot be accommodated within the drainage system and/or absorbed by the ground. Surface water flooding is also known as pluvial flooding.
<b>Surface Water Management Plan</b>	<b>SWMP</b>	Plan to provide sufficient information to support the development of an agreed strategic approach to the management of surface water flood risk within a given geographical area by ensuring the most sustainable measures are identified.

Term	Abbreviation	Explanation
<b>Surge event</b>		The abnormal rise in sea water level during a storm over the sea, measured as the height of the sea water above the normal predicted astronomical tide.
<b>Sustainable Drainage Systems</b>	<b>SuDS</b>	A drainage system designed to reduce the potential impact of new and existing developments with respect to surface water drainage discharges.
<b>Swale</b>		Shallow grassed open channel.
<b>Thames Estuary 2100 Plan</b>	<b>TE2100</b>	TTE2100 recommends the actions the Environment Agency and others will need to take in the short, medium and long term.
<b>The tunnel</b>		Proposed 4.25km (2.5 miles) road tunnel beneath the River Thames, comprising two bores, one for northbound traffic and one for southbound traffic. Cross-passages connecting each bore would be provided for emergency incident response and tunnel user evacuation. Tunnel portal structures would accommodate service buildings for control operations, mechanical and electrical equipment, drainage and maintenance operations. Emergency access and vehicle turn-around facilities would also be provided at the tunnel portals.
<b>Thurrock Council</b>		n/a
<b>Tilbury Loop</b>		A loop line between Barking and Pitsea via Rainham (Essex), Grays and Tilbury. Forms one of the routes on the LTS line.
<b>Transport for London</b>	<b>TfL</b>	The integrated body responsible for London's transport system.
<b>Vegetated drainage system</b>		A type of sustainable drainage system used to convey, store and treat water running off motorways and all-purpose trunk roads, before it outfalls to the receiving waters. They can supplement or replace conventional drainage systems.
<b>Vortex separator</b>	<b>Vortex separator</b>	Proprietary products designed to remove sediments in suspension and floatable debris in the flow of highway surface runoff.
<b>Walkers, cyclists and horse riders</b>	<b>WCH</b>	Walkers, cyclists and horse riders. Note that this term includes scooter riders (non-motorised); cyclists with electrically assisted pedal cycles (where these conform to Department for Transport or other relevant regional regulations and where they can legally be used); and users of powered wheelchairs (where these conform to Department for Transport or other relevant regional regulations and where they can legally be used).



Term	Abbreviation	Explanation
<b>Water Framework Directive</b>	<b>WFD</b>	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. The Directive establishes a framework for the protection of inland surface waters, estuaries, coastal waters and groundwater. The framework for delivering the WFD is through river basin management planning. The UK has been split into several river basin districts. Each river basin district has been characterised into smaller management units known as water bodies. The surface water bodies may be rivers, lakes, estuary or coastal.
<b>Water quality standards</b>	<b>WQs</b>	The concentration of a substance in water which has been defined by government (or its appointed agency) as being a concentration above which contact, ingestion or exposure may cause harm to a sensitive receptor. WQs include drinking water standards and environmental quality standards amongst others.
<b>Watercourse</b>		A natural or artificial channel through which water flows, including a river, canal, estuary.
<b>West Tilbury Main</b>		A main river, wholly in Thurrock, that flows into the River Thames at Bowater Sluice.
<b>Wetland</b>		A pond with a high proportion of shallow zones that promote the growth of bottom-rooted plants, and which can be used for treatment of pollution.

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