

Lower Thames Crossing

6.3 Environmental Statement Appendices

Appendix 14.6 – Flood Risk Assessment - Part 3

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Appendix 14.6 – Flood Risk Assessment - Part 3

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1 Introduction

1.1 Context

- 1.1.1 This document forms Part 3 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, 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.

1.3 Basis of assessment

- 1.3.1 The FRA is based on the design as presented in the Development Consent Order (DCO) 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 Environmental setting

- 1.4.1 This part outlines the various aspects of the existing environmental condition within the Order Limits of the Project. The form of Part 3 of the FRA is presented in Plate 1.2.

Plate 1.1 Form of the FRA

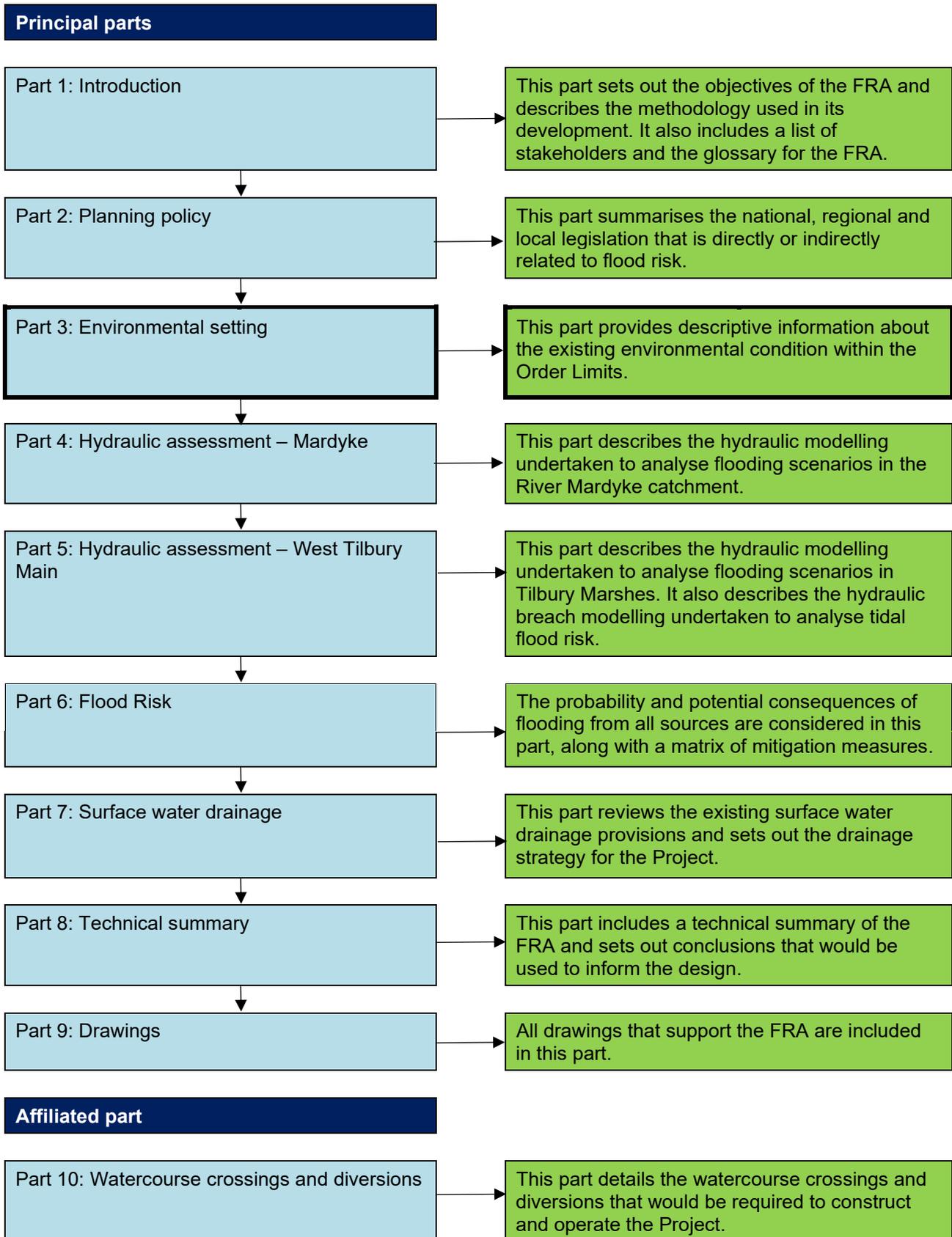
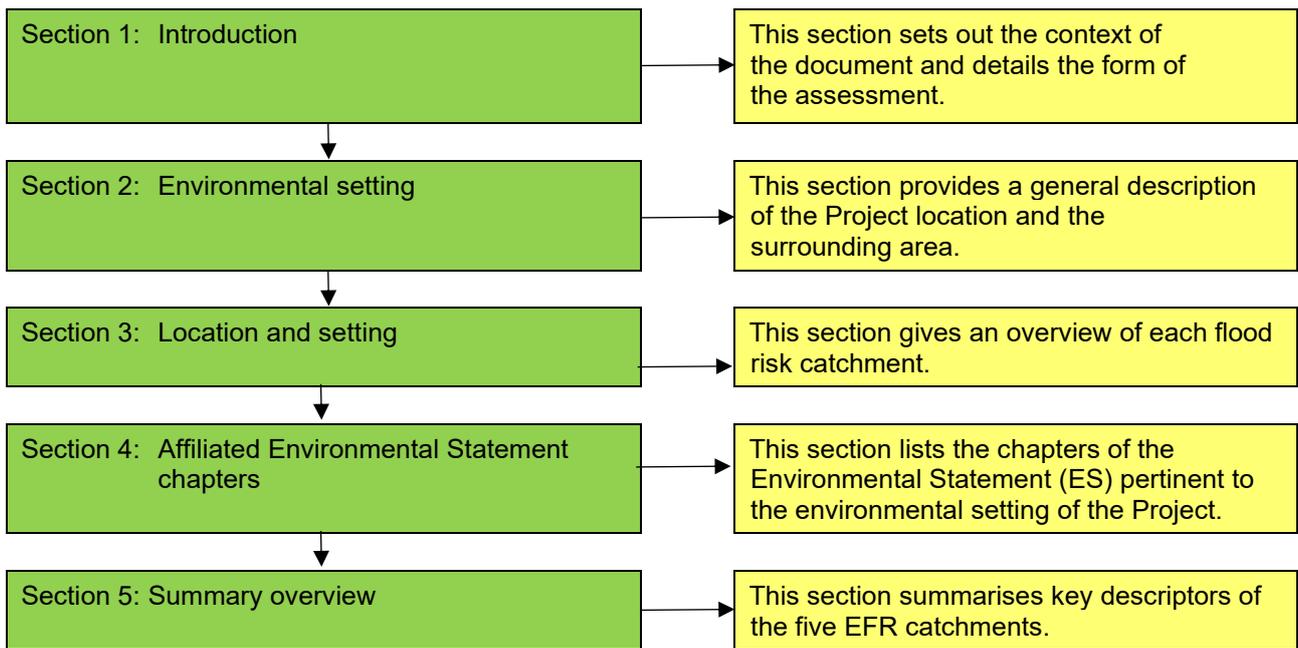


Plate 1.2 Form of Part 3 of the FRA



2 Environmental Setting

2.1 Project location and surrounding area

- 2.1.1 The Project would be located in a highly populated part of the country in the vicinity of urban areas including, but not limited to, Gravesend, Grays and Tilbury. Whilst located within and adjacent to these urban areas, the route passes mostly through rural areas within a designated Green Belt, with an alignment which seeks to reduce impact on environmental assets and communities. There are a large number of footpaths, bridleways, National Cycle Network routes, local cycle routes and trails within the area to provide walkers, cyclists and horse riders (WCH) with access and connectivity to surrounding areas.
- 2.1.2 The environmental features of the area are shown on the ES Figure 2.3 Environmental Constraints Plans (Application Document 6.2). Areas of the physical environment around the Project are designated for their important ecological, cultural heritage, geological and landscape features. South of the River Thames, and in close proximity to the A2, there are a number of areas of nationally important ancient woodland, Sites of Special Scientific Interest (SSSIs) and sites of local biodiversity importance. On the south bank of the River Thames to the east of Gravesend and north-east of Chalk are the Thames Estuary and Marshes Ramsar site, and the South Thames Estuary and Marshes SSSI, with the land further east also being designated as a Special Protection Area (SPA). To the north of the River Thames lies Goshems Farm Local Wildlife Site (LWS). There are a number of other LWSs between the river and the northern end of the Project, as well as other areas of ancient woodland and sites of ecological and local biodiversity importance.
- 2.1.3 The land between the villages of Thong and Shorne and to the south of the A2 forms part of the Kent Downs Area of Outstanding Natural Beauty (AONB). In addition, the Cobham Hall Registered Park and Garden lies to the south of the A2. The villages of Shorne and Cobham are also designated as Conservation Areas. North of the River Thames the settlements of East and West Tilbury are designated as Conservation Areas. Both south and north of the River Thames there are a number of listed buildings of all grades, particularly Grades II and II*. Other heritage features of note are Scheduled Monuments including New Tavern Fort and Cliffe Fort on the southern bank of the River Thames and Coalhouse Fort battery and artillery defences and Tilbury Fort on the northern bank of the River Thames, as well as a cropmark complex at Orsett adjacent to the A13.
- 2.1.4 There are extensive areas of floodplain, associated with the River Thames and the River Mardyke. The Mardyke lies to the north of the Thames in Thurrock and flows into the Thames at Purfleet. Parts of the area benefit from the Thames tidal flood defences. Numerous smaller watercourses and drainage ditches traverse the area, particularly to the north of the Thames.

3 Location and setting

3.1 South of the River Thames

General

- 3.1.1 The catchment to the south of the River Thames (Catchment EFR-1) is shown in Drawing 00100.
- 3.1.2 The catchment falls entirely within Gravesham Borough Council's administrative boundary, with Kent County Council performing the role of Lead Local Flood Authority (LLFA).
- 3.1.3 The topography in the southern part of the catchment is characterised by chalk downs with drained marshes to the north.
- 3.1.4 Above-ground development to the south of the River Thames lies entirely within Catchment EFR-1.
- 3.1.5 The tunnel and some of the temporary works required to construct the Project would lie in the area immediately to the north of the catchment.

Flood defences

- 3.1.6 The area to the north of Catchment EFR-1 is protected by a linear defence structure. This structure protects the inland areas from surge tides in the Thames Estuary.
- 3.1.7 This linear flood defence runs along the south bank of the River Thames and takes the form of a raised earth embankment some 45m across in width; it stretches 4km to the east of the proposed tunnel and 1km to the west before tying into seawalls.
- 3.1.8 Catchment EFR-1 lies beyond the reach of tidal surges so does not need to rely on these defences for flood protection.

Watercourses

- 3.1.9 There would be no watercourse crossings or diversions in Catchment EFR-1.
- 3.1.10 To the north of Catchment EFR-1, the tunnelled section of the Project would run under several watercourses, including one main river.
- 3.1.11 To facilitate construction of the Project, temporary watercourse crossings and diversions would be required in the area to the north of Catchment EFR-1. This would include a temporary crossing and diversion of a main river.
- 3.1.12 For details on the watercourse crossings and diversions that would lie within Catchment EFR-1, refer to Part 10 of the FRA. Watercourse crossings and diversions that would lie in the area immediately to the north of Catchment EFR-1 are also detailed in Part 10 of the FRA.

3.2 North Portal to Chadwell St Mary

General

- 3.2.1 The catchment from the North Portal to Chadwell St Mary (Catchment EFR-2) is shown in Drawing 00100.
- 3.2.2 The catchment falls within Thurrock Council's administrative boundary. Essex County Council is currently undertaking the role of LLFA on behalf of Thurrock Council.
- 3.2.3 The topography in the southern part of the catchment is characterised by marshes and then changing to agricultural use as land begins to rise towards the north.

Flood defences

- 3.2.4 There are no flood defences at the point the tunnelled section of the Project reaches the north bank of the River Thames. Ground levels in this location are relatively high and do not need protection from tidal surges.
- 3.2.5 Linear defences along the Thames Estuary extend to a point approximately 1km to the west (upstream) of the Project road and start again at a point approximately 800m to the east (downstream) of the Project road.
- 3.2.6 The West Tilbury Main sluice gate (Bowaters Sluice) is located 325m east of the Project road. There are short sections of seawall either side of the sluice.

Watercourses

- 3.2.7 There are a number of watercourse crossings in Catchment EFR-2, including one main river crossing (West Tilbury Main).
- 3.2.8 All watercourses in the immediate area drain to the River Thames via the Bowater Sluice.
- 3.2.9 For details on the watercourse crossings and diversions that would lie within Catchment EFR-2, refer to Part 10 of the FRA.

3.3 A13 junction

General

- 3.3.1 The A13 junction catchment (Catchment EFR-3) is shown in Drawing 00100.
- 3.3.2 The catchment falls within Thurrock Council's administrative boundary. Essex County Council is currently undertaking the role of LLFA on behalf of Thurrock Council.
- 3.3.3 The topography in Catchment EFR-3 primarily comprises chalk downs.

Flood defences

- 3.3.4 There are no flood defences present in Catchment EFR-3.

Watercourses

- 3.3.5 There are no watercourse crossings and diversions in Catchment EFR-3.

3.4 Ockendon Link

General

- 3.4.1 The Ockendon Link catchment (Catchment EFR-4) is shown in Drawing 00100.
- 3.4.2 The catchment falls within Thurrock Council's administrative boundary. Essex County Council is currently undertaking the role of LLFA on behalf of Thurrock Council.
- 3.4.3 The majority of land in Catchment EFR-4 is in agricultural use.

Flood defences

- 3.4.4 There are no flood defences in Catchment EFR-4, but it benefits from the defences along the northern bank of the Thames Estuary.

Watercourses

- 3.4.5 There are a number of watercourse crossings in Catchment EFR-4, including three main river crossings (the Mardyke, Orsett Fen Sewer and Golden Bridge Sewer).
- 3.4.6 All watercourses in the catchment drain to the River Thames via the Mardyke Sluice.
- 3.4.7 For details on the watercourse crossings and diversions that would lie within EFR-4, refer to Part 10 of the FRA.

3.5 North Section

General

- 3.5.1 The catchment for the North Section of the Project (Catchment EFR-5) is shown in Drawing 00100.
- 3.5.2 This catchment falls within three different local authority areas:
 - a. Thurrock Council
 - b. London Borough of Havering
 - c. Brentwood Borough Council
- 3.5.3 Essex County Council is acting as LLFA on behalf of Thurrock Council.
- 3.5.4 London Borough of Havering is acting as LLFA for Brentwood Borough Council.

Flood defences

- 3.5.5 There are no flood defences present in Catchment EFR-5.

Watercourses

- 3.5.6 There are a number of watercourse crossings in Catchment EFR-5, including one main river crossing (the West Mardyke).
- 3.5.7 For details on the watercourse crossings and diversions that would lie within Catchment EFR-5, refer to Part 10 of the FRA.

4 Affiliated Environmental Statement chapters

4.1 Affiliated chapters

- 4.1.1 The following chapters of the ES include details on various aspects of the existing environmental baseline conditions within the Order Limits:
- a. For details on climate, refer to Chapter 15: Climate (Application Document 6.1).
 - b. For details on the Project's topography, refer to Chapter 7: Landscape and Visual and Chapter 10: Geology and Soils (Application Document 6.1).
 - c. For details on existing watercourses and water features within the Order Limits, refer to Appendix 14.2: Water Features Survey Factual Report (Application Document 6.3).
 - d. For details of geology and contamination, refer to Chapter 10: Geology and Soils (Application Document 6.1).
 - e. For details of hydrogeology, refer to Appendix 14.5: Hydrogeological Risk Assessment (Application Document 6.3).
 - f. Details on the ecological designations along the Project route are given in Chapter 8: Terrestrial Biodiversity (Application Document 6.1).
 - g. For details of cultural heritage sites, refer to Chapter 6: Cultural Heritage (Application Document 6.1).

5 Overview

5.1 Overview of EFR catchments

5.1.1 Table 5.1 to Table 5.5 summarises key descriptors along the five EFR catchments.

Table 5.1 Overview of Catchment EFR-1

Descriptor	Parameter	Value/comment
Length in highway	Lower Thames Crossing	6.2km
	A2/M2	2.3km
LLFA	Kent County Council	100% of length in EFR-1
Flood Zones crossed by the highway	% of length in Zone 1	100%
	% of length in Zones 2 & 3	–
Flood defences	There are no flood defences in Catchment EFR-1 but there are linear flood defences along the south bank of the Thames Estuary to the north of the catchment.	
Source Protection Zone (SPZ)	Two sections of Catchment EFR-1 lie in SPZ3. These comprise a 1.45km section of the A2 to the east of the Project road and a 2.45km section of the A2 to the west of the Project road. The remainder of Catchment EFR-1 does not lie in a source protection zone.	

Table 5.2 Overview of Catchment EFR-2

Descriptor	Parameter	Value/comment
Length in highway	Lower Thames Crossing	6.2km
LLFA	Thurrock Council	100% of length in EFR-2
Flood Zones crossed by the highway	% of length in Zone 1	68%
	% of length in Zones 2 & 3	32%
Flood defences	Bowater Sluice	
Source Protection Zone (SPZ)	Most of Catchment EFR-2 lies in SPZ3. The exception is a 1.05km section of the Project road near Linford, which lies in SPZ2. The associated SPZ1 lies immediately to the east of the Project road. Part of the highway drainage system lies in SPZ1 (see Part 7 of the FRA for further details).	

Table 5.3 Overview of Catchment EFR-3

Descriptor	Parameter	Value/comment
Length in highway	Lower Thames Crossing	2.2km
LLFA	Thurrock Council	100% of length in EFR-3
Flood Zones crossed by the highway	% of length in Zone 1	100%
	% of length in Zones 2 & 3	–
Flood defences	N/A	
Source Protection Zone (SPZ)	Catchment EFR-3 lies in SPZ3.	

Table 5.4 Overview of Catchment EFR-4

Descriptor	Parameter	Value/comment
Length in highway	Lower Thames Crossing	5.4km
LLFA	Thurrock Council	100% of length in EFR-4
Flood Zones crossed by the highway	% of length in Zone 1	40%
	% of length in Zones 2 & 3	60%
Flood defences	There are no flood defences present in Catchment EFR-4 but it benefits from the Mardyke Sluice, which is in Purfleet.	
Source Protection Zone (SPZ)	Catchment EFR-4 lies in SPZ3.	

Table 5.5 Overview of Catchment EFR-5

Descriptor	Parameter	Value/comment
Highway catchment	M25 (see Note 1)	7.69km
LLFA	Brentwood Council	3% of length in EFR-5
	London Borough of Havering	91% of length in EFR-5
	Thurrock Council	6% of length in EFR-5
Flood Zones crossed by the highway	% of length in Zone 1	96%
	% of length in Zones 2 & 3	4%
Flood defences	N/A	
Source Protection Zone (SPZ)	Catchment EFR-5 lies in SPZ3.	

Note: Length for M25 includes length in slip roads.

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