Lower Thames Crossing

6.1 Environmental Statement Chapter 4 EIA Methodology

APFP Regulation 5(2)(a)

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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Lower Thames Crossing

6.1 Environmental Statement
Chapter 4 EIA Methodology

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4.1 Overview and regulatory context

4.1.1 This chapter describes the general approach followed for the Environmental Impact Assessment (EIA) of the A122 Lower Thames Crossing (the Project), which has been undertaken in accordance with the relevant National Policy Statements and with reference to the Design Manual for Roads and Bridges (DMRB) (Highways England, 2020a) and relevant guidance. More detailed methodologies are provided in the respective environmental topic chapters of this Environmental Statement (ES).

4.1.2 The aims of the EIA process are to:

a. Gather information about the environment of the study area and identify environmental constraints and opportunities associated with the area which may influence, or be affected by, the Project

b. Identify and incorporate into Project design, construction and operation, features and measures to avoid, reduce or remediate adverse impacts, or in some cases to enhance beneficial impacts

c. Identify and assess likely significant residual effects

4.1.3 This ES sets out environmental commitments (mitigation) and likely significant effects of the Project, to inform members of the public and to provide decision makers and statutory consultees with the environmental information needed during the determination of an application for development consent. The ES is submitted as part of the application for development consent.

The EIA regime

4.1.4 European Community Directive 85/337/EEC (EIA Directive) sets out the requirements for the preparation of an EIA for certain types of projects where they are likely to have significant effects on the environment. The original 1985 Directive has been amended three times and those amendments were codified in Directive 2011/92/EU and Directive 2014/52/EU. This forms the EIA regime in Europe and is transposed into UK law for Nationally Significant Infrastructure Projects (NSIPs) in the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations).

4.1.5 The EIA Regulations categorise developments according to their requirement for an EIA. Schedule 1 lists large-scale developments with the potential for significant environmental effects and where an EIA is therefore mandatory. Schedule 2 lists developments that may or may not require an EIA depending on the characteristics and location of the development, and the significance of potential effects.

4.1.6 The requirement for EIA is set out in Schedule 1 of the EIA Regulations (which continue to have effect under s.2(1) of the EU withdrawal Act 2018). EIA is mandatory for all developments involving:

‘*(2) Construction of motorways and express roads.*
(3) Construction of a new road of four or more lanes, or realignment and/or widening of an existing road of two lanes or less so as to provide four or more lanes, where such new road, or realigned and/or widened section of road, would be 10 kilometres or more in a continuous length’.

4.1.7 On the basis that the Project consists of approximately 23km of new road comprising four or more lanes, it is a Schedule 1 development as defined by the EIA Regulations, and requires an EIA.

The Planning Act 2008

4.1.8 Section 22 of the Planning Act 2008 provides that highway-related development will constitute an NSIP if it meets any of the following criteria:

'*(a) construction of a highway in a case within subsection (2),*
(b) alteration of a highway in a case within subsection (3), or
(c) improvement of a highway in a case within subsection (5).'

4.1.9 Subsection (2) further defines the criteria for 'construction of a highway':

'*(2) Construction of a highway is within this subsection only if—*
(a) the highway will (when constructed) be wholly in England,
(b) the Secretary of State or a strategic highways company will be the highway authority for the highway, and
(c) the area of development is greater than the relevant limit set out in subsection (4).'

4.1.10 Subsection (4) clarifies the limits set out in subsection (2)(c):

'*(4) For the purposes of subsections (2)(c) and (3)(c) the relevant limit —*
(a) in relation to the construction or alteration of a motorway, is 15 hectares,
(b) in relation to the construction or alteration of a highway, other than a motorway, where the speed limit for any class of vehicle is expected to be 50 miles per hour or greater, is 12.5 hectares, and
(c) in relation to the construction or alteration of any other highway is 7.5 hectares.'

4.1.11 As the Project meets the criteria under subsections (2) and (4)(b) it qualifies as an NSIP and will be treated as a development for which a Development Consent Order (DCO) is required by part 4, section 31 of the Planning Act 2008:

'*Consent under this Act ("development consent") is required for development to the extent that the development is or forms part of a nationally significant infrastructure project.*'

4.1.12 The Project also involves the installation of an electric line above ground near the A13. Accordingly, as this installation is wholly within England this element of the Project is also an NSIP under sections 14(1)(b) and 16(1)(a) of the Planning Act 2008. None of the exceptions set out in section 16(3) apply to exclude the installation of the electric line above ground as an NSIP, because:

a. The nominal voltage would be above 132kV, the length would be greater than 2km, the distance between the existing line and a new support would be greater than 60m.

b. The Project does not fall under a category of work which would not require a consent under section 37(1) of the Electricity Act 1989 by virtue of the Overhead Lines (Exemption) (England and Wales) Regulations 2009 (as amended).

4.1.13 Annex 2 of the Explanatory Memorandum (Application Document 3.2) provides further information regarding proposed above ground electricity line works for the purposes of section 16 of the Planning Act 2008.

4.1.14 In addition, the Project includes works for three gas pipelines which are NSIPs under sections 14(1)(f) and 20 of the Planning Act 2008. This is because those works entail the construction of a gas transporter pipeline, are to be constructed wholly in England, such works are each likely to have a significant effect on the environment, have a design operating pressure of more than 7 bar gauge and, when constructed, would convey gas for the supply (directly or indirectly) to at least 50,000 customers. Accordingly, for each of these works, each of the conditions in sections 20(2) to (5) of the Planning Act 2008 is satisfied. ES Appendix 1.3: Assessment of proposed gas pipeline works for the purposes of section 20 of the Planning Act 2008 (Application Document 6.3) includes the environmental assessment of the gas pipeline works required as part of the Project for the purposes of determining whether section 20 of the Planning Act 2008 is engaged.

The National Policy Statements

4.1.15 The National Policy Statements (NPSs) set out the policies which will be used by the Secretary of State to make a decision on the application in accordance with the Planning Act 2008. Pursuant to section 104 of the Planning Act 2008, where a NPS has effect, the Secretary of State must decide the application in accordance with any relevant NPS except in certain prescribed circumstances set out in sub-sections (4)–(8).

4.1.16 The National Policy Statement for National Networks (NPSNN) was published in December 2014 (Department for Transport, 2014) and designated by the Secretary of State in January 2015. This sets out the policies relevant to highways NSIPs.

4.1.17 As the Project includes one overhead line diversion NSIP and three gas pipeline diversion NSIPs, it will also be assessed against the following energy policy statements, in accordance with section 104 of the Planning Act 2008:

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

b. National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Department of Energy and Climate Change, 2011b)

c. National Policy Statement for Electricity Networks Infrastructure (EN-5) (Department of Energy and Climate Change, 2011c)

4.1.18 These energy policy statements predominantly reflect the environmental assessment criteria set out in the NPSNN. The NPSNN forms the ‘case-making’ basis for the Project, and the need for nationally significant utilities diversions arises solely from the need for the road element of the Project. National Highways (the Applicant) has taken these policy requirements into account during the development and design of the Project and the preparation of this ES. NPS requirements are set out under each environmental topic, with a number of further requirements in relation to EIA and the assessment of reasonable alternatives. Each relevant chapter of the ES and the relevant associated appendix sets out the NPS requirements and the Project response.

4.1.19 Of particular relevance to this chapter of the ES and the EIA methodology are the requirements set out in Section 4: Assessment principles of the NPSNN and Part 4: Assessment Principles of the NPS EN-1. The information contained in Appendix 4.5 (Application Document 6.3) presents these requirements and the Project response. NPS EN-4 and NPS EN-5 do not include additional requirements over and above those presented in NPS EN-1 for the ES generally, or for EIA methodology. Requirements for the technical environmental topics are presented in NPS EN-4 and NPS EN-5, and these are covered in the relevant environmental topic chapters of this ES and the associated appendices.

4.1.20 An assessment of compliance with all relevant NPS policies is set out in Appendix A of the Planning Statement (Application Document 7.2).

4.2 Standards and guidance

DMRB

4.2.1 The DMRB provides standards, advice notes and other documents relating to the design, assessment and operation of trunk roads, including motorways in the United Kingdom. The DMRB was revised, updated, and restructured from July 2019. Documents within the DMRB covering the general principles of environmental assessment, including screening, scoping, assessment and monitoring and environmental management plans are coded LA 101 to LA 104 (Highways England, 2019a, 2019b, 2020b, 2020c) and LA 120 (Highways England, 2020j) . The DMRB also contains documents setting out the requirements for assessment, reporting and management of impacts for the following topics, in accordance with the EIA Regulations. These documents are coded LA 105 to LA 114.

a. Air quality (LA 105) (Highways England, 2019c)
b. Cultural heritage (LA 106) (Highways England, 2020d)
c. Landscape and visual (LA 107) (Highways England, 2020e)
d. Biodiversity (LA 108) (Highways England, 2020f)
e. Geology and soils (LA 109) (Highways England, 2019d)
f. Material assets and waste (LA 110) (Highways England, 2019e)
g. Noise and vibration (LA 111) (Highways England, 2020g)
h. Population and human health (LA 112) (Highways England, 2020h)
i. Road drainage and the water environment (LA 113) (Highways England, 2020i)
j. Climate (LA 114) Highways England, 2021)

4.2.2 As described in Section 4.3 of this chapter, an environmental Scoping Report (Highways England, 2017) was prepared for the Project in 2017, based on the DMRB guidance published at that time. The updates to the environmental assessment standards within the DMRB, as discussed above, introduced some

changes to the methodologies described within the Scoping Report. A review of the latest DMRB requirements has therefore been undertaken, and each of the environmental topic chapters within this ES includes a discussion on the application of the new DMRB standards to the assessment work completed for the Project. The updates to the DMRB have not reduced the scope of the ES established through submission of the Scoping Report and receipt of the Planning Inspectorate's Scoping Opinion (Planning Inspectorate, 2017), with the exception of minor amendments agreed with prescribed consultees.

4.2.3 In accordance with changes introduced by the EIA Regulations, the DMRB requirements for scoping projects for environmental assessment (LA 103) and environmental assessment and monitoring (LA 104) now include information relating to scoping, and where required, assessment of the effects from heat and radiation, major accidents and disasters and cumulative effects. The DMRB does not currently contain detailed guidance documents for these environmental topics, and the guidance within LA 104 has therefore been supplemented by additional sources where appropriate, as described in ES Chapter 16: Cumulative Effects Assessment and Section 4.10 of this chapter, covering major accidents and disasters. The environmental topic of heat and radiation has been scoped out of assessment, as agreed in the Scoping Opinion.

Other sources of guidance and advice

4.2.4 Other sources of guidance and advice on environmental assessment methodology have been used to supplement the guidance provided within the DMRB. These include the Advice Notes prepared by the Planning Inspectorate to inform applicants, consultees, the public and others on process matters in relation to the Planning Act 2008.

4.2.5 A review has been undertaken by the environmental topic specialists to consider whether the requirements set out in the DMRB are sufficient to enable full assessment of likely significant environmental effects resulting from the Project. Where required, the use of the DMRB in the undertaking of EIA technical assessments has been supplemented by additional EIA guidance. Other topic-specific guidance that has been used is identified in the relevant environmental topic chapters of this ES.

4.2.6 This ES has been prepared in accordance with the requirements contained within National Highways' Project Control Framework (PCF). The PCF sets out how, together with the Department for Transport, National Highways manages and delivers major improvement projects. The PCF sets out a consistent project lifecycle with key decision points and standardised deliverables, which includes the ES and other environmental documents.

4.3 EIA stages

Screening

4.3.1 Under Regulation 8(1) of the EIA Regulations, the applicant for a proposed NSIP is required to either submit a screening request to the Secretary of State or notify the Secretary of State, in writing, of the intention to provide an ES in respect of the proposed NSIP.

4.3.2 A Regulation 8 notification was submitted to the Planning Inspectorate on 2 November 2017, recording the intention to submit an ES for the Project.

Scoping

4.3.3 Regulation 8 also sets out the EIA scoping process, which determines which topics should be included in the ES, and the level of detail to which they should be assessed. National Highways (then known as Highways England) wrote to the Planning Inspectorate on 2 November 2017 to request an opinion on the scope of the information to be included in the ES for the Project.

4.3.4 To inform the Planning Inspectorate's Scoping Opinion, a Scoping Report (Highways England, 2017) was submitted outlining the intended scope of each environmental topic. The published Scoping Report is available on the National Infrastructure Planning website; the link is provided in the references section of this chapter.

4.3.5 The Planning Inspectorate provided their Scoping Opinion (Planning Inspectorate, 2017) on 13 December 2017, which has been taken into account during the preparation of this ES. The published Scoping Opinion is available on the National Infrastructure Planning website; the link is provided in the references section of this chapter.

4.3.6 Appendix 4.1 (Application Document 6.3) contains a copy of the Planning Inspectorate's Scoping Opinion. A response is provided against each of the Planning Inspectorate's comments, explaining how the comment has been addressed in the ES. Appendix 4.1 shows that the Project complies with the Scoping Opinion. Relevant information is also included within each environmental topic chapter.

4.3.7 Further discussions with relevant stakeholders have been carried out, where appropriate, to discuss and agree the scope of the assessments. This has included discussions about updates to, and developments in, guidance, best practice and knowledge, including updates to the DMRB, as identified in Section 4.2.

4.3.8 National Highways has also considered the other stakeholder responses to the scoping consultation (i.e. those not included in the Planning Inspectorate Scoping Opinion) in the development of the EIA process.

4.3.9 The Order Limits have been through several iterations since the scoping process, with each having been communicated to stakeholders and the public through the various consultations held. Further details on the Project consultations are included in ES Chapter 1: Introduction; and the Consultation Report (Application Document 5.1). The Order Limits have evolved as a result of changes to the design following responses received to the consultations, as well as more detailed information regarding the nature of any statutory undertakers' apparatus. The details of the changes to each iteration of the Order Limits have been explained in the materials published during the Project's consultation exercises. The Scoping Opinion remains current and robust. The scope and extent of the study area considered in the Scoping Report was sufficiently broad to accommodate the Order Limits as now presented.

4.4 Assumptions and limitations

4.4.1 General assumptions used throughout the ES, and limitations affecting the assessments are set out below. Further topic specific discussion on relevant assumptions and any other limitations encountered during assessment are as described within the environmental topic chapters of this ES. Acknowledging the assumptions and limitations identified below and elsewhere, the ES is considered robust and in line with relevant legislation, policy, and guidance.

Project flexibility

4.4.2 The assessments presented in this ES are based on the description of the Project as set out in Chapter 2: Project Description. There may be some future minor variations to the Project as design and construction methodologies develop. The Limits of Deviation (LoD) for the Project are summarised within ES Chapter 2: Project Description and set out in Article 6 of the Draft DCO (Application Document 3.1).

4.4.3 The guidance contained within the Planning Inspectorate's (2018a) Advice Note Nine: Rochdale Envelope has been taken into account. In line with the guidance, where there are parameters of the Project design that are not yet fixed, the assessment has considered a reasonable worst-case scenario to provide a robust assessment of the likely significant environmental effects of the Project. The Project design and the flexibility within it is described in Chapter 2: Project Description, of this ES.

Nitrogen deposition compensation sites

4.4.4 The DCO application documents do not specify in detail the design and future management regime for the habitat creation sites proposed as compensation for the effects of nitrogen deposition. The design and management regimes for these locations would be further developed as part of the detailed design, in accordance with the control plan documents including the Outline Landscape and Ecology Plan (OLEMP) (Application Document 6.7), Design Principles (Application Document 7.5) and the Environmental Masterplan (ES Figure 2.4: Application Document 6.2).

4.4.5 Chapter 2: Project Description provides a description of these compensation sites, and the habitat creation works to be undertaken during construction. The environmental assessment of these habitat creation areas has reflected the available design information and the assumed future management requirements. Topic specific assumptions based on the available information are explained within the relevant environmental topic chapters of this ES.

Construction assumptions

4.4.6 The DCO application has been developed on the basis of a 2030 opening year. This assumes consent is granted in 2024. Following the DCO Grant there would be preparatory works, referred to in the draft DCO as preliminary works taking place in 2024. The main construction period for the Lower Thames Crossing would start in early 2025, with the road being open for traffic in late 2030. Construction may take approximately six years, but as with all large projects there is a level of uncertainty over the construction programme, which will be refined once contractors are appointed and as the detailed design is developed.

The 2030 opening year has been selected as the basis for the assessments and is representative of the reasonable worst-case scenario. This has been used consistently across the environmental assessments, transport assessments and the economic appraisal of the Project.

4.4.7 It is anticipated that all construction activities would be complete prior to road opening, however unforeseen delays may result in some minor works, such as demobilisation of construction compounds, continuing after this date. If this were to occur, all works would follow the requirements set out in the control plan documents and it is not anticipated that those works would give rise to material changes in the environmental impacts reported in this ES. The control plan documents and their effect in mitigating, monitoring and controlling the effects of the Project is described in the Introduction to the Application (Application Document 1.3).

4.4.8 The assessments of effects of the Project during construction are based on the construction methodology, which is described within ES Chapter 2: Project Description. The construction methodology may be subject to change during the continuing design process and the detailed design stage. The environmental assessment of construction impacts presented within the ES has taken a precautionary approach thus ensuring that the assessments take into account this potential for minor variation and are representative of the reasonable worst case.

4.4.9 The assessment of construction effects has used a representative scenario from the construction modelling using the Project's transport model. This provides an extensive quantitative assessment of the forecast impact of construction works on the road network, using the same traffic baseline and forecasting work that informs the operational modelling. The construction traffic represented in the Transport Assessment (Application Document 7.9) and within the assessments presented in this ES incorporates details and the spatial extents of the following elements:

a. Heavy Goods Vehicle (HGV) movements associated with the construction of the Project

b. Vehicle movements associated with staff attending the construction sites

c. Temporary traffic management measures associated with:

    i. The construction of the new junctions with the A2/M2, A13/A1089 and M25

    ii. The construction of new structures over existing highways

    iii. The modification of existing roads

    iv. Construction and use of access routes to the construction sites

    v. Utilities diversions and new utility connections required for the Project

Surveys

4.4.10 The survey data used in the assessments has been collated from various sources including onsite surveys, desk-based assessments and information provided by stakeholders and third parties. The data used in the assessments

presented in this ES has been interpreted using professional judgement recognising potential limitations including the age of the information, and the potential sources. Further information is provided in the relevant environmental topic chapter. Where required, the data would be subject to validation surveys and pre-construction surveys. These would confirm assumptions made and support production of pre-construction deliverables such as protected species licences and the development of the Second Iteration of the Environmental Management Plan (EMP2).

4.4.11 The ES was prepared partly during the time when the COVID-19 pandemic affected the UK. The Project had concluded most of the survey work required before March 2020 when government restrictions were put in place. Some surveys did experience delays due to COVID-19, however, these have been updated where relevant and this has not affected the overall assessment of impact of the Project.

Assessment of use of the River Thames

4.4.12 The use of the river by Project vessels and material supply vessels has been considered in this EIA. Chapter 2: Project Description of this ES describes the proposed use of the River Thames for material import. Within each topic chapter of this ES, a section is included on ‘use of the river’. These sections explain the relevance, if any, of vessel movements associated with the Project to the topic in question, and, where relevant, include a qualitative assessment of any effects.

4.4.13 As a result of these assessments, no significant environmental effects resulting from vessel movements have been identified.

4.4.14 Material supply vessels have been excluded from the preliminary Navigation Risk Assessment (pNRA) (Application Document 7.15), although Project vessels were included. Project vessels are those that would be used for temporary works site investigations and during temporary construction works. The reason for the exclusion of material supply vessels from the pNRA is that the imports would be to existing established facilities. The use of established facilities would not give rise to the use of any vessels or any additional vessel movements that would not otherwise be likely to occur in the absence of the Project. Therefore, these movements would be within the parameters of existing navigational risk assessments undertaken by the Port of London Authority (PLA) and any other Statutory Harbour Authority (SHA) (eg PoTLL if movements enter their limits). This position was agreed with the PLA and PoTLL in a meeting on 10 May 2021.

4.5 Overview of EIA process

Study area

4.5.1 The study areas for the Project vary by environmental topic and are defined within the respective chapters of the ES. These are generally based on the geographical scope of the potential impacts on receptors/resources and the relevant topic-specific criteria. However, the study area for certain environmental topics is also informed by the outcomes of the traffic modelling.

Baseline and future conditions

Existing baseline

4.5.2 DMRB LA 104 (Highways England, 2020c) defines the baseline scenario as '*a description of the current state of the environment without implementation of the project*'. Baseline information has been collated to understand the existing environment and inform the assessment of impacts on environmental receptors that would be caused by the Project, and to identify any potential significant effects.

4.5.3 When describing the baseline environmental conditions, this includes the sensitivity, value or importance of receptors that may be affected by the Project.

4.5.4 Each environmental topic has used relevant data-gathering methods and followed topic-specific guidelines to identify and report baseline conditions. This has involved conducting desk-based studies, undertaking specialist surveys where appropriate and engaging with stakeholders both to agree those methods of data collection and also to obtain data they hold. The EIA Scoping Opinion has informed the data gathering and the surveys that have been undertaken.

Future baseline

4.5.5 For each of the environmental topics it is necessary to consider whether the current baseline conditions may change in the absence of the Project. Changes to the existing baseline conditions may occur due to a combination of natural influences (such as climate change) and human influences (such as new developments and changes in land use). DMRB LA 104 defines the future baseline scenario as '*an outline of the likely evolution of the current state of the environment without implementation of the project*'. The future baseline conditions are the predicted future conditions that would exist in the absence of the proposed scheme during construction and operation phases.

4.5.6 How the existing baseline conditions would change and evolve without the implementation of the proposed scheme has been assessed as part of the EIA. The future baseline conditions, applicable to each of the topic chapters, are reported in the environmental topic chapters. There are several development proposals within the study area that have been considered during the development of the Project. A list of committed and planned future developments within the study area has been produced for the cumulative effects assessment, as set out in Chapter 16: Cumulative effects assessment. Further information on other committed developments that are included in the Project traffic model is set out in the Transport Forecasting Package (Appendix C of the Combined Modelling and Appraisal Report (ComMA) (Application Document 7.7)).

Assessment years and scenarios

4.5.7 The assessment of effects involves comparing the situation with and without the Project. For certain topics, the effects need to be reported for the Do-Minimum (i.e. without the Project) and Do-Something (i.e. with the Project) scenarios, identifying changes for a baseline year and a future assessment year or a series of future assessment years.

4.5.8 The Do-Minimum scenario represents the future baseline with minimal interventions and without new infrastructure associated with the Project. The baseline year represents the conditions prior to construction starting. For the purposes of assessment, construction of the Project is assumed to start in 2024, with the Project road expected to open in 2030.

4.5.9 The future assessment year, or years, are as defined in the methodology for each environmental topic assessment presented in the relevant environmental topic chapter of this ES.

4.5.10 The highway element of the Project would be specified to provide a maximum design life of 40 years, and the tunnel would be specified to provide a design life of 120 years. There is no expectation that the permanent structures and the tunnel would be decommissioned in the foreseeable future. Decommissioning of temporary construction elements of the Project (for example construction compounds or temporary watercourse crossings) is considered as part of the assessment of construction effects. Demolition and decommissioning of existing structures and buildings are also considered as part of the assessment of construction effects in the relevant environmental topic chapters of this ES.

4.5.11 The Project would be designed to maximise the scope for materials reuse in the event of decommissioning of its components. However, due to the long design life of the Project it is not considered appropriate for decommissioning to form part of each environmental topic assessment. The Scoping Opinion provided by the Planning Inspectorate in December 2017 agreed that decommissioning should be scoped out of the ES assessments.

Transport modelling

4.5.12 Transport modelling using the Lower Thames Area Model (LTAM) and a Transport Assessment (Application Document 7.9) have been prepared and have informed and provided the relevant data for the assessments within the ES. Chapter 2: Project Description provides a summary of the transport modelling for both the construction and operation phases. More detailed information is provided in the Combined Modelling and Appraisal Report (Application Document 7.7), and the Traffic Forecasts Non-Technical Summary (Application Document 7.8). The Transport Assessment (Application Document 7.9) provides a forecast of the impacts of the Project on the performance of the transport system including the public transport network in the area and Public Rights of Way (PRoWs) as well as the highway network.

Identification of likely significant effects

4.5.13 Schedule 4 of the EIA Regulations requires the ES to include a description of the likely significant environmental effects of the Project, including the existence of the development, the use of natural resources, the emission of pollutants, the creation of nuisances and the elimination of waste.

4.5.14 The effects may be negative (adverse) or positive (beneficial) and can be described as follows:

a. Direct or primary effects: caused by activities which are an integral part of the Project resulting in a change in environmental conditions, for example loss of habitat

b. Indirect or secondary effects: due to activities that affect an environmental condition or receptor, which in turn affects other aspects of the environment or receptors, for example settlement of a feature as a result of dewatering during construction

c. Cumulative: comprising multiple effects from different sources within the Project, or in combination with other developments, on the same receptors

d. Residual: effects that remain after the positive influence of mitigation measures is taken into account

e. Temporary: effects that would last for a limited duration, for example a closure of a footpath during part of the construction phase

f. Permanent: effects that would remain consistent and not alter over time

g. Transboundary: effects that the activities of one European Economic Area (EEA) state may have on the environment or interests of another.

4.5.15 The assessment of environmental effects in the ES has considered the following factors:

a. The receptors/resources (natural and human) which would be affected and the pathways for such effects

b. The geographic importance, sensitivity, or value of receptors/resources

c. The duration (long or short term), permanence (permanent or temporary) and changes in significance (increase or decrease)

d. Reversibility (i.e. is the change reversible or irreversible)

e. Environmental and health standards (e.g. local air quality standards)

f. Feasibility and mechanisms for delivering mitigating measures

Temporal scope

4.5.16 The environmental assessment uses defined temporal scopes to characterise the duration of potential effects. The temporal scope refers to the time periods over which impacts may be experienced by receptors.

4.5.17 Temporary (short- and medium-term) effects are typically those associated with demolition and construction works, and permanent (long-term) effects are typically those associated with the completed and operational development. The topic specific definitions for short, medium (where required for the topic) and long term are provided in the environmental topic chapters.

Significance of effects

4.5.18 The general approach to assessment is based on the determination of likely significant effects from a combination of the sensitivity (or value, importance) of the baseline conditions and the magnitude of potential changes.

Value (sensitivity) and impact magnitude

4.5.19 The environmental topic chapters of this ES describe any topic-specific criteria used to assign categories of value (sensitivity) and impact magnitude. Typical descriptions are set out in Table 4.1 and Table 4.2 respectively. These are reproduced from DMRB LA 104 (Highways England, 2020c).

4.5.20 Assessments against these criteria have been made using review of baseline data, application of relevant legislation and guidance, professional judgement of competent experts and consultation with relevant stakeholders.

Table 4.1 Environmental value (sensitivity) and descriptions

Value (sensitivity) of receptor/resource	Typical description
Very high	Very high importance and rarity, international scale and very limited potential for substitution
High	High importance and rarity, national scale and limited potential for substitution
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution
Low	Low or medium importance and rarity, local scale
Negligible	Very low importance and rarity, local scale

Table 4.2 Magnitude of impact and typical descriptions

Magnitude of impact (change)	Typical description	
Major	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction

Significance of effects matrix

4.5.21 Significance of effects have been determined taking into account the identified value (sensitivity) and impact magnitude, using a matrix approach as set out in DMRB LA 104 (Highways England, 2020c). This matrix is reproduced in Table 4.3 and descriptions of the significance categories in the matrix are provided in Table 4.4. Where appropriate, some environmental topic chapters have used a topic-specific matrix, and not the significance matrix shown in Table 4.3. This is detailed in the assessment methodology section of the appropriate environmental topic chapters.

4.5.22 As noted in DMRB LA 104, effects considered significant in the context of the EIA Regulations are typically those of moderate or higher significance.

Table 4.3 Significance matrix

Environmental value (sensitivity)	Magnitude of impact (degree of change)				
	No change	**Negligible**	**Minor**	**Moderate**	**Major**
Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

Table 4.4 Significance categories and typical descriptions

Significance category	Typical description
Very large	Effects at this level are material in the decision-making process
Large	Effects at this level are likely to be material in the decision-making process
Moderate	Effects at this level can be considered to be material decision-making factors
Slight	Effects at this level are not material in the decision-making process
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error

4.6 Project design and mitigation

4.6.1 Environmental considerations have influenced the Project throughout the design development process, from early route options assessment described in Chapter 3: Assessment of Reasonable Alternatives, through to design refinement to reach the Project design as described in Chapter 2: Project Description of this ES. An iterative process has facilitated design updates and improvements, informed by environmental assessment and input from the Project engineering teams, stakeholders and public consultation. The design of

the Project and its integration into the surrounding environment through the application of 'good design' is discussed in detail in the Design Principles (Application Document 7.5) and the Sustainability Statement (Application Document 7.11).

4.6.2 Mitigation measures included in this ES have been developed using the hierarchical system described in DMRB LA 104 (Highways England, 2020c), as follows:

a. Avoidance and prevention: design and mitigation measures to prevent the effect (for example, alternative design options or avoidance of environmentally sensitive sites)

b. Reduction: where avoidance is not possible, then mitigation is used to lessen the magnitude or significance of effects

c. Remediation: where it is not possible to avoid or reduce a significant adverse effect, these are measures to offset the effect

4.6.3 The Project includes a range of environmental commitments as part of its DCO application. These are identified within each environmental topic chapter of this ES and fall within the following categories:

a. Embedded mitigation: measures that form part of the engineering design, developed through the iterative design process summarised above.

b. Good practice: standard approaches and actions commonly used on infrastructure projects to avoid or reduce environmental impacts, and typically applicable across the whole Project.

c. Essential mitigation: any additional Project-specific measures needed to avoid, reduce or offset potential impacts that could otherwise result in effects considered significant in the context of the EIA Regulations. Essential mitigation has been identified by environmental topic specialists, taking into account the embedded mitigation and good practice commitments.

4.6.4 Environmental mitigation is secured within the control plan documents. The control plan is the framework for mitigating, monitoring and controlling the effects of the Project. It is made up of a series of 'control documents' which present the mitigation measures identified in the application that must be implemented during design, construction and operation to reduce the adverse effects of the Project. Further explanation of the control plan and the documents which it comprises is provided in the Introduction to the Application (Application Document 1.3).

4.6.5 The embedded environmental mitigation measures identified through the iterative design development process would be secured through commitments made within the Design Principles (Application Document 7.5) or as features presented on Figure 2.4: Environmental Masterplan (Application Document 6.2).

4.6.6 Good practice and essential environmental mitigation would be secured through their inclusion in the Register of Environmental Actions and Commitments (REAC). The REAC forms part of Appendix 2.2: Code of Construction Practice (CoCP) (Application Document 6.3). The CoCP provides a framework to manage the onsite construction activities, including those that may affect the environment. The key aims of the CoCP are to ensure that environmental mitigation measures, DCO requirements and any necessary consents and licences are implemented and complied with, to minimise and manage the risk of adverse environmental impacts.

4.6.7 The assessment reported within each environmental topic chapter of the ES determines the likely significance of residual effects, taking into account embedded mitigation, good practice and essential mitigation.

4.6.8 Enhancement measures have been directly incorporated into the Project as part of the application of 'good design' principles. Enhancements are measures that are considered to be over and above any measures to avoid, reduce or remediate adverse impacts of the Project. Where beneficial effects arise as a consequence of this good design process these have been identified within the ES.

4.6.9 The design and delivery of enhancement opportunities would respond to the following items:

a. National and local policy requirements

b. Policy and performance requirements of the overseeing organisation

c. Scheme specific objectives.

4.7 Cumulative effects

4.7.1 In accordance with the requirements of the EIA Directive, the ES includes assessment of cumulative effects, which include those from:

a. The Project (such as numerous different effects impacting a single receptor). These are described as intra-project effects.

b. Different projects (effects from other developments together with the Project being assessed). These are described as inter-project effects.

4.7.2 The inter-project and intra-project assessment methodologies and effects are reported in ES Chapter 16: Cumulative Effects Assessment.

4.8 Monitoring and management

4.8.1 DMRB LA 104 (Highways England, 2020c) states that '*Where ESs conclude that there are significant adverse environmental effects, projects must undertake proportionate monitoring of associated mitigation measures, in accordance with the EIA Directive* […] *The purpose of monitoring is to:*

1) ensure measures envisaged to avoid, prevent or reduce and, if possible, offset significant adverse effects on the environment are delivered;
2) build data on the effectiveness of design and mitigation measures thereby driving improvement in environmental performance for future projects;

3) satisfy licence / permit requirements (where applicable); and
4) identify remedial action as a consequence of underperformance or failure of mitigation.'

4.8.2 Any monitoring requirements are reported within the relevant environmental topic chapter. Where monitoring is proposed, it is designed to be proportionate to the nature, location and size of the Project and the significance of its effects on the environment.

4.8.3 The environmental monitoring requirements, including the durations, are outlined in the REAC within the CoCP (Application Document 6.3) and will be incorporated into the Environmental Management Plans produced for construction and handover stages.

4.9 Transboundary impacts

4.9.1 Schedule 4, paragraph 5 of the EIA Regulations requires that a description of the likely significant transboundary effects be provided in the ES. The Project lies within the counties of Essex and Kent and the Thurrock unitary authority area. The nearest EEA state is France, approximately 110km away across the English Channel. Given this separation, it is considered that no transboundary effects could arise from the construction and operation of the Project, and this is therefore not considered further in this ES. This is consistent with the Scoping Opinion on transboundary impacts. Transboundary screening was also undertaken by the Planning Inspectorate in April 2018 (Planning Inspectorate, 2018b) which concluded that the Project is not likely to have significant effects on the environment in another EEA state.

4.10 Major accidents and disasters

4.10.1 The requirement to consider major accidents and disasters as part of the EIA process was established by the amended EIA Directive 2014/52/EU, as transposed into UK law by the EIA Regulations. The assessment considers extreme incidents during construction and operation, relevant to the project, that would only very rarely occur (or mitigation, management or regulatory controls would be in place to prevent the occurrence). Major accidents and disasters are collectively referred to as 'Major Events' within this ES.

4.10.2 In general, Major Events, as they relate to the Project, fall into three categories:

a. Events that could not realistically occur, due to the type of Project or its location

b. Events that could realistically occur, but for which the Project, and associated receptors, are no more vulnerable than any other development

c. Events that could occur, and to which the Project is particularly vulnerable, or to which the Project has a particular capacity

4.10.3 The Scoping Report for the Project (Highways England, 2017) proposed that the individual topic chapters of the ES would report on Major Events. Subsequent consideration through the EIA process confirmed that all Major Events are either already considered as part of the standard assessment for the

topic chapters (where there is a potential related environmental effect), or the design and mitigation measures of the Project are such that no significant risk of adverse effects from Major Events is predicted. The results of the Major Events assessment are therefore set out in Appendices 4.2 and 4.3 (Application Document 6.3), with an overview of the methodology provided in this chapter.

4.10.4 DMRB LA 104 (Highways England, 2020c) states that Major Events shall include both man-made and naturally occurring events. The assessment of Major Events shall consider:

a. The vulnerability of the Project to Major Events

b. The Project's potential to cause Major Events

4.10.5 In September 2020, the Institute of Environmental Management & Assessment (IEMA) released a primer on Major Accidents and Disasters. The aim was to increase awareness of the topic and its application within all stages of EIA (IEMA, 2020). The guidance sets out the following stages to approach the assessment:

a. Screening – establish if a development has a vulnerability to major accidents and/or disasters, and to consider whether a development could lead to a significant effect.

b. Scoping – determine in more detail whether there is potential for significant effects as a result of major accidents and/or disasters associated with a development, and the resulting scope of – and approach to – the assessment if required. Do existing design measures or legal requirements, codes and standards adequately control the potential major accident and/or disaster, or will it be adequately covered/assessed by another topic? If the answer is no – scope the topic in, and further assessment is likely to be needed. If yes – scope the topic out, and signpost to these measures/assessments.

c. Assessment – set out the baseline, identify reasonable worst-case impact, select the grouped Risk Events that need further assessment, and understand the likelihood of a Risk Event happening.

    i. Mitigation – identify the requirements for secondary mitigation, and the risk management options

    ii. Residual assessment – demonstrate how secondary mitigation reduces the likelihood and/or significance of the reasonable worst-case impact occurring to an acceptable levelThis guidance document was taken into consideration when completing the assessment.

4.10.6 Based on adopted guidance specific to Major Events, the following three-stage methodology is based on EIA good practice and professional judgement:

a. Stage 1 – collation of a long list of possible Major Events within a 3km study area. In accordance with IEMA guidance, the study area has been based

on the nature of potential Major Events that could be associated with the Project, as well as the range of potential receptors present and environmental baseline conditions. This stage included a review of information provided by the Planning Inspectorate in the Scoping Opinion and responses from statutory and non-statutory consultees. It also included an initial review of potential receptors to identify any that could justifiably be excluded from assessment – Major Events with little relevance in the UK (for example, famine) were not included. The long list drew on a variety of sources, including the National Risk Register of Civil Emergencies (Cabinet Office, 2017), the Public Summary of Sector Security and Resilience Plans (Cabinet Office, 2018) and professional judgement.

b. Stage 2 – screening review of the long list to consider the relevance of each possible Major Event to the Project, and therefore whether they should be included on a Project-specific short list of those requiring further consideration at Stage 3. This required a series of discussions with environmental topic leads as well as representatives from the Project design and operational teams. Appendix 4.2: Major Accidents and Disasters Long List (Application Document 6.3) presents the findings of Stages 1 and 2.

c. Stage 3 – detailed consideration of the short list of Major Events to consider reasonable worst case environmental risks and whether these could be resolved through Project design, legal protection, operational requirements, and/or mitigation. Appendix 4.3: Major Accidents and Disasters Short List (Application Document 6.3) presents the findings of Stage 3. This stage includes identifying any requirements for secondary mitigation (where appropriate) and establishes if further residual assessment is required.

4.10.7 Stage 3 of the assessment did not identify any significant risk of adverse effects from Major Events.

4.11 Transport and traffic assessment

4.11.1 The EIA Regulations do not identify a requirement for the assessment of effects from transport and traffic. Whilst it is acknowledged that many ESs prepared for NSIPs include a chapter reporting the effects of a transport and traffic assessment, a chapter has not been included within this ES. This is because it is considered that the scope of relevant assessments, as identified below, is sufficiently covered within the various documents presented as part of the DCO application, such as ES Chapter 13: Population and Human Health and the Health and Equalities Impact Assessment (Application Document 7.10).

4.11.2 The Transport Assessment (Application Document 7.9) presents the assessment of the effects from the construction and operation of the Project on the transport networks. This includes the information that is derived from the transport modelling, for example changes in traffic flow, volume and capacity, effects on journey time, public transport, accidents and road safety. The

Transport Assessment presents how the following transport networks are affected during both construction and operation:

a. Highways

b. Public transport (including buses and coaches, rail, and river users)

c. Walkers, cyclists, and horse riders

4.11.3 ES Chapter 13: Population and Human Health presents the assessment of how environmental receptors would be affected by the changes to the transport network reported in the Transport Assessment. The Population and Human Health chapter is supported by further detail available in the Health and Equalities Impact Assessment (Application Document 7.10).

4.11.4 Appendix 4.4: Traffic and Transport Assessment (Application Document 6.3) identifies the assessments that would be included in the typical scope of a transport and traffic ES chapter and provides signposts to where this information is made available within the ES and other application documents. The scope is as listed below:

a. Severance

b. Pedestrian/cyclist delay and amenity

c. Driver delay

d. Accidents and safety

e. Public transport

f. Hazardous loads

g. Driver stress

Transport model outputs

4.11.5 In addition to the traffic and transport assessment appendix discussed above, outputs from the construction and operation transport modelling and the Transport Assessment (Application Document 7.9) have been used to inform the assessments presented in the following ES chapters:

a. Chapter 5: Air Quality. Transport modelling outputs have informed the assessment of construction and operation phase effects on air quality.

b. Chapter 6: Cultural Heritage. Transport modelling outputs have been used in the assessment of effects from vehicle movements associated with construction activities on designated heritage assets.

c. Chapter 7: Landscape and Visual. Transport modelling outputs have informed the assessment of indirect effects from traffic and noise on the Kent Downs Area of Outstanding Natural Beauty during construction and operation.

d. Chapter 8: Terrestrial Biodiversity. Transport modelling outputs have been used indirectly as part of the assessment of the effects from nitrogen deposition (including ammonia) on designated sites during construction and operation.

e. Chapter 12: Noise and Vibration. Transport modelling outputs have informed the assessment of construction and operation phase effects on noise and vibration.

f. Chapter 13: Population and Human Health. This chapter does not directly use the transport model outputs, but interprets the conclusions drawn by other assessments which have used it. This includes the air quality and noise assessments and the assessment of effects on transport networks presented in the Transport Assessment (Application Document 7.9), as discussed above.

g. Chapter 14: Road Drainage and the Water Environment. Outputs from the operational transport modelling are used as part of the drainage and pollution risk assessments for both surface waters and groundwater. These assessments are presented in Appendix 14.3: Operational Surface Water Drainage Pollution Risk Assessment (Application Document 6.3) and in Annex 15 of the Hydrological Risk Assessment (Appendix 14.5, Application Document 6.3).

h. Chapter 15: Climate. The outputs from the Transport Analysis Guidance TAG (Department for Transport, 2021) greenhouse gas emissions assessment have informed the assessments reported within the chapter.

i. Chapter 16: Cumulative Effects Assessment. Construction and operation traffic data has been used indirectly through the use of the assessments listed above to inform the conclusions on cumulative effects.

4.11.6 A more detailed description of the use of the outputs from the Project's transport model within the assessments is provided within the relevant environmental topic chapters and associated appendices.

4.12 Structure of the Environmental Statement

4.12.1 The full ES comprises four DCO application documents, as follows:

a. Application Document 6.1 – chapters reporting the environmental assessment, as listed below

b. Application Document 6.2 – drawings ('figures'), photographs and other illustrative material to support the chapters

c. Application Document 6.3 – technical appendices

d. Application Document 6.4 – Non-Technical Summary (NTS)

4.12.2 The structure of Application Document 6.1 is as follows:

a. Chapter 1: Introduction
b. Chapter 2: Project Description
c. Chapter 3: Assessment of Reasonable Alternatives
d. Chapter 4: EIA Methodology
e. Chapter 5: Air Quality
f. Chapter 6: Cultural Heritage
g. Chapter 7: Landscape and Visual
h. Chapter 8: Terrestrial Biodiversity
i. Chapter 9: Marine Biodiversity
j. Chapter 10: Geology and Soils
k. Chapter 11: Material Assets and Waste
l. Chapter 12: Noise and Vibration
m. Chapter 13: Population and Human Health
n. Chapter 14: Road Drainage and the Water Environment
o. Chapter 15: Climate
p. Chapter 16: Cumulative Effects Assessment
q. Chapter 17: Summary

4.12.3 The structure of the environmental topic chapters is as follows:

a. Introduction
b. Legislative and policy framework
c. Assessment methodology
d. Baseline conditions
e. Project design and mitigation
f. Assessment of likely significant effects
g. Cumulative impacts
h. Monitoring
i. Summary

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