

# East Anglia Green Energy Enablement (GREEN)

EIA Scoping Report

November 2022

national**grid**

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## Abbreviations

AA	Appropriate Assessment
AADT	Annual Average Daily Traffic
AC	Alternating Current
AIL	Abnormal Indivisible Loads
AQAL	Air Quality Assessment Level
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
ATN	Automatic Traffic Counts
BAP	Biodiversity Action Plan
BMV	Best and Most Versatile
BNG	Biodiversity Net Gain
BNL	Basic Noise Level
BPM	Best Practicable Means
BRES	Business Register and Employment Survey
CGS	County Geodiversity Sites
CIEEM	Chartered Institute of Ecology and Environmental Management
CLVIA	Cumulative Landscape and Visual Impact Assessment
CoCP	Code of Construction Practice
COMAH	Control of Major Accident Hazards
CPRSS	Corridor Preliminary Routeing and Siting Study
CRTN	Calculation of Road Traffic Noise
CSEC	Cable Sealing End Compound
CTMP	Construction Traffic Management Plan
CWS	County Wildlife Site
DBA	Desk Based Assessment
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
DEFRA	Department of Environment, Food and Rural Affairs
DfT	Department for Transport



DLL	District Level Licensing
DMRB	Design Manual for Roads and Bridges
DNO	Distribution Network Operators
EAC	East Anglia Connection
EEA	European Economic Area
EC	European Commission
EcIA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
EMF	Electric and Magnetic fields
EPS	European Protected Species
ES	Environmental Statement
ESO	Electricity System Operator
EU	European Union
FWRA	Foundation Works Risk Assessment
FEED	Front End Engineering Design
FLL	Functionally Linked Land
FRA	Flood Risk Assessment
GCN	Great crested newt
GCR	Geological Conservation Review
GHG	Green House Gas
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GP	General Practitioner
GREEN	Green Energy Enablement
GWDE	Groundwater Dependent Terrestrial Ecosystem
HER	Historic Environment Record
HGBI	Herpetofauna Groups of Britain and Ireland
HGV	Heavy Goods Vehicle
HPIE	Habitats of Principal Importance in England
HRA	Habitats Regulations Assessment
HVDC	High Voltage Direct Current
IACPC	Impact Assessment and Conservation Payment Certificate
IAQM	Institute of Air Quality Management
ICNIRP	International Commission on Non-Ionizing Radiation Protection

IDB	Internal Drainage Board
IEMA	Institute of Environmental Management and Assessment
IIA	Integrated Impact Assessment
INNS	Invasive Non-Native Species
IPC	Infrastructure Planning Commission
IRZ	Impact Risk Zones
kV	Kilovolt
LBAP	Local Biodiversity Action Plan
LCA	Landscape Character Assessment
LCT	Landscape Character Type
LEMP	Landscape and Ecology Management Plan
LGS	Local Geological Site
LI	Landscape Institute
LIDAR	Laser Imaging Detection and Ranging
LNR	Local Nature Reserves
LoD	Limits of Deviation
LOAEL	Lowest Observed Adverse Effect Level
LONI	Letters of No Impediment
LPA	Local Planning Authority
LSOA	Lower Super Output Area
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
MAGIC	Multi-agency Geographic Information for the Countryside
MCA	Mineral Consultation Areas
MCC	Manual Classified Counts
MITTS	Main Interconnected Transmission System
MPS	Marine Policy Statement
MRA	Minerals Resource Assessment
MSAs	Mineral Safeguarding Areas
NERC	Natural Environment and Rural Communities
NETS	National Electricity Transmission System
NETS SQSS	National Electricity Transmission System Security and Quality of Supply Standard
NGC	National Grid Company

NGET	National Grid Electricity Transmission
NGR	National Grid Reference
NHLC	National Historic Landscape Characterisation
NIA	Noise Important Area
NNR	National Nature Reserve
NOA	Network Options Assessment
NVC	National Vegetation Classification
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NPSE	National Policy Statement for England
NSIP	Nationally Significant Infrastructure Project
NSR	Noise Sensitive Receptors
NTS	National Transmission System
OHID	Office of Health Inequalities and Disparities
OHL	Overhead Lines
ONS	Office for National Statistics
OS	Ordnance Survey
PBDE	Polybrominated diphenyl ethers
PHE	Public Health England
PPG	Planning Practice Guidance
PPE	Personal Protective Equipment
PRA	Preliminary Roost Assessment
PR	Potential Roost Assessment
PRoW	Public Right of Way
RBD	River Basin District
RBMP	River Basin Management Plan
RIGS	Regionally Important Geological Site
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SLA	Special Landscape Area
SOAEL	Significant Observed Adverse Effect Level
SuDS	Sustainable Drainage System
SGT	Super Grid Transformer

SNCI	Site of Nature Conservation Importance
SQSS	Security and Quality of Supply Standard
SPA	Special Protection Area
SPZs	Source Protection Zone
SRN	Strategic Road Network
SRP	Soil Resources Plan
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Urban Drainage Systems
TA	Transport Assessment
TAR	Transport Assessment Reports
TEMPro	Trip End Model Presentation Program
TGM	Thematic Group Meeting
TGN	Technical Guidance Note
TPO	Tree Preservation Order
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UXO	Unexploded Ordnance
WER	Water Environment Regulations
WFD	Water Framework Directive
WSI	Written Scheme of Investigation
WWII	World War 2
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility
μT	Microteslas

# 1 Introduction

## 1.1 Overview of the Project

- 1.1.1 National Grid Electricity Transmission (NGET referred to as National Grid within this Scoping Report) owns and maintains the national high-voltage electricity transmission network throughout England and Wales.
- 1.1.2 The transmission network connects the power from where it is generated to the regional Distribution Network Operators (DNO) who then supply businesses and homes.
- 1.1.3 National Grid holds the Transmission Licence for England and Wales and their statutory duty is to develop and maintain an efficient, co-ordinated and economical system of electricity transmission and to facilitate competition in the generation and supply of electricity, as set out in the Electricity Act 1989.
- 1.1.4 As a licence holder National Grid has specific duties to uphold in relation to the desirability of preserving amenity of certain aspects of the environment and mitigating any effect which its proposals would have on the natural beauty of the local environment under Section 38 and Schedule 9 of the Electricity Act 1989.
- 1.1.5 The East Anglia Green Energy Enablement (GREEN) Project would facilitate the transfer of power from the East Anglia region to the rest of the Main Interconnected Transmission System (MITS) thereby enabling connection of offshore wind generation, nuclear power generation and interconnectors which are expected into East Anglia by 2035.
- 1.1.6 The Project comprises a 400 Kilovolt (kV) electricity transmission line over a distance of approximately 180 Kilometres (km) (hereafter known as the 'Project').
- 1.1.7 The Project would include:
- A new 400kV electricity transmission line, majority being overhead lines (OHL), of approximately 180km
  - New undergrounding of 400kV cabling (approximately 10km) is also proposed in particular through the Dedham Vale Area of Outstanding Natural Beauty (AONB)
  - New Cable Sealing End Compounds (CSEC) to connect the OHLs to the underground cables
  - A new 400kV connection substation
  - Works at Norwich Main, Bramford and Tilbury Substations
  - Temporary works associated with construction of the Project
- 1.1.8 In addition, third party utilities diversions and / or modifications may also be required to facilitate the construction of the Project. Further details would be included within the Environmental Statement (ES).
- 1.1.9 Further details of the Project are included within Chapter 4: Description of the Project.
- 1.1.10 The Project would facilitate the transfer of power from the East Anglia region to the rest of the Main Interconnected Transmission System (MITS) thereby enabling connection of offshore wind generation, nuclear power generation and interconnectors which are expected into East Anglia by 2035.
- 1.1.11 The Project is a Nationally Significant Infrastructure Project (NSIP) as defined under

Part 3 Section 14 and Section 16 of the Planning Act 2008 as it meets the criteria:

- *‘Section (14)(1) In this Act “nationally significant infrastructure project” means a project which consists of any of the following—...*
  - (b) the installation of an electric line above ground...’
- *‘Section (16)(1) The installation of an electric line above ground is within section 14(1)(b) only if (when installed) the electric line will be— (a) wholly in England...’*
- The Act also lists out specific exemption criteria if a new electric line does not constitute an NSIP. The exemption criteria together with Project commentary includes:
- (3) *The installation of an electric line above ground is not within section 14(1)(b)—*
  - (a) if the nominal voltage of the line is expected to be less than 132 kilovolts, (aa) if the length of the line (when installed) will be less than two kilometres, (ab) if— (i) the line will replace an existing line....
  - (b) to the extent that (when installed) the line will be within premises in the occupation or control of the person responsible for its installation...
  - (c) if section 37(1) of the Electricity Act 1989 (consent required for overhead lines) does not apply to it by virtue of the Overhead Lines (Exemption) (England and Wales) Regulations 2009 (S.I. 2009/640), as amended by the Overhead Lines (Exempt Installations) (Consequential Provisions) Order 2010.]

1.1.12 The Project does not meet any of the exemption criteria, therefore is an NSIP.

1.1.13 National Grid intends to submit an application for the granting of an order for development consent to the Secretary of State for the East Anglia Green Energy Enablement (GREEN) Project as it comprises a 400 Kilovolt (kV) electricity transmission line over a distance of approximately 180 Kilometres (km) (hereafter known as the ‘Project’).

1.1.14 The Project also constitutes Environmental Impact Assessment (EIA) development as defined in the Infrastructure Planning EIA Regulations 2017 (the ‘EIA Regulations’). The Project falls within Schedule 1 paragraph 20 of the EIA Regulations, ‘Construction of overhead electrical power lines with a voltage of 220 kV or more and a length of more than 15 km’. Consequently, an assessment of the impacts of the Project on the environment is required.

## 1.2 The need for the Project

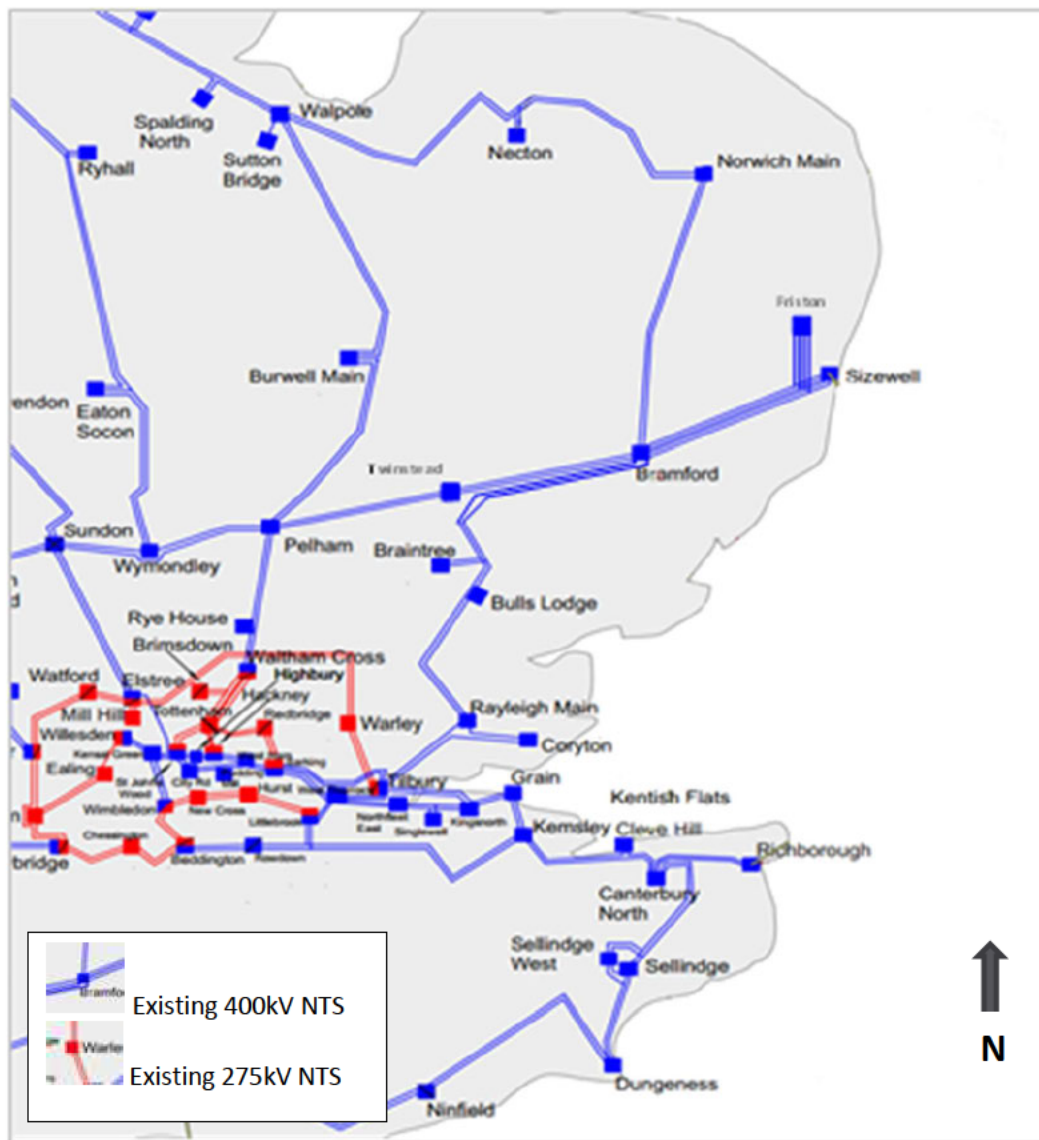
1.2.1 New connections for new offshore wind and nuclear power generation projects and interconnectors are expected to be constructed in East Anglia by 2035. These are being constructed or expected to be fed into substations at Necton, Norwich Main, Bramford, Friston and Sizewell. Additionally, agreements are in place with two offshore wind farm projects on the basis of their connection into a new East Anglia Connection Node substation (EAC). National Grid has a duty to facilitate new connections and maintain a safe National Transmission System (NTS) and has considered the capability of the existing network to support proposed new connections.

1.2.2 The need for the Project is to facilitate the transfer of additional energy into the network in order to support the UK Government's target of tackling the climate emergency’ and achieving net zero by 2050. As part of this, the UK Government has an ambition of

achieving 50 Gigawatts (GW) plus of offshore wind power by 2030. The Project would provide offshore connection points to incorporate this within the energy transmission network.

1.2.3 National Grid Electricity System Operator (ESO) concluded that the existing high voltage electricity network in East Anglia does not have the capability needed to reliably and securely transport all the energy that will be connected while meeting the National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS). In particular, the standard requires that the NTS continues to operate under the conditions of the loss of a double circuit route. The current network arrangements (including planned upgrades to existing circuits and the proposed Bramford to Twinstead area reinforcement – refer to Image 1.1) are not sufficient to meet this standard for the levels of power flow that will be required.

Image 1.1 – Anticipated baseline network configuration (not to scale)



1.2.4 As a result, and to meet its duties, National Grid needs to reinforce the electricity network to allow power to be imported to, and exported from, East Anglia and to provide additional capability to allow power flows into and out of the south-east area to connect with areas of demand and interconnectors to Europe.

1.2.5 An optioneering process has been completed for the Project which identified a preferred Strategic Proposal (a new 400kV double-circuit of ~60km between Norwich Main and Bramford substations and a new 400kV double circuit of ~120km between Bramford and Tilbury substations via a new East Anglia Connection Node substation to be located in the Tendring District). Following the selection of the Strategic Proposal, the routing and siting stage was undertaken, this resulted in a preferred corridor as reported in the Corridor Preliminary Routing and Siting Study (CPRSS) being identified. The preferred corridor in the CPRSS, was consulted on at non-statutory consultation and in this Scoping Report is referred to as the 'Scoping Report Corridor'. The Scoping Report Corridor has been referenced within this Scoping Report to determine the scope of the EIA to be reported in the ES. Further details of this are included within Chapter 3: Main Alternatives Considered and Chapter 4: Description of the Project.

### **Transmission of energy legislative controls**

1.2.6 The Electricity Act 1989 and the Transmission Licence Standard Conditions (OFGEM, 2022) provide that:

- Under section 9(1) of the Electricity Act 1989, National Grid has a duty:
  - To develop and maintain an efficient, co-ordinated and economical system of electricity transmission
  - To facilitate competition in the supply and generation of electricity
- Under Licence Condition C8 (Requirement to offer terms) of the Transmission Licence Standard Conditions (OFGEM, 2022), National Grid have a duty to meet obligations relating to making offers to provide connections to the Transmission System. In summary, where any person applies for an offer, National Grid shall offer to enter into an agreement(s) to connect, or to modify an existing connection, to the Transmission System and the offer shall make detailed provision regarding:
  - The carrying out of works required to connect to the Transmission System
  - The carrying out of works (if any) in connection with the extension or reinforcement of the Transmission System
  - The date by when any works required to permit access to the Transmission System (including any works to reinforce or extend the Transmission System) shall be completed

## **1.3 Geographical context**

1.3.1 Figure 1.1 at Appendix A presents the location of the Project together with the Scoping Report Corridor. The northern most extent of the Project comprises the connection with the existing Norwich Main substation in South Norfolk. The Project extends south through the districts of South Norfolk, Mid Suffolk, Babergh, Colchester and through to Tendring where a new substation would be constructed. From there it continues south through Braintree, Chelmsford, Basildon, Brentwood and into Thurrock where the new OHL would connect to the existing Tilbury substation.

1.3.2 The topography of the wider geographical area is predominantly flat and low-lying comprising of large-scale arable fields with clusters of urban and rural settlements. Part of the Scoping Report Corridor is located within the Dedham Vale AONB (approximately 3%), noted for its unspoilt rural character which has remained free from the intrusion of modern development. Within the AONB it is proposed that underground cabling would



be used.

- 1.3.3 There are a number of areas within the Scoping Report Corridor which are within areas of flood risk (Flood Zones 2 and 3), with particularly large areas of flood risk around Tilbury.
- 1.3.4 Ecological features in the area include the Flordon Common Site of Special Scientific Interest (SSSI), Marks Tey Brickpit SSSI, River Ter SSSI, Langdon Ridge SSSI and many discrete areas of ancient woodland.
- 1.3.5 Cultural assets in the area include the Bressingham Museum and Gardens, and Langley’s Historic Park/ Garden, as well as many discrete heritage assets such as scheduled monuments and listed buildings within and in close proximity to the Scoping Report Corridor. The Mellis and Badley Conservation Areas overlap with the Scoping Report Corridor.
- 1.3.6 The majority of the Project would be located in land that is categorised on provisional ALC mapping as Grade 3 agricultural land or higher quality.

## 1.4 Purpose of this report

- 1.4.1 This Scoping Report has been prepared to accompany a request for a Scoping Opinion from the Planning Inspectorate (prepared on behalf of the Secretary of State). The Scoping Opinion would then inform the scope of the EIA for the Project. The results of the EIA would be presented in an ES to be submitted to the Planning Inspectorate as part of the Development Consent Order (DCO) application.
- 1.4.2 This Scoping Report has been prepared in accordance with the EIA Regulations, Regulation 10 also taking account of the guidance in the Planning Inspectorate’s Advice Note Seven<sup>1</sup>.
- 1.4.3 Scoping has been undertaken to identify issues which are likely to give rise to significant effects and therefore should be included within the scope of the ES. Table 1.1 outlines the chapters and supporting appendices along with a summary of the content of this Scoping Report.

Table 1.1 – Scoping Report structure

Chapter / Appendix	Content
1. Introduction	An introduction to the Project and the purpose and structure of the Scoping Report.
2. Legislation and Planning Policy Context	A review of the legislation and policy relevant to the Project.
3. Main Alternatives Considered	Identifies the main alternatives considered through the optioneering process.
4. Description of the Project	The chapter describes the Project including permanent features and associated temporary works. It describes the general characteristics of the Project, outlines areas of flexibility in relation to design parameters, and how these would be addressed in the environmental

<sup>1</sup> Planning Inspectorate, 2020. Advice Note Seven. EIA: Process, Preliminary Environmental Information, and Environmental Statements.

<b>Chapter / Appendix</b>	<b>Content</b>
	assessment through the application of Limits of Deviation (LoD) and the Rochdale Envelope.
5. EIA Approach and Methodology	A description of the overall EIA methodology that is proposed for the Project including temporal durations and approach to mitigation.
6-16: Topic Chapters (Agriculture and Soils, Air Quality, Ecology and Biodiversity, Geology and Hydrogeology, Health and Wellbeing, Historic Environment, Hydrology and Land Drainage, Landscape and Visual, Noise and Vibration, Socio-Economic, Recreation and Tourism and Traffic and Transport)	There is a chapter for each environmental topic scoped into the ES. The topic chapters are structured as follows: <ol style="list-style-type: none"> <li>1. Approach to scoping</li> <li>2. Regulatory and planning policy context</li> <li>3. Study area</li> <li>4. Data collection</li> <li>5. Engagement with stakeholders</li> <li>6. Baseline condition (inc. future baseline)</li> <li>7. Further data to be gathered / processed in the ES</li> <li>8. Measures adopted as part of the Project</li> <li>9. Likely significant effects</li> <li>10. Proposed scope of the ES</li> </ol>
17. Cumulative Effects	A description of the way in which cumulative effects would be assessed along with an initial indication of potential cumulative effects associated with the Project.
18. Summary and the Proposed Structure of the ES	The conclusion includes a summary table depicting each of the aspects and matters that are proposed to be scoped in and out of the EIA. It also provides the outline structure of the proposed ES.
<b>Appendices</b>	Technical content relating to topic assessments.
Appendix A – Figures	A plan sufficient to identify the land and topic specific figures together with figures specific to each environmental topic.
Appendix B – Initial Outline Code of Construction Practice	Initial Outline Code of Construction Practice (CoCP) containing embedded, standard and additional mitigation.
Appendix C – Competent experts	Details of the competent experts that have prepared this Scoping Report.
Appendix D – Transboundary Screening	Transboundary supporting information.
Appendix E – Sites Designated for Biodiversity	Provides details of the qualifying features / details of designated sites.
Appendix F – Biodiversity Survey Methodology	Provides details of proposed survey methodologies.
Appendix G - Key Characteristics of Landscape Character Assessment	Includes details of key characteristics of landscape character assessment.
Appendix H – Preliminary Viewpoints	Outlines preliminary viewpoints.

<b>Chapter / Appendix</b>	<b>Content</b>
Appendix I – Landscape and Visual Impact Assessment Methodology	Provides further details of the landscape and visual impact assessment methodology.
Appendix J – Arboriculture Strategy	Provides the arboriculture strategy.
Appendix K – District Licencing	Provides confirmation Natural England agree to using district licencing for the Project.

- 1.4.4 The Scoping Report has been developed in parallel with other regulatory environmental studies, namely the Habitats Regulations Assessment (HRA), Flood Risk Assessment (FRA), and the Water Environment Regulations (WER) assessment which replaces the Water Framework Directive Assessment. These are described in further detail in Chapter 8: Ecology and Biodiversity and Chapter 12: Hydrology and Land Drainage.
- 1.4.5 The Scoping Report has been prepared by competent experts as required under the EIA Regulations. Further information about the authors is presented at Appendix C.

# 2 Legislation, Regulatory and Planning Policy Context

## 2.1 Introduction

- 2.1.1 This chapter sets out a summary of environmental legislation and national policy relevant to the Project.
- 2.1.2 A Planning Statement would be produced to support the DCO application and would provide a full planning policy review and would set out how the Project meets planning policy.

## 2.2 Legislation

### Planning Act 2008

- 2.2.1 The Planning Act 2008 introduced a new consenting procedure for NSIPs. Section 14 lists types of projects which can constitute an NSIP, including at Section 14(1)(b) the installation of an electric line above ground. Sections 16(1)(a) further defines the NSIP designation as applying to projects within England. Section 16(3)(a) states that the legislation does not apply to projects where the nominal voltage of the line is expected to be less than 132 kilovolts or if the length of the line would be less than 2km. OHL projects of less than 2km are not NSIPs by virtue of amendments made by the Localism Act 2011.
- 2.2.2 Section 104 of the Planning Act 2008 states at (2)(a) that the Secretary of State must have regard to any national policy statement which has effect in relation to development of the description to which the application relates.
- 2.2.3 NPS EN-1 and NPS EN-5 together provide the primary policy for decisions by the Secretary of State. Under Section 104 of the Planning Act 2008 the Secretary of State must also have regard to any local impact report submitted by a relevant local authority, any relevant matters prescribed in regulations, the Marine Policy Statement (MPS) and any applicable Marine Plan, and any other matters which the Secretary of State thinks are both important and relevant to the planning decision. EN-1 and EN-5 are covered in more detail below.
- 2.2.4 The Planning Act 2008 has been amended through the adoption of the Localism Act 2011. Under the Localism Act 2011, the Planning Inspectorate is responsible for the NSIP planning process and would examine the DCO application for the Project and make a recommendation to the SoS to grant or refuse consent.

### The Infrastructure Planning (EIA) Regulations 2017

- 2.2.5 The Infrastructure Planning (EIA) Regulations 2017 govern the EIA process relevant to NSIPs. Schedule 1 of the EIA Regulations lists those projects for which an EIA is required and includes, under paragraph 20, the construction of overhead electrical power lines with a voltage of 220kV or more and a length of more than 15km. Similarly relevant to the Project is regulation 3, which confirms that EIA development means schedule 2 development likely to have significant effects on the environment by virtue of factors such as its nature, size or location. 'Schedule 2 development' is described at schedule 2 paragraph 3(b) to include projects for the transmission of electrical energy

by overhead cables.

- 2.2.6 The Project includes installation of a 400kV electricity transmission line over a distance of approximately 180km, of which the majority is OHL. It therefore falls under Schedule 1 and requires a statutory EIA.
- 2.2.7 The EIA Regulation 5 sets out the EIA process. This includes Regulation 5(2) to identify, describe and assess the direct and indirect significant effects of the Project during construction and operation on the environment (see Table 4.1 for a list of relevant factors) and EIA Regulation 5(4) to include, where relevant the expected significant effects arising from the vulnerability of the Project to major accidents or disasters. Schedule 4 of the EIA Regulations set out the information to be included in an ES.
- 2.2.8 There is a requirement under EIA Regulation 32(1) to consider transboundary effects, that is, those effects that could affect receptors in other countries. A screening exercise has been undertaken using Advice Note Twelve: Transboundary Impacts and Process, Annex I (Planning Inspectorate, 2020) as part of the scoping process and is documented at Appendix D. No transboundary effects have been predicted in relation to the Project, as there is no pathway for effects to occur outside the UK.

## Electricity Act 1989

- 2.2.9 Section 9(2) of the Electricity Act 1989 places general duties on National Grid as a licence holder ‘to develop and maintain an efficient, co-ordinated and economical system of electricity transmission...’. In addition, Section 38 and Schedule 9 of the Electricity Act 1989 require National Grid, when formulating proposals for new lines and other works, to:  
*“...have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and shall do what [it] reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects”.*
- 2.2.10 National Grid's Stakeholder, Community and Amenity Policy (National Grid, 2016) sets out how the company would meet the Schedule 9 duty placed upon it by the aforementioned legislation.

## Countryside and Rights of Way Act 2000

- 2.2.11 AONBs are designated solely for their landscape qualities, for the purpose of conserving and enhancing their natural beauty. They are designated under Section 82 of the Countryside and Rights of Way Act 2000 to secure their permanent protection against development that would damage their special qualities. National Grid, as a statutory undertaker, has a duty under Section 85 of the Act which states *“In exercising or performing any functions in relation to, or so as to affect, land in an AONB, a relevant authority shall have regard to the purpose of conserving and enhancing the natural beauty of the AONB”.*
- 2.2.12 Section 89 of the Countryside and Rights of Way Act 2000 requires a Management Plan to be produced for each AONB. These are statutory documents which form a material consideration in decision making. The Dedham Vale AONB and Stour Valley Management Plan 2021-2026 (Dedham Vale and Stour Valley and Landscapes for Life, 2021) is the current adopted plan.
- 2.2.13 The Management Plan covers the Dedham Vale AONB and also the Stour Valley Project Area and sets out policies for its management. The Stour Valley Project Area is

not currently designated, although an application has been submitted to Natural England to extend the Dedham Vale AONB to include parts of the Stour Valley Project Area.

## The Conservation of Habitats and Species Regulations 2017

- 2.2.14 There is a requirement to undertake a screening exercise to determine whether there are likely significant effects on European sites as a result of the Project, either alone or in combination with other plans and projects. If likely significant effects cannot be ruled out, an Appropriate Assessment (AA) must be carried out by the competent authority, in this case, the Secretary of State. The applicant must provide a report with the application showing the site(s) that may be affected together with sufficient information to allow the AA to take place. The Planning Inspectorate would also expect a series of matrices to be completed and submitted, in line with section 6 of Advice Note Ten: Habitat Regulations Assessment relevant to Nationally Significant Infrastructure Projects (Planning Inspectorate, 2022).

## Environment Act 2021

- 2.2.15 The Environment Act provides a framework for improving environmental management across a wide spectrum of environmental issues including waste and resources, water quality, biodiversity and air quality. It aims to deliver long-term targets to improve environmental conditions and reduce pollution, which would need to be considered by the Project. The Environment Act in Section 99 and Schedule 15 includes a requirement for NSIPs to deliver biodiversity gain as part of the application and for the areas of biodiversity gain to be maintained for a specified period. DCOs must meet a biodiversity gain objective defined in a biodiversity gain statement. This requirement for NSIPs begins in November 2025. National Grid is currently working with other organisations to identify how this can best be implemented and also the securing mechanisms for maintaining habitats for the specified period.

## Water Environment Regulations

- 2.2.16 The Water Environment (Water Framework Directive) Regulations 2017 impose duties on the Secretary of State and the Environment Agency to carry out certain, in particular when deciding whether to grant, vary or revoke certain permits and licences which affect water quality.
- 2.2.17 Part 2 of the regulations requires the identification of River Basin Districts (RBD), and a number of other assessments to be carried out by the Environment Agency to characterise and classify the status of water bodies in those districts, and assess the economic aspects of water use. River basin management plans must be established for each river basin district.
- 2.2.18 The regulations require a number of types of areas which are protected by other EU legislation (for example, protected habitats and birds sites) to be included on registers of protected areas.

## 2.3 National planning and energy policy

### Overarching National Policy Statement for Energy (EN-1) (2011)

- 2.3.1 National Policy Statement (NPS) EN-1 sets out the Government's overarching policy with regard to the development of NSIPs in the energy sector.
- NPS EN-1 sets out the Government's overarching policy with regard to the development

of NSIPs in the energy sector. It emphasises the need for new energy projects to contribute to a secure, diverse and affordable energy supply. This is to support the Government's policies on sustainable development, in particular by mitigating and adapting to climate change.

- 2.3.2 Section 3.7 in EN-1 states that current scenarios show significant potential increases in generation and changes in direction of net electricity flows from Eastern England to centres of demand in the Midlands and South-East England and that these kinds of flows of power cannot be accommodated by the existing network and new lines would have to be built. It also acknowledges in paragraph 3.7.10 that *"in most cases, there will be more than one technological approach by which it is possible to make such a connection or reinforce the network (for example, by overhead line or underground cable) and the costs and benefits of these alternatives should be properly considered as set out in EN-5 before any overhead line proposal is consented"*.
- 2.3.3 EN-1 sets out generic impacts in respect of matters such as air quality and emissions, biodiversity, dust and odour, flood risk, historic environment, landscape, land use, noise and vibration, socio-economic, traffic and transport and waste management. These generic impacts have been taken into account in the preparation of this Scoping Report.

## Draft Overarching National Policy Statement for Energy (EN-1) (2021)

- 2.3.4 The draft NPS EN-1 sets out the goal of decarbonising the energy network to achieve net zero whilst ensuring security of supply. It sets out how as the electricity system grows in scale, dispersion, variety, and complexity, work would be needed to protect against the risk of large-scale supply interruptions in the absence of sufficiently robust electricity networks. While existing transmission and distribution networks must adapt and evolve to cope with this reality, development of new transmission lines of 132kV and above would be necessary to preserve and guarantee the robust and reliable operation of the whole electricity system. It refers to how the onshore transmission network would require substantial reinforcement in East Anglia to handle increased power flows from offshore wind generation.
- 2.3.5 The draft NPS states that given the level and urgency of need for infrastructure of the types covered by the energy NPSs set out in Part 3 of this NPS, the Secretary of State would start with a presumption in favour of granting consent to applications for energy NSIPs. That presumption applies unless any more specific and relevant policies set out in the relevant NPSs clearly indicate that consent should be refused. It sets out how in considering any proposed development, in particular when weighing its adverse impacts against its benefits, the Secretary of State should take into account: its potential benefits including its contribution to meeting the need for energy infrastructure, job creation, ecological enhancements, and any long-term or wider benefits, its potential adverse impacts, including any long-term and cumulative adverse impacts, as well as any measures to avoid, reduce, mitigate or compensate for any adverse impacts.
- 2.3.6 The draft NPS has been consulted on and is considered a material consideration for the Project, therefore, both the draft and published EN-1 are referenced throughout this Scoping Report. When finalised it would supersede the current EN-1.

## National Policy Statement for Electricity Networks Infrastructure (EN-5) (2011)

- 2.3.7 NPS EN-5 specifically relates to electricity networks and Part 2 includes specific policies including consideration of good design, biodiversity and geological conservation,

landscape and visual and noise and vibration. These policies have also been taken into account in the relevant topic chapter.

- 2.3.8 Paragraph 2.2.6 of EN-5 reiterates the duties of transmission and distribution licence holders under Section 9 of the Electricity Act 1989, both in relation to developing and maintaining an economical and efficient network and in formulating proposals for new electricity networks infrastructure, to “*have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest...*”
- 2.3.9 Paragraph 2.8.4 addresses undergrounding it states that “wherever the nature or proposed route of an overhead line proposal makes it likely that its visual impact will be particularly significant, the applicant should have given appropriate consideration to the potential costs and benefits of other feasible means of connection or reinforcement, including underground and sub-sea cables where appropriate. The ES should set out details of how consideration has been given to undergrounding or sub-sea cables as a way of mitigating such impacts, including, where these have not been adopted on grounds of additional cost, how the costs of mitigation have been calculated.”

## Draft National Policy Statement for Electricity Networks Infrastructure (EN-5) (2021)

- 2.3.10 The draft NPS EN-5 specifically relates to electricity networks. It sets out how the Secretary of State should consider this NPS and EN-1 in tandem when evaluating applications relating to electricity networks infrastructure. It also lays out the general principles against which electricity network schemes should be assessed.
- 2.3.11 The draft NPS has been consulted on and is a material consideration for the Project therefore, both the draft and published EN-5 are referenced throughout this Scoping Report. When finalised it would supersede the current EN-5.
- 2.3.12 Paragraph 2.11.13 covers undergrounding stating that “although it is the government’s position that overhead lines should be the strong starting presumption for electricity networks developments in general, this presumption is reversed when proposed developments will cross part of a nationally designated landscape (i.e. National Park, Broads, or AONB). In these areas, and where harm to the landscape cannot feasibly be avoided by mitigation or re-routing, the strong starting presumption will be that the developer should underground the relevant Section of the line. Note however that undergrounding will not be required where it is infeasible in engineering terms, or where the harm that it causes is not outweighed by its corresponding landscape and/or visual benefits”.

## National Planning Policy Framework (NPPF) (2021)

- 2.3.13 Paragraph 5 of NPPF states that the “Framework does not contain specific policies for nationally significant infrastructure projects. These are determined in accordance with the decision-making framework in the Planning Act 2008 (as amended) and relevant NPSs for major infrastructure, as well as any other matters that are relevant (which may include the National Planning Policy Framework (NPPF))”.
- 2.3.14 While EN-1 and EN-5 remain the prime decision-making documents, where they do not provide guidance, each topic chapter would consider whether there is important and relevant guidance in the NPPF that may require consideration by the decision-making authority. At this stage, it is not possible to confirm if such secondary guidance would be considered important or relevant by the Secretary of State, and it is therefore included for completeness to allow the Secretary of State to make such a determination.



## 2.4 Local planning policy

- 2.4.1 Regional and local planning policies have been considered in the development of the Scoping Report.
- 2.4.2 As set out above, the NPSs are the primary basis for decision making, but the Secretary of State must also have regard to any other matters which they think are both important and relevant to the decision and this could include regional and local planning policies. In so doing, the Secretary of State must have regard to the local impact reports produced by the relevant local planning authorities for consideration during the examination of the application.
- 2.4.3 Local planning policies have also been considered in the development of the Scoping Report. The relevant adopted and emerging local plans for the Scoping Report Corridor Local Planning Authorities are:
- South Norfolk Council
    - Joint Core Strategy for Broadland, Norwich and South Norfolk, adopted 2011, amendments adopted 2014
    - Site Specific Allocations and Policies Document, adopted 2015
    - Development Management Policies Document, adopted 2015
    - Emerging Greater Norwich Local Plan – currently under examination and due for adoption later in 2022
  - Mid Suffolk District Council
    - Saved policies from the Mid Suffolk Local Plan, adopted 1998
    - Core Strategy, adopted 2008, reviewed in 2012
  - Babergh District Council
    - Saved policies from the Babergh Local Plan Alteration No.2, adopted 2006
    - The Babergh Core Strategy, adopted 2014
    - A Joint Local Plan (Babergh and Mid Suffolk) is currently under development
  - Colchester Borough Council
    - Core Strategy, adopted 2008 and amended 2014
    - Development Policies, adopted October 2010 and selected policies revised 2014
    - An emerging Local Plan is currently being drafted and when approved would replace the existing Plan until 2033
  - Tendring District Council
    - Local Plan 2013-2033 comprising:
      - North Essex Authorities' Shared Strategic Section 1 Plan, January 2021
      - Tendring District Local Plan 2013-2033 Section 2, January 2022
  - Braintree District Council
    - Braintree District Council Local Plan Section 1, adopted 2021

- Braintree District Council Local Plan Section 2, adopted 2022
- Chelmsford City Council
  - Chelmsford Local Plan; Our Planning Strategy 2013 to 2036, adopted 2020
  - A Local Plan Review 2022 is being carried out to assess if any changes or additional documents are required
- Basildon Borough Council
  - Basildon District Council Local Plan Saved Policies, adopted 2007
  - Basildon District Council Compliance Review of the Saved 1998 Local Plan Policies with the Revised NPPF, adopted 2018
  - A new Local Plan is currently being prepared
- Brentwood Borough Council
  - Brentwood Borough Council Local Plan 2016-2033, adopted 2022
- Thurrock Council:
  - Core Strategy and Policies for Management of Development, adopted 2015
  - The Thurrock Council Local Plan is currently under review and a new plan is set to be adopted in 2022

## 2.5 Guidance

### Holford Rules

- 2.5.1 Guidelines on OHL routeing were first formulated in 1959 by Sir William, later Lord, Holford, as advisor to the Central Electricity Generating Board. Holford developed a series of planning guidelines in relation to amenity issues, that have subsequently become known as the “*Holford Rules*” and remain a valuable tool in selecting and assessing potential OHL route options as part of the options appraisal process. A summary of the Holford Rules can be found in Table 2.1. These have been an important consideration during the development of the Scoping Report Corridor and whether certain sections should be considered for undergrounding. The Holford Rules are also expressly considered as part of NPS EN-5 (in both the current and draft NPS). Principles of the Holford Rules are being considered during the development of the Project, which would be incorporated within the DCO application.

Table 2.1 - Summary of the Holford Rules

Rule	Description
Rule 1	Avoid altogether, if possible, the major areas of highest amenity value, by so planning the general route of the first line in the first place, even if the total mileage is somewhat increased in consequence.
Rule 2	Avoid smaller areas of high amenity value, or scientific interests by deviation; provided that this can be done without using too many angle towers, i.e., the more massive structures which are used when lines change direction.

<b>Rule</b>	<b>Description</b>
Rule 3	Other things being equal, choose the most direct line, with no sharp changes of direction and thus with fewer angle towers.
Rule 4	Choose tree and hill backgrounds in preference to sky backgrounds wherever possible; and when the line has to cross a ridge, secure this opaque background as long as possible and cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees.
Rule 5	Prefer moderately open valleys with woods where the apparent height of towers will be reduced, and views of the line will be broken by trees.
Rule 6	In country which is flat and sparsely planted, keep the high voltage lines as far as possible independent of smaller lines, converging routes, distribution poles and other masts, wires and cables, so as to avoid a concentration or 'wirescape'.
Rule 7	Approach urban area through industrial zones, where they exist; and when pleasant residential and recreational land intervenes between the approach line and the substation, go carefully into the comparative costs of the undergrounding, for lines other than those of the highest voltage.

## Horlock Rules

2.5.2 National Grid devised the Horlock Rules in 2003, and these were subsequently updated in 2006. The Horlock Rules provide guidelines for the siting and design of new substations, or substation extensions, to avoid or reduce the environmental effects of such developments. In summary, like the Holford Rules, they facilitate consideration of environmental and amenity considerations within the design and siting of new substation infrastructure.

2.5.3 Horlock contains the following guidelines in relation to siting:

- Overall System Options and Site Selection
  - In the development of system options including new substations, consideration must be given to environmental issues from the earliest stage to balance the technical and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum
- Amenity, Cultural or Scientific Value of Sites
  - The siting of new National Grid Company (NGC) substations, sealing end compounds and line entries should as far as reasonably practicable seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections
  - Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable
- Local Context, Land Use and Site Planning

- The siting of substations, extensions and associated proposals should take advantage of the screening provided by land form and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum
- The proposals should keep the visual, noise and other environmental effects to a reasonably practicable minimum
- The land use effects of the proposal should be considered when planning the siting of substations or extensions
- Design
  - In the design of new substations or line entries, early consideration should be given to the options available for terminal pylons, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practicable minimum
  - Space should be used effectively to limit the area required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation
  - The design of access roads, perimeter fencing, earthshaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings
- Line Entries
  - In open landscape especially, high voltage line entries should be kept, as far as possible, visually separate from low voltage lines and other overhead lines so as to avoid a confusing appearance
  - The inter-relationship between pylons and substation structures and background and foreground features should be studied to reduce the prominence of structures from main viewpoints. Where practicable the exposure of terminal pylons on prominent ridges should be minimised by siting pylons against a background of trees rather than open skylines

## 2.6 National Grid policy and guidance

2.6.1 National Grid has its own policies and processes that are followed when developing projects. The policies that are applicable to this Project are as follows:

- Our Approach to Options Appraisal (National Grid, 2012): This document describes the options appraisal process that is followed when developing new gas and electricity infrastructure projects. It follows a staged approach to the assessment and sets out the considerations when making decisions as to which option should be taken forward
- Our Stakeholder, Community and Amenity Policy (National Grid, 2016): This document describes the ten commitments that National Grid has made to the way that electricity and gas works are carried out in the UK. This includes setting out how National Grid would meet its amenity responsibilities and how stakeholders and communities are involved on projects

- Our Approach to Consenting (National Grid, 2022): This document outlines National Grids approach to developing and delivering new infrastructure and applies to projects across their whole regulated electricity transmission business

2.6.2 National Grid also has an extensive range of process and guidance documents that govern how projects are designed and implemented to ensure operational safety.

# 3 Main Alternatives Considered

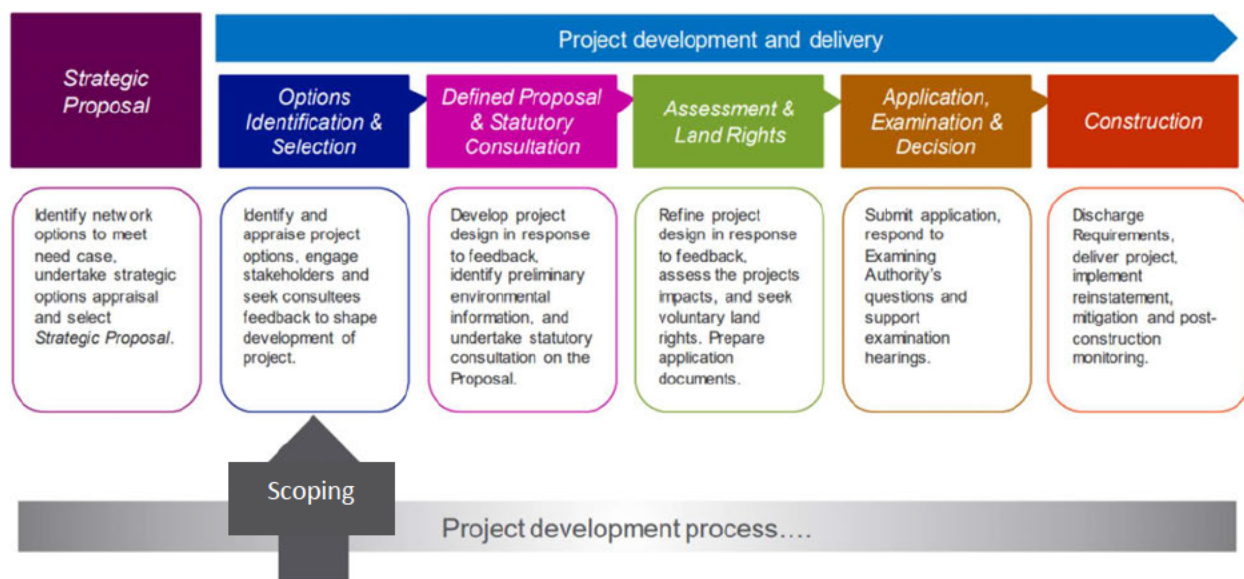
## 3.1 Background

- 3.1.1 Regulation 14(d) in conjunction with Schedule 4, paragraph 2 of the EIA Regulations states that an ES should include a description of reasonable alternatives studied by the promotor and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects. While there is no statutory requirement to include an assessment of alternatives in support of a request for a Scoping Opinion, the Planning Inspectorate's Advice Note Seven Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping (Planning Inspectorate, 2020) recommends that a Scoping Report includes "*an outline of the reasonable alternatives considered and the reasons for selecting the preferred option*".
- 3.1.2 National Grid have been through an iterative options appraisal process to determine the preferred option for the Project which comprises the Scoping Report Corridor in this Scoping Report (Figure 1.1 at Appendix A).

## 3.2 National Grid approach to options appraisal

- 3.2.1 National Grid undertakes an options appraisal for their individual projects. There are often a number of different ways that a project can be developed, involving different locations, technologies or designs. Each project requires judgements and decisions about the most appropriate way to achieve the required outcome. The options appraisal process provides information to help inform those judgements.
- 3.2.2 Options appraisal is a robust and transparent process that is used to compare options and to assess the positive and negative effects they may have, across a wide range of criteria including environmental, socio-economic, technical, and cost factors. The aim is to find a balanced outcome, bearing in mind the range of National Grid's statutory duties. Further details on the options appraisal process can be found in Our approach to Options Appraisal (National Grid, 2012) and in Our Approach to Consenting (National Grid, 2022).
- 3.2.3 At each stage in the options appraisal process for the Project, transparent methods are used to inform the iterative decision-making and design development processes, including inputs from engineers and environmental consultants. Interim decision making takes into (and continues to take) account of feedback from both prescribed bodies, as defined in the Planning Act 2008, other stakeholders and the local community through an extensive programme of engagement and consultation. In addition, projects are subject to challenge and review to ensure the robustness of the decisions made in the light of changing environments (including technical, environmental, socio-economic and cost). Options appraisal has been undertaken for the Project. Image 3.1 presents where the options appraisal sits in the overall National Grid consenting process and where scoping fits in with the process.

Image 3.1 – National Grids consenting process (Our Approach to Consenting (National Grid, 2022))



### 3.3 Strategic Proposal

- 3.3.1 National Grid ESO leads an annual cycle which identifies how much electricity can be carried on the network and where future capacity is required, reported within their Network Options Assessment (NOA) reports. The need for the Project was identified as critical to take forward in both the 2021 and 2022 editions of the Network Options Appraisal 2021/22 Report (National Grid ESO, 2022). The first stage in the options appraisal process was to determine a preferred Strategic Option or Strategic Proposal.
- 3.3.2 Conceptually there were numerous options through which reinforcements could theoretically be achieved including a range of different technologies and multiple connection points on the existing NTS.
- 3.3.3 Initially alternative connection technologies were considered and then these were applied to a representative number of alternative reinforcement options. Alternative technologies included:
- Offshore connections
  - Onshore connections
  - Increasing operating voltage
  - Alternating Current (AC) OHLs
  - AC underground cable
  - Alternative overhead AC tower types
  - High Voltage Direct Current (HVDC) offshore cables
  - HVDC onshore OHL
  - HVDC onshore cables
  - Gas insulated line

- 3.3.4 Through the filtering and optioneering process AC OHLs (with undergrounding through AONBs / National Parks), High Voltage Direct Current (HVDC) offshore cables, HVDC onshore cable, and increasing the operating voltage were taken forwards and considered with a number of alternative reinforcement options.
- 3.3.5 The geographical scope of options was then considered. In general terms, the geographical scope was restricted to the area of East Anglia and the south-east that encompassed the nearest parts of the NTS that would facilitate a connection between the northern parts of East Anglia, South Coast Interconnectors and the electricity demand area formed by Greater London and south-east.
- 3.3.6 Reinforcement options were considered next by applying a filter to technology and geographical scope that could meet the needs case. A total of 23 options were identified that aimed to provide a solution with longer term goals of supporting the system's capacity into the 2030s. These options were then appraised following National Grid's options appraisal process which looked at environmental, socio-economic, technical, and cost factors.
- 3.3.7 Options were discounted, for example, owing to poor performing cost benefit analysis, the presence of complex Special Protection Area (SPA)/Special Area Conservation (SAC)/SSSIs and options having higher capital costs for limited benefit and the presence of the Suffolk Coast and Heaths AONB.
- 3.3.8 The preferred Strategic Proposal, progressed through to non-statutory public consultation, included three distinct elements: an offshore reinforcement between the south coast and East Anglia (whilst subject to separate study this is initially identified as between Sizewell and Richborough and referred to as the SEALink project); onshore reinforcement between Tilbury and Grain; and onshore reinforcement between Norwich and Tilbury.
- 3.3.9 In response to feedback, including that from non-statutory consultation and the Offshore Electricity Grid Task Force (OffSET<sup>2</sup>) regarding a fully offshore HVDC option to deliver the Project. National Grid provided further clarification on the potential for a feasible offshore strategic option to deliver the additional transmission capacity required, having regard to their duties. The clarification provided explained why, at this early pre-statutory stage of consultation, the offshore strategic option is not being progressed, although none of the conclusions should be seen as final. This information can be found on the Project website
- 3.3.10 The East Anglia GREEN Project covers the terrestrial element between Norwich and Tilbury.
- 3.3.11 Therefore, the element of the Strategic Proposal the Project comprises is:  
*"A new 400kV double-circuit of ~60km between Norwich Main and Bramford substations and a new 400kV double circuit of ~120km between Bramford and Tilbury substations via a new EAC Node substation to be located in Tendring District"*  
 (Corridor and Preliminary Routeing and Siting Study, National Grid, 2022).
- 3.3.12 It was understood that the preferred Strategic Proposal would initially comprise steel lattice pylon supported OHLs, with the use of appropriate mitigation including undergrounding such as through the Dedham Vale AONB.

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<sup>2</sup> A task force set up to represent communities in Suffolk and Essex.

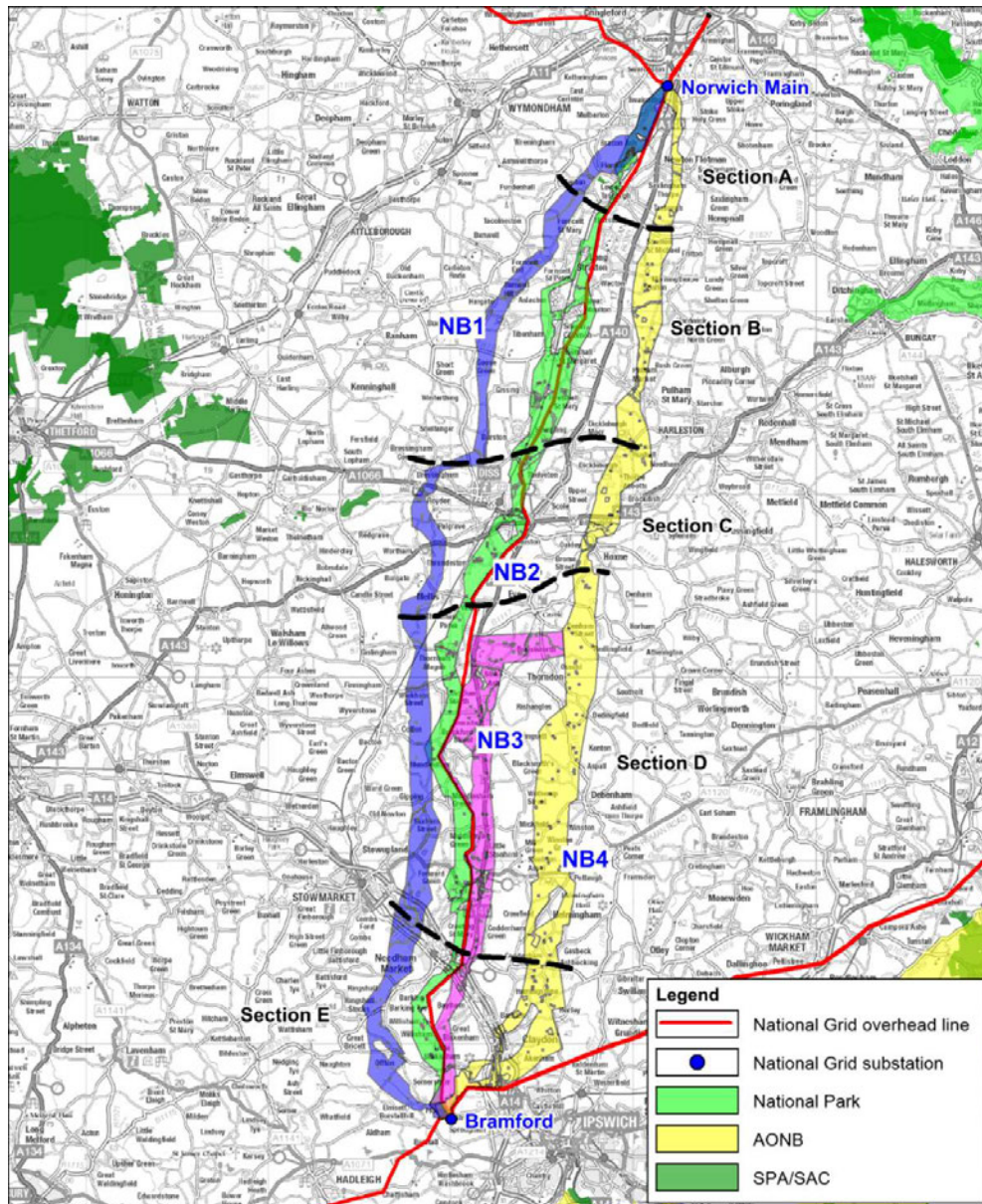


### 3.4 Options identification and selection – Norwich to Bramford Substation

3.4.1 Following the selection of the preferred Strategic Proposal, the routing and siting process commenced which as previously noted followed the appraisal process outlined within Our Approach to Options Appraisal (National Grid, 2012) and Our Approach to Consenting (National Grid, 2022). The appraisal covering technical, environmental, socio-economic and cost is documented in the Corridor and Preliminary Routing and Siting Study (National Grid, 2022).

3.4.2 A study area was first defined to deliver the Strategic Proposal between Norwich and Bramford. Baseline information was then obtained, this included information on environmental features within the defined study area. Four potential route corridors were identified and taken forward to the options appraisal. These are presented on Image 3.2 and referenced as NB1 to NB4.

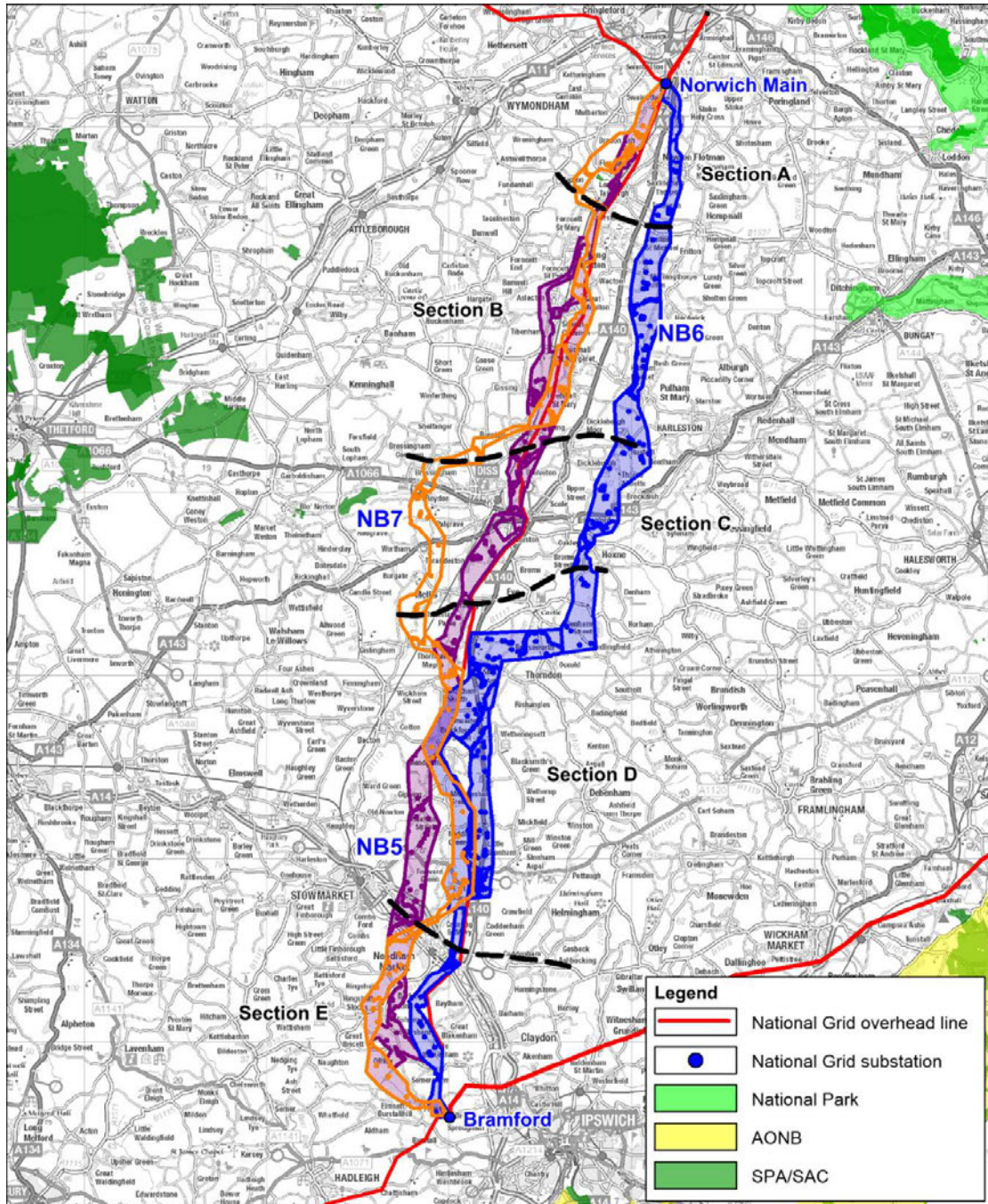
Image 3.2 – Norwich to Bramford initial options (not to scale)



3.4.3

Following the appraisal, a challenge and review exercise took place to analyse and discuss the outputs of the options appraisal, filter out / remove non-feasible options, and ultimately shortlist options to be taken forward for further consideration. As part of this exercise three hybrid corridors were identified (Options NB5, NB6 and NB7) which were also subject to the options appraisal process. These are presented on Image 3.3.

Image 3.3 – Norwich to Bramford hybrid options (not to scale)



3.4.4

Following the decision exercise undertaken after the options appraisal process was complete Option NB1 (Image 3.2) was preferred from an environmental (ecology, landscape, historic environment, socio-economic), technical and cost perspective.

3.4.5

Option NB1 had the potential for effects on an SAC, while Options NB2, NB4, NB5 and NB6 did not. However, it was considered that effects could be minimised through the

implementation of standard mitigation measures so that significant effects did not arise. Option NB1 avoided the potential for residential properties to be surrounded in close proximity by OHLs to a greater extent than the other options and thus reduced the potential of unacceptable levels of effect upon general residential amenity. As such, effects were deemed to be difficult to mitigate with standard measures, this weighed considerably in favour of Option NB1. Option NB1 also avoided a locally protected landscape that other options did not, though this in itself was not a major differentiating factor. Option NB1 was also preferred from an historic environment perspective, particularly compared to Option NB4 which directly affected a Conservation Area (at Shotesham through the estate park land of the Grade I listed 'The Hall' and associated listed buildings).

3.4.6 From a technical perspective, Option NB1 was preferred as it had fewer constraining areas and an overall greater level of flexibility for the routeing of an OHL with reduced construction/ delivery and engineering complexity than Options NB2, NB5, NB6 and NB7.

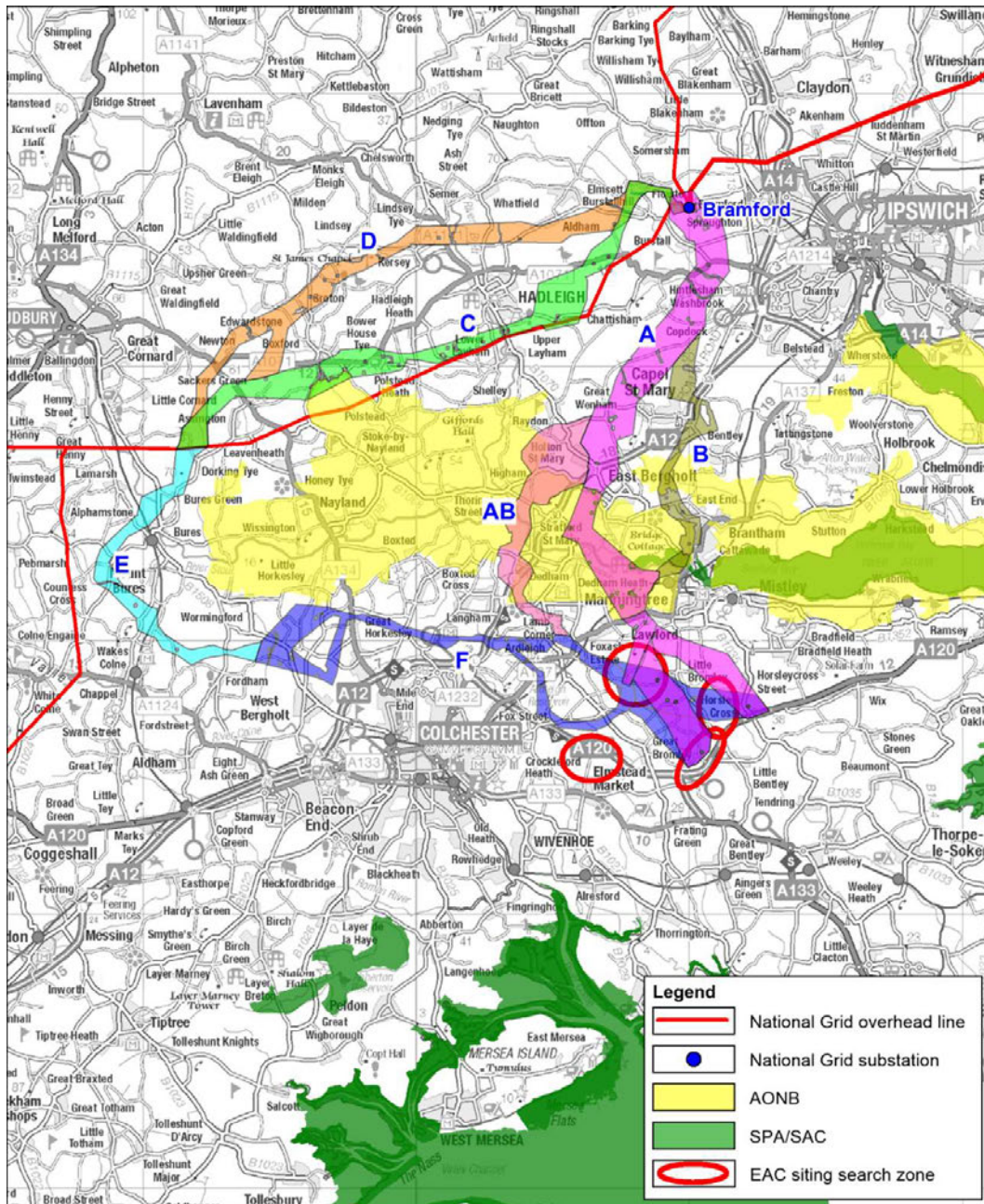
3.4.7 From a cost perspective, Option NB1 was the least cost. It had anticipated capital costs of £157 million. By comparison anticipated capital costs for Options NB2 to NB7 ranged from £169 million to £313 million. Option NB1 was therefore preferred from a cost perspective.

## **3.5 Options identification and selection – Bramford to East Anglia connection (EAC) substation**

3.5.1 A study area was defined to deliver the Strategic Proposal associated with the Bramford to East Anglia connection substation. Features were then gathered, including environmental baseline information within the defined study area. Four initial potential route corridors were then identified and appraised (BE1 (A), BE2 (north A, B and south A), BE3 (C, E and F) and BE4 (D, E and F)).

3.5.2 Following the initial appraisal, a challenge and review exercise took place to analyse and discuss the outputs of the options appraisal, filter out/remove non-feasible options, and shortlist options to be taken forwards for further consideration. The exercise also identified an additional hybrid corridor (BE5 (north A, AB and F)) to be subject to options appraisal. These are presented on Image 3.4.

Image 3.4 – Bramford to East Anglia connection substation options (not to scale)



3.5.3 Following the decision exercise undertaken after the options appraisal process was complete option BE5 (consisting of the northern part of Section A, Section AB and the eastern part of Section F) was preferred from an environmental and cost perspective.

3.5.4 Overall, a decision about which option to take forward in this area was largely driven by whether the connection should pass through the AONB or avoid it. From a landscape and visual perspective, while undergrounding through the AONB would have a temporary effect on the landscape it would facilitate a more direct route – approximately half the length compared to a route that avoids the AONB. Specifically, the environmental effects of underground cabling are largely short-term and associated with the construction period, whereas those associated with OHLs are largely long-term. As a result, there would be a reduction in the environmental effects and cumulative effects likely to be associated with a connection of less than half the length of the alternative

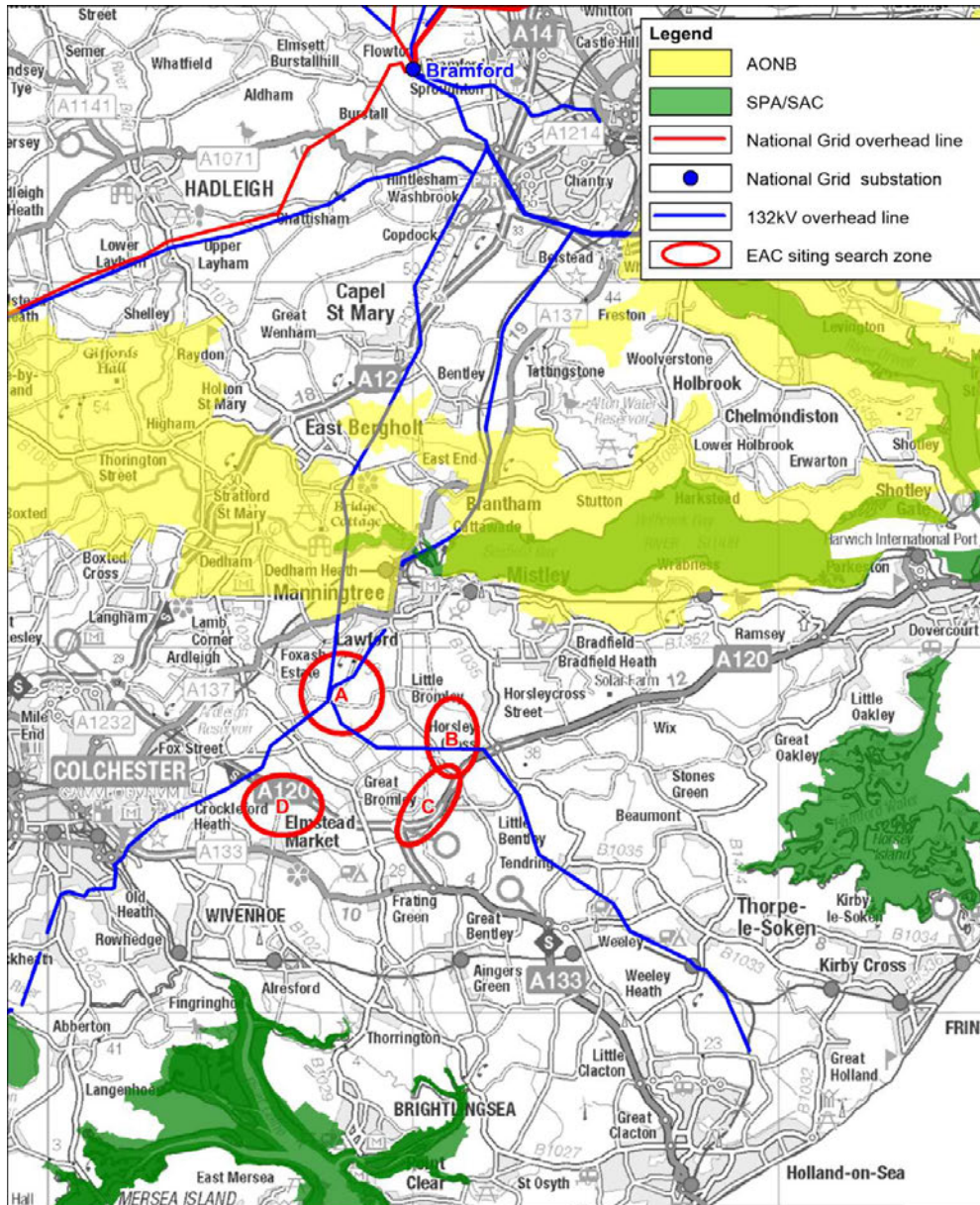
route passing around the AONB. Of the routes that pass through the AONB, Option BE5, which use the northern part of Section A, Section AB (the section through the AONB) and the eastern part of Section F, was preferred compared to Options BE1 and BE2 - due to greater separation from particularly highly valued parts of the Dedham Vale AONB.

- 3.5.5 From a historic environment perspective Option BE5 was preferred as it avoided passing through any conservation areas unlike Options BE3 and BE4 that seek to avoid the AONB. (Section A did contain the edge of the Dedham Conservation Area at its central part, but would be entirely avoided by using Section AB to achieve a connection, as in the preferred Option BE5).
- 3.5.6 While the westerly options were preferred from an ecology and biodiversity perspective, Option BE5 was appraised to have the least potential of those that pass through the AONB to have potential for effects resulting in likely significant effects on the Orwell Estuaries SPA.
- 3.5.7 From a socio-economic perspective Option BE5 was preferred as it achieves greater separation from areas of particular focus for AONB visitors. It was considered that while a connection that passes through the AONB would be in conflict with Holford Rule 1, the use of undergrounding through this designation would minimise long term residual effects on this designation.
- 3.5.8 From a technical perspective, all options performed similarly and therefore it was not a differentiating factor.
- 3.5.9 Connections that avoided the AONB, had similar costs to the most costly option through the AONB using underground cables. The preferred option costs £240 million which was in the middle of the range of costs for all options.

## **3.6 Options identification and selection – East Anglia connection substation**

- 3.6.1 In view of the locations of the connecting windfarm proposals (North Falls and Five Estuaries), potential landing points on and north of the Tendring peninsula, extending from Clacton-on-Sea in the south through to sites north of Felixstowe, were considered as strategic options. The Strategic Options Report (National Grid, 2022) concluded that options associated with Clacton landing points and EAC locations in on the Tendring peninsula were preferred in view of the locations of the connecting windfarm proposals (North Falls and Five Estuaries).
- 3.6.2 A study area was defined to deliver the Strategic Proposal associated with the East Anglia connection substation. Features were then gathered, including environmental baseline information within the defined study area. A long list of 45 relatively unconstrained candidate areas were identified. An initial filtering exercise was undertaken and the number of sites were reduced. Those remaining were grouped into four zones (A, B C and D) which were then appraised. These four zones are presented on Image 3.5.

Image 3.5 – East Anglia connection substation options (not to scale)



- 3.6.3 Following the appraisal of the four zone options described above, a challenge and review exercise took place to analyse and discuss the outputs of the options appraisal and filter out/remove non-feasible options and shortlist options to be taken forward to the decision workshop. No additional options were identified.
- 3.6.4 Following the decision exercise undertaken after the options appraisal process was complete Zone A was preferred from an environmental, technical and cost perspective.
- 3.6.5 Overall, a decision about which zone to take forward as the preferred option was driven by the differences between landscape, technical engineering challenges and cost. Zone A would also result in shorter length of OHL which would mean fewer pylons and thus fewer effects compared to Zones B to D. This was assessed to be a differentiating factor between the zones as it avoided introducing further additional OHLs into the landscape.
- 3.6.6 While Zone A as a whole was considered less preferable from a landscape and visual

perspective compared to Zone C when considering the substation in isolation, when account was taken of the 400kV OHLs, Zone A would require the shortest length of connection. The cost for a substation at Zone A would be between approximately £16 million and £20 million less than that for a substation at any of the other zones.

### **3.7 Options identification and selection – East Anglia connection substation to Tilbury**

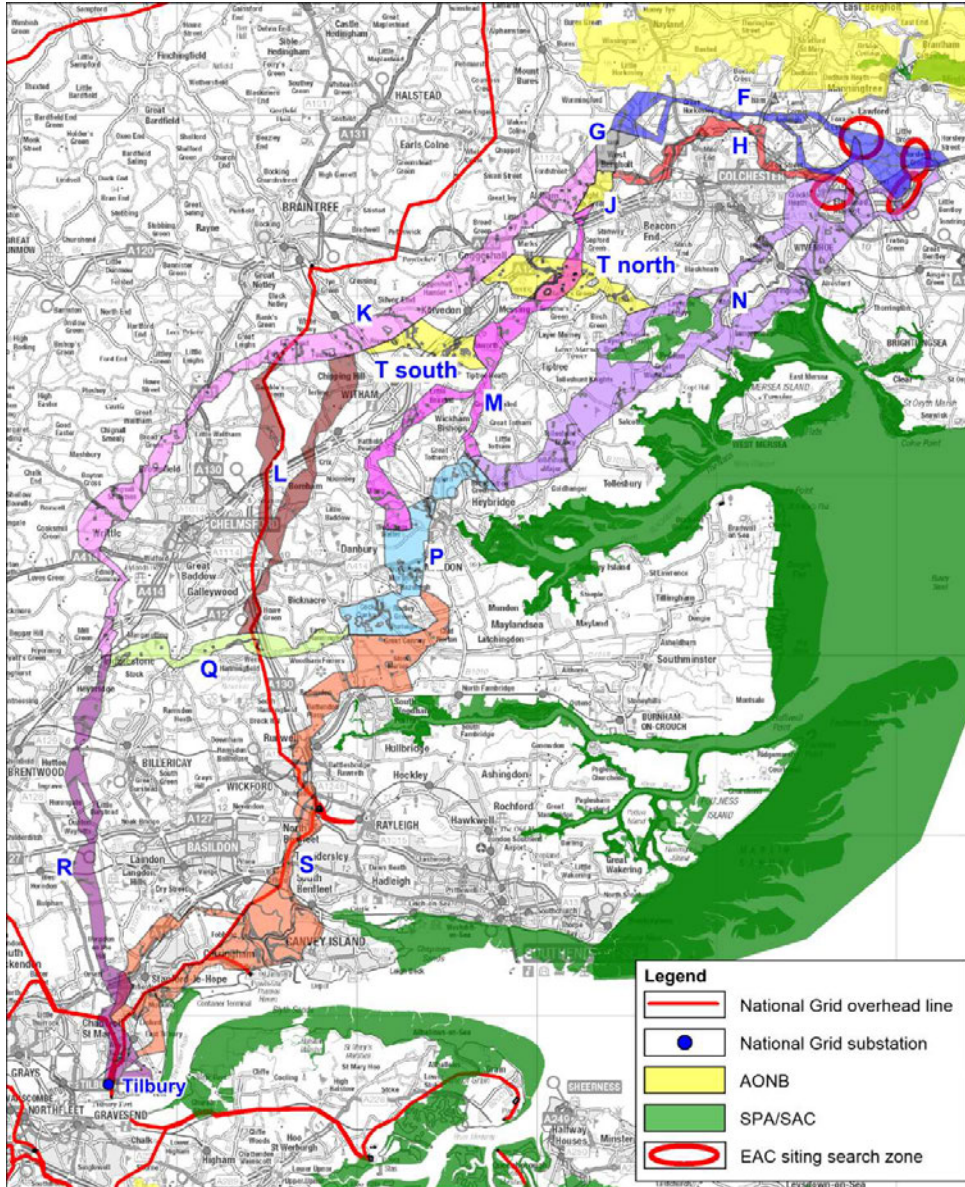
3.7.1 A study area was defined to deliver the Strategic Proposal associated with the East Anglia connection substation to Tilbury element. Features were then gathered, including environmental baseline information within the defined study area. Twelve potential route corridor sections were then identified (Section F, Section G, Section H, Section J, Section K, Section L, Section M, Section N, Section P, Section Q, Section R, Section S). The corridor sections were then subject to an iterative process which removed some due to primarily engineering constraints. Additional sections were also identified and included:

3.7.2 Two additional sections south of Colchester:

- Section T North – a section that allows a link from Section N east of Colchester to continue southwards via an inland route either on Sections M or K
- Section T South – a more southerly section south of Colchester that allows a link from Section M to K to continue southward via a more inland route

3.7.3 All 14 options were taken forwards to options appraisal and are presented on Image 3.6.

Image 3.6 – East Anglia connection substation to Tilbury options (not to scale)



- 3.7.4 Following the appraisal, a challenge and review exercise took place to analyse and discuss the outputs of the options appraisal, filter out/ park non-feasible options, and shortlist options to be taken forward to the decision exercise. The exercise also identified six additional permutations of sections already identified as being potentially viable (ET1 (F and G or H and J plus K and R), ET2 (N, P and S), ET3 (F, J and J or H and J plus M, P and S), ET4 (F, G and J or H and J plus M, P and S) ET5 (F and G or H and J plus K, L Q and R) and ET6 N and T north or N, T north , M and T south plus K and R) to be taken forward.
- 3.7.5 Following the decision exercise, the options appraisal process was complete and hybrid option ET1 (a combination of Sections F, G, K and R) was preferred from an environmental, technical and cost perspective.
- 3.7.6 Overall, a decision about which option to take forward was largely driven by whether to take a coastal route or a more inland route. A coastal route had greater potential to result in likely significant effects on a range of international and nationally designated ecological sites, including SPAs and Ramsar sites, SACs and SSSIs. There was



consequently a high risk that a coastal connection would require a Habitat Regulations Assessment process to be undertaken due to potential effects on the qualifying species and habitats of the sites. This means if alternatives are identified that won't lead to an adverse effect on the integrity of the designated sites they should be taken forward in preference, which in this case are those options further inland which are less likely to affect qualifying features of the sites.

- 3.7.7 In addition, coastal Section P would pass through the Chelmer and Blackwater Navigation Conservation Area, which could not be avoided by routeing, due to the east / west extent of its coverage, resulting in a negative effect on the historic environment. Other corridors either avoid conservation areas or have sufficient space for alignments within a corridor to avoid conservation areas.
- 3.7.8 From a technical perspective, Option ET1 was deemed to be the preferred option for the routeing of an OHL. This was largely due to fewer constraints in Section K when compared to Section N, and upon entry into Tilbury via Section R when compared to Section S. The other options utilising Sections M, P, L and Q, whilst similar were less favourable than using Sections K and R alone as they provided no tangible benefits and in some instances additions of construction/delivery and engineering complexity. Section R was deemed favourable to Section S as the latter would necessitate complex engineering designs which would lead to significant programme risk and at additional cost. Option ET1 was considered technically preferable. Option ET2, utilising Sections N, P and S was not preferred.
- 3.7.9 When comparing more inland connections, Option ET1 was preferred over corridors using central connecting sections (Sections M, L, Q and T, within Options ET3, ET4, ET5 and ET6) on the basis of fewer effects on biodiversity and ecology and fewer Technical complexities compared to routeing east of Chelmsford in Sections L and Q.
- 3.7.10 A more inland connection was also preferred on the basis it was £107 million less than a coastal route (£353 million for Option ET1 compared to £460 million for Option ET2). Option ET1 was marginally more expensive than the least cost inland option (Option ET5) with the difference in cost being £1million and for the reasons set out above Option ET1 was preferred on environmental and technical grounds compared to the other options.

## **3.8 Preferred route corridor**

- 3.8.1 These preferred corridors and single preferred siting zone form the Scoping Report Corridor which is presented on Figure 1.1 at Appendix A.

# 4 Description of the Project

## 4.1 Overview of the Project

- 4.1.1 This chapter sets out the current description of the Project that is proposed to be constructed and operated subject to an order granting development consent.
- 4.1.2 The precise alignment of the Project, location of construction compounds and haul road(s) are not available at this stage as they are still under development<sup>3</sup>. Feedback from the non-statutory consultation is still being processed and may result in changes to the Project. Therefore, the Scoping Report Corridor has been used to determine the scope of the ES in this Scoping Report. The Scoping Report Corridor aligns with the preferred corridor presented at non-statutory consultation and is presented on Figure 1.1 at Appendix A. Within the Scoping Report Corridor the following principal permanent components would be located (also detailed in Table 4.1):
- A 400kV electricity transmission reinforcement between existing substations - Norwich Main, Bramford and Tilbury comprising:
    - Installation of approximately 180km of 400kV OHL
    - Installation of approximately 500-550 steel lattice pylons. Steel lattice pylons are on average, approximately 50m in height
    - Installation approximately 10km of 400kV underground cables, largely located through the Dedham Vale AONB
  - Cable sealing end compounds CSEC<sup>4</sup> (including permanent access roads)<sup>5</sup>
  - A new 400kV substation located on the Tendring Peninsula (including permanent access road) and associated works (including new underground cables) to connect with the 400kV OHL
  - Works at Norwich Main Substation, Bramford Substation and Tilbury Substation
- 4.1.3 Removal/ diversion and modification of existing National Grid infrastructure and third-party utilities would also be considered.
- 4.1.4 In addition to the permanent infrastructure listed above within the Scoping Report Corridor there would be land temporarily required for construction activities including working areas for construction equipment and machinery, site offices, welfare, storage and temporary construction access. There would also be land required for mitigation, compensation and enhancement of the environment including Biodiversity Net Gain.
- 4.1.5 The Project would be designed, constructed and operated in accordance with applicable health and safety legislation. The Project would also need to comply with design safety standards including the NETS SQSS, which sets out the criteria and methodology for planning and operating the National Electricity Transmission System (NETS). This

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<sup>3</sup> The design presented within the ES would show the alignment together with proposed temporary works which would also incorporate feedback from the non-statutory consultation and statutory consultation.

<sup>4</sup> Required at either side of undergrounded cables.

<sup>5</sup> At this stage of development CSECs are expected to be required for the cable through the AONB with, one to the north (Babergh district) and one to the south (Tendring district) of the AONB and in additional select locations to be confirmed where the OHL may need to cross existing permanent infrastructure such as other OHL's or where mitigation requires

informs a suite of National Grid policies and processes, which contain details on design standards required to be met when designing, constructing and operating assets such as proposed on the Project.

- 4.1.6 As the Project is an NSIP, proposed Order Limits would be defined to encompass the land required temporarily to construct the Project and permanently operate the Project.

### Limits of Deviation

- 4.1.7 The proposed Order Limits (which would be presented in the ES) would also include Limits of Deviation (LoD), which represent both the vertical and horizontal maximum deviation for permanent infrastructure, such as the OHL, pylons and underground cables. The LoD would allow for adjustment to the final positioning of project features to avoid localised features or unknown or unforeseeable issues that may arise.

- 4.1.8 The LoD would also be defined within the DCO and assessed (representing the worst-case scenario) within the ES.

### The Rochdale Envelope

- 4.1.9 Advice Note 9: The Rochdale Envelope (Planning Inspectorate, 2018) provides guidance regarding the degree of flexibility that may be considered appropriate within an application for development consent under the Planning Act 2008. The advice note acknowledges that there may be parameters of a project's design that are not yet fixed and, therefore, it may be necessary for the ES to assess likely worst case variations to ensure that the likely significant environmental effects of the Project have been assessed.

- 4.1.10 Within this Scoping Report, the description of the Project reflects what is currently known owing to the limited Front End Engineering Design (FEED) undertaken to date. However, as the Project evolves sufficient flexibility within the design would be allowed to provide the future design and build Main Works Contractor with sufficient scope for value engineering through innovative design and / or construction techniques. As such, the Project design presented in the ES and the accompanying assessment, would both reflect the need for this flexibility and the requirements of Advice Note 9 to ensure that the likely significant effects of the Project are assessed. Furthermore, the design would be informed by the EIA with the design reflecting iterative working between the designers and the environmental specialists.

### Programme

- 4.1.11 It is anticipated that construction would commence in 2027 and the Project would be operational in 2031.

## 4.2 Description of each section of the Scoping Report Corridor

- 4.2.1 The Project is subject to change as the design develops and feedback is received from non-statutory consultation and statutory consultation.

- 4.2.2 For the purpose of scoping, the Project has been divided into nine sections. The sections are split from north to south by the geographical alignment of the EIA Scoping Report Corridor, and the interactions of the corridor with Local Authority boundaries e.g. where the corridor passes through Babergh, Colchester and Tendering etc). The nine sections are described in Table 4.1 and presented on Figure 4.1 at Appendix A. Table 4.1 includes infrastructure likely to be located in each section.

Table 4.1 – Description of the Scoping Report Corridor north to south by section

Section name	Local authority	Approximate section length (km)	Description	Principle features	Principle Project infrastructure
1	South Norfolk	26.5	From the existing National Grid Norwich Main Substation, the Scoping Report Corridor heads south by southwest of Dunston through arable fields before crossing an unnamed river between Flordon and Toprow, this river is connected to the SSSI Flordon Common located 300m from the Scoping Report Corridor. The Scoping Report Corridor continues south through mainly arable fields and crossing some unnamed roads, passing between Forncett St Mary and Forncett End. The Scoping Report Corridor passes within 200m of an area of ancient woodland (Bunwell Wood) at Bunwell Hill. The Scoping Report Corridor then crosses the River Tas, north of Tibenham Airfield. Just south of this the corridor crosses the B1134 at Long Row. The Scoping Report Corridor continues south through arable fields, before crossing another unnamed river. The corridor then heads west, crossing the B1077 (Shelfanger Road) and then another unnamed river before heading south, crossing the A1066 between Roydon and Fen Street. At this point the Scoping Report Corridor comes within close proximity of the Bressingham Steam museum and Gardens. The corridor crosses the River Waveney before this section concludes.	Unnamed river x3 Flordon Common SSSI Bunwell wood (Ancient Woodland) River Tas B1134 B1077 A1066 Bressingham Steam Museum and Gardens River Waveney	Works at the existing Norwich Main Substation  Pylons and OHL
2	Mid Suffolk (and Babergh north of the existing Bramford substation)	33.8	Section 2 continues south past Wortham Ling, through arable fields before crossing the A143 at Bury Road. Shortly after the Scoping Report Corridor crosses an unnamed river. The Scoping Report Corridor continues south past Mellis and through the Mellis Green before crossing an unnamed river at Gislingham. The Scoping Report Corridor continues south before it crosses the Chelmsford to Colchester railway line travelling north-east to south west across the path of the Scoping Report Corridor. The Scoping Report Corridor continues south, crossing an unnamed river at Finningham. Then continues south past Finningham and Mendlesham Green, the ancient woodland - Gipping Great Wood overlaps with the Scoping Report Corridor very slightly before crossing the River Gipping. The Scoping Report Corridor continues south before crossing the A1120 at Bell's Lane. It then continues south until crossing the A14 east of Stowmarket. Shortly after it crosses an unnamed river and the River Gipping again. The Scoping Report Corridor then crosses another railway line before crossing the B1113. South of the B1113 there are three areas of ancient woodland within the Scoping Report Corridor, at this point the corridor also crosses another unnamed river. The Scoping Report Corridor continues south before crossing the B1078 between Barking and Ringshall Stocks, just south of this it then diverges around Offton Middle Wood (an area of ancient woodland and crosses a river known as 'The Channel'). It then continues southeast. The Scoping Report Corridor then heads southeast, another unnamed river enters, but does not cross at Flowton. This section concludes a little further south east where it meets the Bramford 400kV Substation.	A143 Unnamed river x5 Meilis Green Railway line Gipping Great wood River Gipping x2 A1120 A14 B1113 Unnamed ancient woodland x3 B1078 Offton Middle wood The Channel Bramford 400kv substation	Works at the existing Bramford Substation  Pylons and OHL
3	Babergh and Colchester (to the north of the new 400 kV Substation)	12.4	The Scoping Report Corridor in Section 3 continues south west through arable fields. The Scoping Report Corridor crosses the A1071 at Thorpe's Hill. Shortly afterwards it crosses an unnamed river and the Spring Brook River. The Scoping Report Corridor then heads south west through arable fields, an unnamed ancient woodland is present within the corridor between Great Wenham and Washbrook. Continuing south west from Great Wenham, it crosses the B1070 at Holton St Mary and then crosses the B1068 before it joins the A12. The A12 overlaps with the Scoping Report Corridor only slightly, but does not cross through (this occurs at junction 31 on Ipswich Road). It is just south of the B1068 that the Scoping Report Corridor enters the Dedham Vale AONB, designated for its meadows, fens and ancient woodland (it is proposed that underground cabling is used at this point). The Scoping Report Corridor stays within the AONB	A1071 Spring Brook River Unnamed ancient woodland B1070 B1068 A12 Dedham Vale AONB	CSEC (North of the AONB)  Pylons and OHL  Underground cable

Section name	Local authority	Approximate section length (km)	Description	Principle features	Principle Project infrastructure
			located in both Babergh and Colchester. Once in Colchester borough it heads south east, re-entering the AONB, to the east of Langham and crossing the A12 before exiting Colchester to the southeast and concluding the section.		
4	Tendring	9.9	From the Colchester and Tendring boundary southeast of Langham, the Scoping Report Corridor heads east crossing the B1029 at Dedham road. The underground cabling would likely transition back to OHL lines at this point. It then continues between Foxash and Ardleigh, crossing the A137 at Harwich road. Shortly after it crosses a railway line. The Scoping Report Corridor then enters the area where the proposed Tendring 400kv connection substation would be situated. The Scoping Report Corridor then heads west back the same way where it re-crosses the railway line, A137 and B1029, but this time head straight west, and crosses an unnamed river connected to the Ardleigh reservoir before exiting the section at the boundary between Tendring and Colchester.	B1029 A137 Railway line Unnamed river	CSEC (south of the AONB)  Pylons and OHL (including parallel lines into and out of the new substation)  New substation
5	Colchester	21.7	The Scoping Report Corridor re-enters this section from the proposed end point of Section 4 (the Colchester/Tendring boundary) heading west, it immediately crosses the A12 at Ipswich Road. It then continues west through arable fields, crossing the A134 south of Little Horkesley. The Scoping Report Corridor then heads south west, part of Pitchbury Wood – an area of ancient woodland overlaps with the Scoping Report Corridor west of Great Horkesley. It then continues to the south west crossing the B1508, shortly after it crosses the River Colne east of Fordstreet. Between the B1508 and the River Colne, two areas of ancient woodland are adjacent to the Scoping Report Corridor on the east side, Stitching Wood and Hillhouse Wood. Just south of the River Colne there is an area of ancient woodland within Scoping Report Corridor, Fiddlers Wood. It then continues south west crossing the A1124 at Halstead Road. The Scoping Report Corridor then passes past Aldham and two areas of ancient woodland, one unnamed the other is Aldham Wood. Then continues on this path crossing a railway line south of Great Tey and the Roman River after that. At the Roman River the Marks Tey Brickpit SSSI is adjacent to the Scoping Report Corridor. The Scoping Report Corridor continues through arable fields past Little Tey before it then crosses the A120 at Coggeshall Road.	A12 A134 Pitchbury wood B1508 River Colne Stitching wood Hillhouse wood Fiddler's wood A1124 Unnamed ancient woodland Aldham wood Railway Line Roman River Marks Tey Brickpit SSSI A120	Pylons and OHL
6	Braintree	14.9	From the proposed location of the Section 5 endpoint and the Colchester and Braintree border) the Scoping Report Corridor continues south west through Coggershall Hamlet, it crosses the River Blackwater, before crossing the B1024. It continues south west, there are two very small unnamed areas of ancient woodland adjacent to the northern boundary of the corridor, there is also a larger unnamed area of ancient woodland within the Scoping Report Corridor between Silver End and Rivenhall. Tarecroft Wood – an area of ancient woodland is also adjacent on the southern side just south of Rivenhall. The Scoping Report Corridor continues south west, but curves west, crossing the B1018 at Cressing road. It then crosses a railway line before crossing the River Brain, at this point the Faulkbourne Hall registered Park/garden is adjacent to the Scoping Report Corridor on the southern side. It then continues west through arable fields, the ancient woodland Troy's wood is within the boundary and Ivy wood is adjacent to it on the southern side, further west the Scoping Report Corridor then crosses an unnamed tributary of the River Ter. At this point the existing Braintree – Pelham OHL intersects the Scoping Report Corridor, the Project must go underneath this existing OHL. At this point there are also three small unnamed areas of ancient woodland and two named ones, Brickhouse wood and Hookley wood. The Scoping Report Corridor continues	River Blackwater B1024 Unnamed ancient woodland Tarecroft Wood B1018 Railway line River Brain Faulkbourne Hall registered park/ garden Troy's wood Ivy Wood Unamed Tributary Brickhouse wood Hookley wood	CSEC's to cross existing OHL  Pylons and OHL

Section name	Local authority	Approximate section length (km)	Description	Principle features	Principle Project infrastructure
			west, concluding at the boundary between Braintree and Chelmsford, at this end point the Scoping Report Corridor is adjacent to Mann/Parsons ancient woodland.	Mann/ Parsons ancient woodland	
7	Chelmsford	19.6	From the proposed location of the Section 6 end point (at the Braintree and Chelmsford boundary) the Scoping Report Corridor continues southwest through arable fields until crossing the River Ter, at this point it is also adjacent to the SSSI area of the River Ter. The Scoping Report Corridor then continues south west through arable fields before crossing the A131 (Braintree Road). It then crosses the B1008 before crossing the River Chelmer west of Little Waltham. At this point the Scoping Report Corridor is also adjacent to the Langley's historic park/garden area. It then continues southwest, there are two ancient woodlands within the Scoping Report Corridor just south of Broad's Green, Sparrowhawk wood and Bushy Wood. The Scoping Report Corridor then crosses the River Can, just further southwest of this point (within the Scoping Report Corridor) is the Chelmsford Compressor Station where three gas pipelines converge. It then crosses the A1060 at Roxwell road and Roxwell brook river. From here the Scoping Report Corridor heads southeast crossing the A414 at Ongar Road and then the Sandy Brook river, before heading south. The Scoping Report Corridor then heads south at Edney common and moves through many small streams and adjacent to many large areas of ancient woodland including Chapel Wood and Writtle-Writtle Park wood. It continues south through arable fields and many small unnamed streams before crossing the A12 and B1002 at Margaretting before concluding the section at the border between Chelmsford and Basildon.	River Ter River Ter SSSI A131 B1008 River Chelmer Langley's Historic Park/ Garden Sparrowhawk Wood Bushy Wood River Can Chelmsford Compressor Station A1060 Roxwell River Brook A414 Sandy Brook River Writtle-Writtle Park Wood Chapel Wood A12 B1002	Pylons and OHL
8	Basildon and Brentwood	12.7	From the proposed location of the Section 7 endpoint (the Chelmsford and Brentwood boundary) the Scoping Report Corridor continues south and crossing an unnamed river, further south from this an ancient woodland Harespring wood within the Scoping Report Corridor. It continues south through arable fields before crossing the River Wid and another railway line. At this point there are two ancient woodlands within the Scoping Report Corridor, one unnamed and Wid wood. The Scoping Report Corridor continues south crossing the A129. It then continues south past Havering's Grove with areas of ancient woodland in close proximity to the Scoping Report Corridor James wood and Bluntshall wood just south of Havering's Grove. The Scoping Report Corridor then crosses an unnamed river. The Scoping Report Corridor continues south through arable fields passing Little Burstead before crossing the A127. At this point the boundary is adjacent to Frieren Manor wood an area of ancient woodland. The Scoping Report Corridor continues south through arable fields concluding this section at the border of Thurrock at the crossing of another railway line.	Railway Lines Harespring Wood River Wid Wid Wood Unnamed ancient woodland A129 Bluntshall Wood A127 Frieren Manor Wood	Pylons and OHL
9	Thurrock	17.1	From the proposed location of the Section 8 endpoint (the Brentwood and Thurrock boundary) the Scoping Report Corridor continues south through arable fields before crossing the Mar Dyke north of Doesgate Lane. At this point the Langdon Ridge SSSI is within 400m of the Scoping Report Corridor. It then continues south through arable fields and some areas of sparse woodland and housing before crossing the A13 and the A1013. It then continues south around Walton Farm:  To the east it goes to the east of Linford and around East Tilbury. The existing National Grid ZJ 400kV OHL crosses the Scoping Report Corridor just north of Linford.	Mar Dyke Langdon Ridge SSSI A13 A1013 Tarmac Linford Blocks Plant Multiple OHL Mucking Heath	CSEC (where the corridor connects to Tilbury substation)  Pylons and OHL Works at the existing Tilbury Substation.

Section name	Local authority	Approximate section length (km)	Description	Principle features	Principle Project infrastructure
			<p>To the west it travels through arable fields and Mucking Heath. (It may also go through the Tarmac Linford Blocks Plant). There are also three existing OHL which run through this area along the Scoping Report Corridor.</p> <p>The Scoping Report Corridor converges at west Tilbury and continues south, crossing a railway line before concluding at a point east of Tilbury. The Scoping Report Corridor concludes at the existing Tilbury Substation. There would likely be CSECs and cable sections required to cross the various infrastructure in the final approach into Tilbury Substation.</p>		

## 4.3 Embedded and standard mitigation measures

### Embedded and standard measures

- 4.3.1 Embedded measures are those that are intrinsic to and built into the design of a project to avoid or reduce significant effects that may otherwise be experienced during construction and operation of the Project. Table 4.2 outlines the principle embedded measures.
- 4.3.2 As the assessment and further consultation is undertaken the design of the Project would evolve. The environmental assessment would continue to influence the design, and measures may be embedded into the design, to help avoid and reduce potentially significant effects arising from the Project. Table 4.2 would be updated in the ES to document all embedded measures that have been developed and are considered as part of the design.

Table 4.2 - Embedded measures

<b>Embedded Measures</b>	<b>Benefits</b>
Sensitive Routeing and Siting	Avoid and reduce as far as practicable impacts on identified receptors.
Underground cable through the Dedham Vale AONB.	The Dedham Vale AONB is a nationally important and designated landscape. With the proposed underground cable the impact on views and setting would be reduced.
The Project would include triple Araucaria conductors	Due to its geometrical configuration the triple Araucaria design is the least electrically stressed conductor system that National Grid uses. It is the best design for reducing the effects of line crackle (corona discharge) and would reduce the generation of noise from the proposed OHLs during operation.
T - Pylons and Low Height Pylon designs would be considered where appropriate and justified by the technical assessments.	Possible benefits of using low height pylons and alternative pylon design would, in the appropriate circumstances, have the ability to better integrate the transmission lines into the immediate and wider landscape setting over traditional lattice pylons.
The Project would be designed in accordance with National Grid design standards and would be compliant with the guidelines and policies relating to EMF stated in NPS EN-5 (DECC, 2011), including the ICNIRP guidelines (1998).	Compliance with these guidelines and policies mean that the Project would already have designed out potential effects from Electric and Magnetic Fields (EMF) to a level to meet health and safety standards.



Embedded Measures	Benefits
The Project would be designed to comply with design safety standards including NETS SQSS and the suite of National Grid policies and processes which contains details on design standards required to be met when designing, constructing and operating its projects.	Existing National Grid processes are designed to identify potential safety risks during construction and operation and to design these out at each stage of Project development.
The design would allow for landscape planting around CSEC and the new substation.	This would reduce effects on views and landscape setting.

4.3.3 Standard measures comprising management activities and techniques, would be implemented during construction of the Project to limit impacts through adherence to good site practices and achieving legal compliance. This is captured within the Initial Outline CoCP at Appendix B.

## 4.4 Permanent features (during operation)

4.4.1 This section describes the permanent features of the Project that would be in place during operation. It is split into four main components:

- OHLs (including CSEC)
- Underground cables
- A new substation at Tendring
- Works at existing Norwich Main, Bramford and Tilbury Substations

### OHL (Including CSEC)

4.4.2 Three types of standard steel lattice pylons may be used within the Project, these comprise:

- Suspension steel lattice pylons: which support the OHL in a straight line (presented in Image 4.1)
- Tension (also called angle) steel lattice pylons: which support the OHL where the line changes direction (presented in Image 4.2)
- Terminal pylons: which support the OHL where it connects to underground cables at a CSECs or substations

Image 4.1 - Typical suspension steel steel lattice pylon



Image 4.2 - Typical tension/angle lattice pylon



### Alternative 400kV AC OHL pylon designs

4.4.3 Alternative pylon designs may also be considered, particularly where mitigation (e.g. for landscape and visual effects) is required. The designs which may be considered are:

- Low height steel lattice (Image 4.3)
- T pylon (Image 4.4)

Image 4.3 - Typical low height lattice pylon



Image 4.4 – T-pylon



### Cable Sealing End Compounds

- 4.4.4 These typically occupy a footprint of approximately 100m x 50m for a 400kV double circuit compound. Each CSEC would comprise an adjacent terminal pylon with down-leads connecting to one or more gantries which then connect to CSECs and other electrical equipment. In addition, a small control building may be required in each compound. Each compound would be surrounded by a security fence to protect the equipment and incorporate landscape planting where appropriate.

### Underground cables

- 4.4.5 The Project would include a section of 400kV underground cable where it passes through the Dedham Vale AONB (other areas would also potentially be undergrounded, however this is to be determined through further assessment work and consultation). The underground cables would be laid in corridors and comprise multiple transmission cables. Each cable within the corridor would be approximately 150mm diameter and buried in trenches approximately 1.8m below ground level and would be surrounded by an additional layer of cement bound sand to protect from future excavation works.
- 4.4.6 For the purposes of the assessment, a corridor of up to 200m to provide flexibility (noting that in limited areas this may need to be increased up to 500m) would be considered. This would be reduced to take into account sensitive features. The cables would be laid within a permanent swathe of approximately 65m wide (which may be wider in some instances e.g.at trenchless crossings). This would be set out in the ES.
- 4.4.7 Routeing of cables and haul roads would seek to minimise hedgerow and tree removal by targeting existing gaps and gateways, where practicable to accommodate the permanent corridor width and construction access.
- 4.4.8 Depending on the cable manufacturer, joint bays would be required every 500m–1km.

### New Tendring substation

- 4.4.9 A new 400kV/ 132kV Substation connection node would be constructed on the Tendring Peninsula where the customers would connect (customer connections would be subject to separate consents). This would include 400kV/ 132kV transformers and other typical equipment.

- 4.4.10 The operational footprint of the substation is likely to be approximately 450m x 250m with heights of approximately 15m – 25m excluding any requirement for landscaping and cable/ OHL connections.
- 4.4.11 In addition, a number of small modular container type buildings would be constructed to house electrical equipment, together with small modular self-contained office/ welfare units. The site would be surrounded by security fencing to protect the equipment.

## Changes to existing substations

- 4.4.12 Details of the likely works required at existing substations are outlined below.

### Norwich Main Substation

- 4.4.13 A proposed 2-bay extension to Norwich Main Substation would be required for two new OHL feeder circuits to the south. The extension would comprise:
- Extension of the existing site compound with use of existing site access arrangements
  - Equipment up to 12.5m in height
  - Mix of impermeable concrete surfaces surrounded by permeable stone chippings
  - Electrified palisade fence 4m high

### Bramford Substation

- 4.4.14 An extension would be needed within the existing Bramford substation. The extension would comprise:
- Extension of the existing site compound with use of existing site access arrangements
  - Equipment up to 12.5m in height
  - Mix of impermeable concrete surfaces surrounded by permeable stone chippings
  - Electrified palisade fence 4m high

### Tilbury Substation

- 4.4.15 A new CSEC and extension to the existing substation is required which would require some extension to the existing substation boundary, the new cables would terminate into the new CSEC

## 4.5 Temporary features (during construction)

- 4.5.1 This section describes how the Project would be constructed including the temporary work features, such as, site compound and haul routes. It is split into practices common to the whole Project (OHLs and underground cables) and then for each component for example OHL (including CSEC), underground cables and the proposed Tendring substation. The elements of temporary works have been provided to assist in defining the scope of the assessments and would evolve as the design of the Project progresses and further consultation including with landowners and persons with an interest in the land is undertaken.

## Practices common to OHL, underground cables, construction compound and working areas

- 4.5.2 There would be an element of preparatory works in anticipation of construction at all temporary construction sites. The working areas would be demarcated and secured by temporary fencing appropriate to the location, for example, provision of stockproof fencing in grazing areas. Gated entrances would be installed at the entrance to the working areas, to secure the site. Once secured, the working area, site compounds and proposed cable sections would generally be stripped of the upper layers of soil and stored appropriately.
- 4.5.3 Site compounds would be established and where necessary parts of the compound area would be levelled to provide a flat foundation. Main Works Compounds are likely to be sited at each substation and along OHL between Norwich and Bramford and the EACN and Tilbury. Main Works Compounds would be approximately 250m x 250m. They would be typically surfaced with stone chippings over geogrid to contain welfare, equipment storage and car parking spaces.
- 4.5.4 Satellite compounds would also be required. They are likely to be approximately 110m x 130m and located between Main Works Compounds as well as at the CSEC. These would be smaller and serve specific working areas to provide local welfare facilities for staff and points for delivery of materials to the working areas.

### Temporary haul route and access points

- 4.5.5 A temporary haul route would be constructed to provide access for construction vehicles along the working areas and to minimise impacts of construction traffic using the local road network. The position of the haul route would be determined as the Project evolves, the location would be assessed and presented in the ES. It is currently assumed that temporary haul route would have the topsoil stripped and hardcore placed on top of the subsoil, this would be delivered to site by Heavy Goods Vehicles (HGV). It would be sited where possible to make use of existing access tracks where possible and avoid sensitive ecological locations and water crossing where possible.
- 4.5.6 The haul route for the OHL would be typically 12m wide to allow for a running track, topsoil storage and passing places where required (formed with imported stone and geogrid). Where possible alternatives to imported stone would be considered to limit HGV movements associated with haul road construction. Temporary widening of access points may also be required to access the temporary haul route and construction compounds. Existing access points from the local road network would be used where possible.
- 4.5.7 Temporary crossings may also be required over watercourses, streams and field ditches to maintain the haul route along the Project, these would likely consist of temporary bridges or culverts.
- 4.5.8 Maintenance requirements for T pylons, if selected for mitigation would require retention of a means of permanent access (for mobile platforms) rather than the use of temporary access typical for lattice pylons.
- 4.5.9 Details of the temporary haul route and access arrangements would be provided in the ES.

## OHL (Including CSEC and potential removal / diversion of OHL)

### New Overhead Line

- 4.5.10 The working areas around each new pylon would be cleared of vegetation and fenced appropriately. A temporary stone pad would be required adjacent to each new pylon location, on which to place plant such as cranes and piling. Materials would be brought to site on HGVs and would include the steelwork for the pylons and the conductors (i.e., cabling) wrapped around large drums.
- 4.5.11 The base of the pylons would involve the excavation of the soil. Piling (which may include percussive) may be required at some pylon locations, subject to the ground conditions. This would be confirmed through a programme of ground investigations which would in turn inform the foundation designs. Further details on the need for piling and specific locations would be set out within the ES.
- 4.5.12 The steelwork for the pylons would be bolted together on the ground and each pylon would be assembled in sections beginning with each leg being fastened to the stubs. The pylon would be erected using a mobile crane to lift the assembled steelwork into position. Linesmen help guide the sections into place and bolt the pylon together.
- 4.5.13 The insulators would be fastened to the pylons in preparation for installing the aluminium conductors. The conductors would typically be installed in sections between tension pylons, where the line changes direction. A pulling site would be established at one end of the section with the conductors running out from a tensioning site at the other end of the section, to keep the wires off the ground. Pilot wires would be used to pull conductors between pylons. Additional fittings, such as spacers (to prevent the conductors from touching each other) and dampers (to prevent oscillations in the OHL), would then be fitted to the conductors. An earth wire would run along the top of the pylons and contains optical fibres to allow transmission of data around the system.

### CSEC

- 4.5.14 Construction would begin with the preparation and installation of the permanent access road to the CSECs, which would also be used as the construction access to the rest of the site where practicable. Following this, the working areas would be stripped of soil and a stone pad would be installed for the mobile crane. The terminal pylon would be constructed in a similar way to the OHL pylon construction noted previously, with a concrete foundation and the pylon being assembled before being lifted into position by a crane. The cable troughs would also be excavated and the underground cables and/or ducts would be channelled through the troughs onto the CSEC structures.
- 4.5.15 The CSECs require a clean and controlled environment whilst being installed. Therefore, a weatherproof covered scaffold structure would be erected over the CSECs during installation. Once constructed, the cables would be tested using a high voltage cable testing lorry.
- 4.5.16 Percussive piling may be required at the CSEC. This would be confirmed through a programme of ground investigations which would in turn inform the foundation designs. The Scoping Report assumes that piling is required at all CSEC. Further details on the need for piling and specific locations would be set out within the ES.

### Removal / diversion of OHLs

- 4.5.17 There may be a need to remove/ replace or divert lower voltage OHLs.
- 4.5.18 Construction activities for the removal/ diversion of the OHLs would begin with the preparation and installation of temporary access tracks to each existing pylon site. The working areas around each pylon would be cleared and, where appropriate, fenced to

keep the public and any livestock away from the construction work.

4.5.19 Fittings, such as dampers and spacers, would be removed and the conductors would be winched onto drums in a reverse of the process described for the construction of pylons. The fittings would be removed from the pylons and lowered to the ground.

4.5.20 Construction methods for diversions would be as per paragraphs 4.5.10 – 4.5.13.

## Underground cables

4.5.21 There are two standard techniques that could be adopted to install underground cables, standard open cut and trenchless. Methods adopted would be determined based on ground conditions, technical and environmental features present.

### Standard opencut installation

4.5.22 Standard open cut installation typically involves the following processes:

- Vegetation would be removed where necessary and topsoil would be stripped and stored for reuse
- A temporary haul route would be installed along the length of each cable section to provide access for construction vehicles to the working areas
- A number of open trenches (typically six trenches each accommodating three cables) would be excavated for cabling to be installed and covered

### Trenchless installation

4.5.23 Trenchless crossings may be necessary for example crossing rivers, roads and rail.

4.5.24 The underground cable would be installed using a drilling or boring method to pass beneath features. There are different trenchless methods that could be used and each method would have a different construction footprint required for the drill launching/receiving sites or drill pits. Depending on the technique, the drill may need to undertake a number of passes to make the hole wide enough to allow the ducts (pipes) to be pulled through. The cables would be pulled through the ducts using a cable pulling rig.

## New Tendring Substation

4.5.25 Construction activity would begin with site preparation including setting up the temporary accommodation, parking and laydown area. The permanent perimeter fencing would be completed early in the construction programme to secure the construction area. The permanent access road would be installed to connect the proposed substation to the nearest main road.

4.5.26 The initial preparatory works would comprise the temporary removal of the top layer of ground and laying a temporary stone capping to provide a clean and stable working platform. Typically, the topsoil and a layer of subsoil would be excavated within the footprint and this would be replaced with clean imported granular fill to form the surface of the compound. A series of copper earth tapes would be installed below the ground to create an earth mat to distribute any electrical charge transferred to the ground by earthed equipment and infrastructure in the proposed Tendring substation.

4.5.27 The permanent foul, oily water, including below ground oil separator, and surface water drainage systems would be installed once the preparatory works are complete. In addition, shallow concrete pad foundations and steel supports would be installed for the electrical equipment. The majority of electrical equipment would be mounted on steel posts fixed to concrete foundations.

4.5.28 Reinforced concrete bunds would be installed for each super grid transformer (SGT)

and would comprise a perimeter concrete wall, a base slab continuous with the wall and a central plinth for supporting the SGT. The bunds act as a secondary oil containment measure. SGTs would be transported to site as AIL and installed within the bunds. Concrete for the foundations and bunds would be ready-mixed, brought to site in lorries and placed using small plant such as cranes and excavators.

- 4.5.29 Once the equipment is installed, commissioning tests would be undertaken to check that the individual items of plant and the system as a whole works as required. Following successful testing, the substation would be connected to the electricity transmission system ready for operation.

## Reinstatement

- 4.5.30 Once the Project has been constructed, the working areas would be removed and the site reinstated. Temporary construction haul routes (including temporary bridges and culverts) are likely to be removed unless identified as offering a long-term improvement to the environment and land usage during the design. Temporary features such as site welfare, fencing and scaffolding would be removed. Any stripped topsoil would be reinstated and the site would be returned to its former use, subject to any planting restrictions or agreements with land owners.
- 4.5.31 Reinstatement would also include landscaping. This is likely to include reseeded grassland areas, replanting hedgerows and trees. It would also include additional landscape planting in some areas to help screen the new infrastructure from sensitive receptors.
- 4.5.32 Details of reinstatement would be provided within the ES.

## Routine activities and maintenance

- 4.5.33 This section describes the activities that are anticipated during the operation stage including site inspections and routine maintenance. It is split into OHL (including CSEC), underground cables and the Tendring substation.

### OHL (Including CSEC)

- 4.5.34 The typical lifespan of an OHL and the CSEC would be at least 40 years, depending on use and location. Over this time, the OHL and CSEC would be subject to regular inspection from the ground (using a small van) or by helicopter to check for visible faults or signs of wear in line with existing maintenance requirements at any point in time. The inspections would confirm when refurbishment is required and indicate if plant/ tree growth or development were at risk of affecting safety clearances. There are two types of refurbishment: fittings only refurbishment; and full refurbishment.
- 4.5.35 Fittings only refurbishment would be undertaken if the conductors were still in good condition. The refurbishment involves removing and replacing the insulators, their associated fittings and the spacers that keep the conductors separate in the spans between pylons. The insulators and fittings have a life expectancy of approximately 20-40 years.
- 4.5.36 Full refurbishment would typically be needed at the end of the lifespan (40 years although pylons have a typical life expectancy of 80 years) of the OHL and works would be subject to separate permissions, to take into account the latest site conditions and up to date legislation.
- 4.5.37 The CSEC would contain equipment that would be monitored remotely. Site inspections would include visual checks for signs of damage or wear of the condition of non-mechanical equipment, structures and buildings.



### **Underground cables**

- 4.5.38 Underground cables have a typical life expectancy of at least 40 years. Over this time, the cables would be subject to regular checks. Inspections using the fibre-optic cables that were installed alongside the underground cables during construction would be undertaken in line with maintenance policies and procedures. This would identify whether cable repairs were required.
- 4.5.39 When a repair is needed, the area where the fault is located would be accessed using a temporary access track made up of crushed stone. A working area would be established, similar to that used for construction, and the ground would be excavated.

### **New Tendring Substation**

- 4.5.40 The Tendring substation would be unmanned during operation. Routine site visits would be required to visually inspect condition of equipment, structures and buildings for signs of damage or wear. The routine maintenance would be carried out in line with maintenance policies and procedures.

## **4.6 Decommissioning**

- 4.6.1 It is expected that the transmission of electricity would continue for as long as there is a business case for doing so and that decommissioning activity would occur decades into the future. Refer to Chapter 5: EIA Approach and Method.

# 5 EIA Approach and Method

## 5.1 General approach

- 5.1.1 This section describes the general methodology which would be used to assess the potential significance of effects on the natural, human and built environment as a result of the Project. In accordance with the EIA Regulations, the assessments within the ES would evaluate and identify the likely significant environmental effects arising from the Project for both the construction and operational phases. Mitigation methods and residual effects would also be identified for each topic. Interrelationship of effects and cumulative effects would be identified for each environmental topic within a separate cumulative effects chapter. The environmental assessments would be presented in an ES.
- 5.1.2 The significance of an effect is usually derived from combining the value of the receptor (sensitivity) with the magnitude of the impact. A 'significant effect' is generally considered to be an effect that is of moderate or major significance and is likely to be relevant in the determination as to whether a development should gain consent. However, some assessments, such as the cumulative effects do not use this approach and would conclude only whether an effect is likely to be significant or not.
- 5.1.3 Each topic chapter within this Scoping Report includes a description of the methodology that is proposed for determining significant effects for that relevant topic. The Scoping Report, and ultimately the ES, would also be supported by professional judgement and discussion from the technical specialist author to justify the final judgements on significance.
- 5.1.4 In general, the assessment within the ES would follow a receptor-based assessment approach. Receptors are those aspects of the environment which are sensitive to change as a result of sources such as dust, noise and construction activities. When deciding on which receptors to include within the Scoping Report, consideration has been given to Regulation 5(2) and Schedule 4 paragraph 4 of the 2017 EIA Regulations and the Planning Inspectorate Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements (Planning Inspectorate, 2020).
- 5.1.5 A draft of proposed methodology to be adopted in the ES for each topic has been shared with relevant stakeholders, including Local Authorities and Statutory Environmental Bodies in advance of submitting the Scoping Report. Methodologies were shared via a letter, then in some instances were followed by a thematic group meeting. Summaries of the comments received and how National Grid have addressed feedback is provided within each scoping topic chapter.

## 5.2 Geographical and duration of effects

### Geographical scale of effects

- 5.2.1 The proposed Order Limits would encompass the land required permanently and temporarily to build and operate the Project.
- 5.2.2 The proposed Order Limits would include LoD, covering the maximum parameters within which the Project would be installed. The LoD are often applied to the horizontal alignment of the Project but may also include the maximum height above ground and

maximum depth below ground. The assessments within the ES would be based on the maximum LoD as defined in the DCO. This would provide flexibility regarding any deviations in the alignment.

- 5.2.3 The study areas to be presented in the ES are based on the distance over which an impact is likely to occur. Study areas are defined in each of the topic chapters and vary between topics.

## Duration of effects

- 5.2.4 The EIA would consider separately the effects that are expected to arise during the construction and operation phases and compare them with the current and future baseline. This would be covered within each of the topic chapters.

- 5.2.5 Environmental assessment uses defined temporal scales to characterise the duration of potential effects. Short-term is used in some topic sections to reflect the transient nature of the construction works. For the purposes of assessment, the following definitions would be applied (unless defined differently in the specific topic chapters to remain consistent with recognised assessment methodologies):

- Short term: This is assumed to be up to 2032 which covers construction plus one-year reinstatement
- Medium term: This is assumed to be 2033 to 2048 which is based on year 2-15 years post construction
- Long term: This is assumed to be 2049 onwards and is used to describe effects with a duration that extends longer than 15 years post construction

- 5.2.6 The temporal nature of effects could be different to the phase in which the effects occur. For example, effects as a result of vegetation clearance during construction may be felt for a number of years after construction has been completed, before any replanted habitats have matured. For the purposes of the EIA, the effects would be described under the phase within which the impact arises, i.e., construction in relation to vegetation loss.

## Mitigation measures adopted as part of the Project

- 5.2.7 A number of measures would be adopted in the Project to avoid and reduce the likely significant effects that would be experienced during implementation of the Project, which fall into one of three categories: embedded measures, standard mitigation and additional mitigation measures, which ensure the Project's compliance with legislative and regulatory regimes.

- 5.2.8 **Embedded mitigation measures** are those that are intrinsic to and built into the design. Embedded measures may include, for example, working within the existing topography to reduce pylon intrusion, landscaping to visually screen and contain new infrastructure and reducing habitat loss by minimising land take. They can also include the avoidance of designated sites through sensitive routeing, siting and design. An example of this would be undergrounding thorough through the Dedham Vale AONB. Initial embedded measures are described within Chapter 4: Description of the Project.

- 5.2.9 The embedded mitigation measures which form an intrinsic part of the Project design would be described within the ES.

- 5.2.10 **Standard mitigation measures** comprise management activities, control measures and techniques, that would be implemented during construction of the Project to limit impacts. They include adherence to good site practices and achieving legal compliance. These measures may include, for example, applying construction site dust suppression

techniques within working areas, which the Main Works Contractor would be required to implement as part of their working practices under the terms of their contract. Standard mitigation measures to address construction-related impacts would be described within the ES and detailed in the outline CoCP (submitted with the DCO application).

- 5.2.11 In addition, licenses through separate regimes may also be required. For example, ecological licences and assents granted by Natural England and various permits relating to water and waste granted by the Environment Agency. On the presumption that the regulatory authorities would not permit the works unless the potential impacts have been appropriately managed, it is assumed that these licensable activities are considered measures adopted as part of the Project.
- 5.2.12 **Additional mitigation measures** comprise measures over and above any embedded and standard mitigation measures, for which the EIA has identified a requirement to further reduce significant environmental effects. Additional mitigation measures would be described within the ES and secured through the DCO or through other statutory agreements.
- 5.2.13 Environmental compensation is considered where mitigation at an affected location is not possible to avoid or reduce a significant effect. Where identified, compensation measures forming part of the Project design would be described within the ES.
- 5.2.14 Embedded, standard and additional mitigation measures are assumed to be in place or at least achievable prior to undertaking the scoping of likely significant effects, in accordance with guidance from the IEMA Guide to Shaping Quality Development. (IEMA, 2016).

### 5.3 Assessment of residual effects and determination of significance

- 5.3.1 Regulation 5(2) of the EIA Regulations states that “the EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors: (a) population and human health, (b) biodiversity..., (c) land, soil, water, air and climate, (d) material assets, cultural heritage and the landscape; e) the interaction between the factors referred to in sub-paragraphs (a) to (d).”
- 5.3.2 Schedule 4 paragraph 5 of the EIA Regulations requires a description of the likely significant effects of the development on the environment.
- 5.3.3 Residual effects are those that are predicted to remain after the environmental mitigation measures have been implemented. Only residual effects would be described within the ES as these are the effects ‘likely’ to arise as a result of the construction and operation of the Project. These effects would be described within each topic chapter within the ES.
- 5.3.4 Generally, the assessment of significance is based on a three-step process. The first step assigns sensitivity or an inherent value to a receptor. Sensitivity is how easily the receptor is affected by change; value is a measure of its inherent worth. The criteria defining the sensitivity/ value of a receptor varies between each environmental topic – this is presented within each topic chapter in this Scoping Report.
- 5.3.5 The second step of the assessment determines the likely magnitude of the potential impact. This is the scale of the change caused to the baseline conditions considering both the degree of change from the baseline conditions and the duration and/or reversibility of the effect. The assessment of magnitude takes into consideration all

mitigation whether embedded, standard or additional measures. These criteria for defining magnitude are presented within each topic chapter within this Scoping Report.

- 5.3.6 As the third step in the process, the significance of an effect on a receptor is considered in relation to the sensitivity/ value of the receptor and the magnitude of the potential impact. Assigning significance in EIA is subjective, particularly where the assessment is qualitative rather than quantitative. To aid transparency in the assessment process, the matrix shown in Table 5.1 would be used as the basis for assigning significance to an effect.
- 5.3.7 Professional judgement would be used when determining significance. This is of particular relevance where the assessment is based on a qualitative approach and the significance of effect is a matter of judgement rather than a quantified outcome. Explanatory text would be provided to explain how professional judgement, where used, has determined the significance value. Where the matrix indicates two or more levels of significance are possible, professional judgement would be applied to determine the level of significance.
- 5.3.8 The assessment of significance would include the reasoned argument setting out the rationale for the value, magnitude and significance of effect.

Table 5.1 – Significance matrix

Value / Sensitivity of Receptor	Magnitude of Change			
	Large	Medium	Small	Very Small
High	Major	Major	Moderate	Minor / Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor / Negligible	Negligible	Negligible	Negligible

- 5.3.9 The influence of impact duration on the overall significance of effect would also be considered as part of the determination of magnitude and sensitivity to change.
- 5.3.10 Under the EIA Regulations, the significant effects of the Project on the environment must be reported in the ES. A significant effect in relation to the EIA Regulations is taken to mean one of moderate or major adverse or beneficial significance, and which would be considered material in determining the application. While the effects of minor or negligible significance are not considered to be significant effects on the environment, they are reported to acknowledge that there would be some differences from the baseline conditions and that they are not significant.

## 5.4 Monitoring

- 5.4.1 Schedule 4, Paragraph 7 of the EIA Regulations is clear that, where appropriate, the ES should include a description of any proposed monitoring arrangements where likely significant effects have been identified. The monitoring of significant effects requirements would be detailed within the ES topic chapters to include clear and proportionate objectives for monitoring, the parameters to be monitored, the methodology for the monitoring, a timescale for implementation, identification of the party who would be responsible for the monitoring, and an outline of the remedial actions to be undertaken should results be adverse.

## 5.5 General Limitations

- 5.5.1 A number of general limitations have been encountered during the scoping exercise.
- 5.5.2 The detailed construction methodology for the Project has yet to be defined. This would be subject to further development during the process of iterative design and environmental assessment of the Project.
- 5.5.3 The status of other planned development with which the Project could potentially interact would be monitored throughout the EIA process to establish any change in their status, and to identify whether additional development proposals have come forward that warrant consideration within the ES.
- 5.5.4 Scoping has been prepared based on the environmental baseline available at the time of writing, and the extent of the Scoping Report Corridor. Due to the scoping exercise being undertaken part way through the design-development and EIA processes, not all environmental desk-based and site-based surveys have commenced or have been completed. A full programme of data gathering and surveys would be undertaken to fully inform the baseline of the assessment to be outlined within the ES. Further information to be obtained is outlined within each topic specific chapter, presented in Chapters 6-16 of this Scoping Report.

## 5.6 Environmental topics

- 5.6.1 Table 5.2 outlines the topics that have been considered within this Scoping Report and how they relate to the topics identified in the EIA Regulations.
- 5.6.2 The focus for the EIA is the impact of effects on receptors. The main receptors are people and local communities, biodiversity, land use and land quality, landscape/views, and surface and groundwater resources.

Table 5.2 – Environmental topics considered with this Scoping Report

<b>Environmental Factors to be considered (EIA Regulations, Regulation 5(2) and Schedule 4</b>	<b>Topics considered in this Scoping Report</b>
Population and human health	Health and Wellbeing Traffic and Transport Socio-economics, Recreation and Tourism
Biodiversity (flora and fauna)	Ecology and Biodiversity
Land (for example land take)	Geology and Hydrogeology Agriculture and Soils Socio-economics, Recreation and Tourism
Soil (for example organic matter, erosion, compaction, sealing)	Geology and Hydrogeology Agriculture and Soils
Water (for example, hydromorphological)	Hydrology and Land Drainage

<b>Environmental Factors to be considered (EIA Regulations, Regulation 5(2) and Schedule 4</b>	<b>Topics considered in this Scoping Report</b>
changes, quantity and quality)	
Air	Air Quality
Climate (for example, greenhouse gas emissions, impacts relevant to adaptation) and vulnerability of the Project to climate change	Refer to section 5.6.
Material assets	This topic is concerned with the interference of the Project with other infrastructure, including utilities, highways, and rail. The mitigation is to avoid the need for crossings and where this is unavoidable, to agree to the form of crossing or divert utilities with the statutory undertaker or private enterprise. This is a construction engineering issue and is addressed within Chapter 4: Description of the Project.
Cultural heritage (including architectural and archaeological aspects)	Historic Environment
Landscape	Landscape and Visual
The interaction between the factors listed above	Part of the cumulative effects assessment.
Vulnerability of the development to risks of major accidents and / or disasters	Refer to section 5.6.

5.6.3 The environmental topic chapters presented in this Scoping Report therefore comprise:

- Agriculture and Soils
- Air Quality
- Ecology and Biodiversity
- Geology and Hydrogeology
- Health and Wellbeing
- Historic Environment
- Hydrology and Land Drainage
- Landscape and Visual
- Noise and Vibration
- Socio-economics, Recreation and Tourism

- Traffic and Transport
- Cumulative Effects

## 5.7 Whole topics proposed to be scoped out (and not considered further)

### Major accidents and disasters

- 5.7.1 The EIA Regulations require the environmental assessment to identify, describe and assess major accidents and/ or disasters. A major accident is defined for the purposes of this Scoping Report as an occurrence resulting from an uncontrolled event caused by a man-made activity or asset leading to serious damage on receptors. The term 'disaster' is used to describe a natural occurrence leading to serious damage on receptors. In both cases, the effects could be either immediate or delayed.
- 5.7.2 It is not anticipated that the Project would use significant amounts of hazardous material that could be released in the event of a natural disaster.
- 5.7.3 The potential major accidents and disasters which could occur as a result of the Project, or arise from the surrounding environment and affect the Project include the following:
- Physical accident: The construction of the Project carries the risk of an accident occurring and leading to a low number of worker fatalities (e.g., due to crane topple). The hazards associated with construction projects, are known and well understood. National Grid has an established process for managing these projects which complies with The Construction (Design and Management) Regulations 2015 and industry good practice. All aspects would be risk assessed, and the ability to safely undertake works would be a material consideration in the design process. There is potential for the above ground structures (e.g., pylons and OHLs) to collapse during the operation and maintenance phase albeit a very small risk as appropriate Health and Safety would be adhered to on site. The primary mitigation is to ensure that the elements of the Project are designed in accordance with National Grid standards, industry good practice and the anticipated environmental conditions
  - Electrical accident: There may be electrical hazards associated with the commissioning of the infrastructure, and particular consideration would be given to tie-in to the existing electrical grid. The Project would be designed to allow this to be done in a safe manner utilising National Grid standards, industry good practices including for isolation and testing of high voltage systems. There is a potential major accident involving electrocution during the operation and maintenance phase if there were to be a failure of the transmission infrastructure, or at the substations. Electrocution hazards are primarily protected by good design of the electrical systems and safe systems of work
  - Fire/ explosion: There is the potential for a fire involving diesel fuel or combustible materials during construction. These would be prevented by selecting fuel tanks of a robust design, siting them appropriately within secured compounds and providing suitable containment and ignition control. Other minor fires would be prevented through good site management practices to minimise any material build up. A potential major accident identified during the operation and maintenance phase is a fire or explosion which could occur at one of the substations. Fires and explosions are primarily protected by good design of the electrical systems and



fuel storage. Workers would be experienced and competent operators, who understand the risks associated with electrical and vehicle refuelling systems

- Ground hazards: There is the potential for major accidents associated with the ground on any construction work, these include the potential for unexploded ordnance (UXO), historic ground contamination, landfill gases and/or asbestos. These potential accidents are likely also to be present during construction in some areas on the Project. Chapter 9: Geology and Hydrogeology and Chapter 12: Hydrology and Land Drainage would provide further detail and mitigation on these potential hazards. National Grid would ensure that any issues identified are accounted for in the design
- External industrial hazards: External industrial hazards are events, such as fires, explosions or releases of hazardous substances which could take place in nearby industrial sites and cause serious harm to the Project. There are no sites falling under The Control of Major Accident Hazards (COMAH) Regulations 2015 within the Scoping Report Corridor. There are a number of buried gas pipelines, existing OHLs and buried electricity cables and oil pipelines within the Scoping Report Corridor. For any works in close proximity to gas pipelines, the appropriate safe methods of work would be agreed with the pipeline operator and suitable risk assessment undertaken. The Health and Safety Executive would also be consulted on any developments within the consultation distance of major hazard sites and/or major accident hazard pipelines
- Security threat: There is the potential for hostile acts against the Project and the associated workforce, which could occur at any stage of the lifecycle of the Project. National Grid take safety and security very seriously and work closely with the police and security services when designing equipment and the security measures needed to protect them. There is no history of terrorist threat to pylons and OHLs in the UK. Even so, damage to OHLs, pylons and substations, however caused, can be repaired more quickly than damage to underground cables and direct current converter stations. This makes OHLs more resilient and flexible than buried assets
- External interference: There is a risk that a third party might disturb and damage the infrastructure in error, which may lead to serious harm to third-parties such as electrocution. The infrastructure would have appropriate signage to warn of the presence of high voltage electricity. There is the potential for third party transport to impact on the Project. In all cases when planning to build a new OHL, National Grid consult with the Civil Aviation Authority, National Air Traffic Service and the Ministry of Defence. Where there are airstrips or Ministry of Defence sites that might be affected, National Grid liaise with the sites to enable an understanding of the potential impacts on their operations, should a new OHL be proposed in their vicinity and reduce adverse effects
- Adverse weather: The risk of adverse weather conditions affecting the construction of the Project is limited. The design of any temporary works would be designed to account for ground and groundwater conditions. There would be procedures developed for working in areas liable to flooding, and for cessation of activities in extreme adverse conditions. When locating infrastructure, National Grid consider the topography of the land, including likely flood zones and rivers. The design of the Project would account for all foreseeable weather conditions and potential disasters (e.g., OHLs are designed to withstand extreme weather conditions, such as high winds and ice formation on the wires)

5.7.4 National Grid would apply a comprehensive risk management framework to reduce risks to as low as reasonably practicable and ensure that there are no significant effects throughout the Project lifecycle. The likelihood of these potential major accident and disaster events is considered so low that the risks are considered to be not significant. All potential effects have been scoped out from further assessment, as there are no likely significant effects. A standalone major accidents and/ or disasters ES chapter is therefore not proposed. Where appropriate, relevant environmental aspects, as part of the EIA, would assess the likely risks to the Project in relation to potential areas of vulnerability. For example, any flood risk concerns are considered within Chapter 12: Hydrology and Land Drainage and would be addressed as part of the Flood Risk Assessment.

## Material assets (and waste)

- 5.7.5 The use of new materials would be required to construct the Project. The main materials would include steel for the pylons, concrete for the foundations, insulator sets and aluminium conductors (wire) and the underground cables. Further information regarding materials would be included within the description of the Project chapter within the ES a separate chapter is not proposed.
- 5.7.6 The material sources are unlikely to be identified until the detailed design stage of the Project, which would happen post grant of the DCO. The nature of the Project means that it is not possible to use secondary sources during construction, as this can affect the operation and the design life of the Project. However, National Grid has existing processes in place to source materials from sustainable sources and to use recycled materials where these do not compromise the required design standards and operational life.
- 5.7.7 Temporary materials, such as hardcore for the haul route and site compounds, works cabins and security fencing would be required during construction. As is standard on large construction projects, it is assumed that these would be sourced from other construction projects within the region, where practicable, and would be reused at other construction projects after completion of the Project where possible.
- 5.7.8 Waste materials would be produced by the Project. The Main Works Contractor would produce a Site Waste Management Plan (SWMP) prior to construction (a draft SWMP would be included as an appendix to the outline CoCP within the DCO application). This would set out the measures to reduce the generation of waste in the first place and appropriate measures to reuse and recycle materials where practicable. It would also identify appropriate waste facilities to dispose of materials. It is therefore proposed that materials would not be the subject of a separate environmental aspect chapter in the ES.
- 5.7.9 National Grid would adopt good construction and management practices to ensure waste is minimised as far as possible and that the storage, transport and eventual disposal of waste have no significant environmental effects. The management and collection of waste arisings would be carried out under the requirements of the UK waste regulatory regime. It is therefore proposed that waste would not be the subject of a separate environmental aspect chapter in the ES. The effects of any waste producing development would be addressed as part of the relevant environmental aspects and associated strategies, for example the transport effects from the management of waste arisings would be considered in Chapter 16: Traffic and Transport where appropriate.

## Climate

5.7.10 Climate can be split into the following:

- The benefit of the Project in connecting renewable sources of energy
- The vulnerability of the Project to climate change
- Carbon emissions from construction plant and embodied carbon

- 5.7.11 The need for the Project is to support the transfer and connection of green, renewable energy into the UK power infrastructure network. The Project would support the UK's net zero target to achieve net zero emissions by 2050 through the connection in East Anglia of new low carbon energy generation, and by reinforcing the transmission network. Therefore, the operational, medium to long term benefits of delivering the Project on a national level are considered to outweigh any short-term impacts of greenhouse gas usage as a result of material use and construction activities.
- 5.7.12 In terms of vulnerability of the Project to climate change, OHLs are designed to withstand extreme weather conditions, such as high winds and ice formation on the wires. National Grid has previously investigated whether climate change might require OHLs to be redesigned but found there is more likely to be a reduction in the risk of ice on the wires and intense wind gusts occurring simultaneously. The vulnerability of the Project to future flooding would be considered as part of the FRA. Therefore, vulnerability to climate change is proposed to be scoped out of the ES.
- 5.7.13 Details of the likely construction materials would be included within the Project description within the ES together with a simple estimate of the Green House Gas (GHG) emissions associated with the construction phase of the project and potential opportunities to save carbon. emissions associated with the construction phase of the project and potential opportunities to save carbon.

## Decommissioning

- 5.7.14 NPS EN-1 (published and draft) paragraph 4.2.3 states that the ES should cover the decommissioning of a project. At present, no specific plans have been formulated for the decommissioning phase of the Project. It is expected that the transmission of electricity would continue for as long as there is a business case for doing so and that any decommissioning activity would occur decades into the future. To date, relatively few transmission projects have been decommissioned since the main expansion of such infrastructure in the 1950s and 1960s. The cables and pylons for overhead transmission lines are replaced periodically, ordinarily under National Grid's permitted development rights.
- 5.7.15 The pylons comprise open, lattice structures which can be easily dismantled. It is expected that proposals for decommissioning would be subject to separate consenting procedures, including environmental assessment of the proposed activities and taking account of the baseline as it exists at the time of decommissioning. Undertaking an assessment of the potential decommissioning of the Project infrastructure at this stage is expected to be so heavily based on assumptions that it would not serve any useful purpose. Consequently, decommissioning has been scoped out of the ES. Instead, the ES would include a high-level summary of potential effects from decommissioning for each environmental topic within an appendix to the description of the Project chapter within the ES.

# 6 Agriculture and Soils

## 6.1 Approach to scoping

6.1.1 The approach to scoping has drawn from previous experience of similar projects. Determining the scope of the Agriculture and Soils assessment has included the following stages:

- Regulatory and planning policy context
- Defining the study area
- Stating sources of data collected
- Outlining baseline conditions
- Highlighting further data to be gathered
- Outlining environmental measures
- Predicting likely significant effects
- Drafting the proposed assessment methodology
- Stating the proposed scope of the ES

6.1.2 There are interrelationships related to the potential effects on agriculture and soils and other environmental topics. Therefore, please also refer to the following chapters:

- Chapter 8: Ecology and Biodiversity
- Chapter 9: Geology and Hydrogeology
- Chapter 10: Health and Wellbeing
- Chapter 12: Hydrology and Land Drainage

6.1.3 This chapter should also be read in parallel with Figure 6.1, Figure 6.2, Figure 6.3, Figure 6.4 and Figure 6.5 at Appendix A.

## 6.2 Regulatory and planning policy context

### National policy

6.2.1 Chapter 2: Legislation and Planning Policy Context sets out the overarching policy relevant to the Project including the Overarching NPS for Energy EN-1 and NPS for Electricity Networks Infrastructure EN-5. EN-1 contains the following paragraphs relating to agriculture and soils which have been considered within this chapter:

- Paragraph 5.10.8 – *“Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification) and preferably use land in areas of poorer quality (grades 3b, 4 and 5) except where this would be inconsistent with other sustainability considerations. Applicants should also identify any effects and seek to minimise impacts on soil quality taking into account any mitigation measures proposed”*

- Paragraph 5.10.15 – *“The Infrastructure Planning Commission (IPC) should ensure that applicants do not site their scheme on the best and most versatile agricultural land without justification. It should give little weight to the loss of poorer quality agricultural land (in grades 3b, 4 and 5), except in areas (such as uplands) where particular agricultural practices may themselves contribute to the quality and character of the environment or the local economy”*
- 6.2.2 The policy set out in draft NPS EN-1 is substantially the same as the above.
- 6.2.3 NPS EN-5 sets out limited policy in relation to soils and agriculture. In relation to Electro-magnetic fields (EMFs) it states in paragraph 2.10.8 that:
  - *“There is little evidence that exposure of crops, farm animals or natural ecosystems to transmission line EMFs has any agriculturally significant consequences.”*
- 6.2.4 Draft NPS EN-5 in relation to proposals for undergrounding states that they should consider:
  - Paragraph 2.11.14 – *“...the developer’s commitment, as set out in their ES, to mitigate the potential detrimental effects of undergrounding works on any relevant agricultural land and soils, particularly regarding Best and Most Versatile land. Such a commitment must guarantee appropriate handling of soil, backfilling, and return of the land to the baseline Agricultural Land Classification (ALC), thus ensuring no loss or degradation of agricultural land. Such a commitment should be based on soil and ALC surveys in line with the 1988 ALC criteria and due consideration of the Defra Construction Code.”*

## Regional and local policy

- 6.2.5 Chapter 2: Legislation and Planning Policy Context sets out relevant regional and local policy.

## Guidance

- 6.2.6 Relevant guidance, specific to agriculture and soils, that has informed this Scoping Report and would inform the assessment within the ES, comprises:
  - Department for Environment, Food and Rural Affairs (Defra, 2009) Safeguarding our Soils: A Strategy for England
  - Technical Information Note 049. ALC Protecting the Best and Most Versatile Agricultural Land (Natural England, 2012)
  - Guide to assessing development proposals on agricultural land (Natural England, 2021)
  - Guidance Note: Working with Soil Guidance Note on Benefitting from Soil Management in Development and Construction (The British Society of Soil Science, 2022)
  - British Standard Specification for Topsoil and Requirements for Use (BS3882:2015)
  - Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra, 2009)
  - Good Practice Guide for Handling Soils. Cambridge: The Farming and Rural Conservation Agency (Ministry of Agriculture, Fisheries and Food (MAFF), 2000)

- Agricultural Land Classification of England and Wales. Revised Guidelines and Criteria for Grading the Quality of Agricultural Land (MAFF, 1988)
- A new perspective on land and soil in Environmental Impact Assessment (IEMA, 2022)

## 6.3 Study area

- 6.3.1 The study area for agriculture and soils comprises the area directly affected by the Project (assumed for the purpose of this chapter, referred to as the Scoping Report Corridor). A ‘wider study area’ is also considered, which extends to 1km around the Scoping Report Corridor in order to provide environmental context and identify potential receptors. This is considered an appropriate study area based on professional judgement, knowledge of similar projects and the Design Manual for Roads and Bridges (DMRB) LA09: Geology and Soils (National Highways, 2019)<sup>6</sup>.
- 6.3.2 The study area for agriculture and soils is presented on Figure 6.1 at Appendix A. As the iterative design process continues, the Scoping Report Corridor would be refined to comprise the proposed Order Limits within the ES.

## 6.4 Data Collection

- 6.4.1 The baseline assessment has been informed by a desk study which has drawn on the following information sources:
- British Geological Survey (BGS) online mapping for bedrock and superficial geology (BGS Geology Viewer, 2022)
  - OS mapping and aerial photography to establish land use and settlement patterns
  - Soilscape mapping showing the distribution of main soil types was assessed on the Land Information System website (Cranfield University/Defra, 2021)
  - ALC mapping, including provisional and (where available) detailed ALC mapping (developed from surveys) from the MAGIC website (Defra, 2022)
  - Extent of agri-environmental, and woodland and forestry schemes from the MAGIC website (Defra, 2022)

## 6.5 Engagement with stakeholders

- 6.5.1 A summary of engagement undertaken to date is presented in Table 6.1.

Table 6.1 – Summary of engagement

Organisation and date	Summary of response	Consideration in the Scoping Report
Natural England June / July 2022	A letter was issued to Natural England setting out the proposed methodology and scope, and this was presented to Natural England in a meeting in July 2022 and a	The presence of BMV land would be addressed through the desk-based study and detailed ALC surveys where required. All soil handling would

<sup>6</sup> DMRB used in the absence of other appropriate guidance.

Organisation and date	Summary of response	Consideration in the Scoping Report
	thematic group in July 2022. Natural England advised that applicants' should seek to minimise impacts on best and most versatile (BMV) agricultural land, ensure the appropriate handling of soils in line with published guidance (Defra, 2009) and use experienced soil scientists to advise on and supervise soil handling.	be undertaken in line with the Defra (2009) Code of Practice and include a requirement for those advising on and supervising works to have the appropriate skills and qualifications.

## 6.6 Baseline conditions (inc. future baseline)

### Geology

- 6.6.1 The solid geology underlying the northern section of the study area is predominately described as comprising of the Lewes Nodular Chalk, Seaford Chalk, Newhaven Chalk, Culver Chalk and Portsdown Chalk. Most of this northern section is also overlain by superficial sedimentary deposits of Lowestoft formation - diamicton, formed during the Quaternary period (BGS Geology Viewer, 2022).
- 6.6.2 South of Ipswich multiple bedrock formations are mapped as being present, primary amongst them are the Thames Group - Clay, silt and sand, and the London Clay Formation (BGS Geology Viewer, 2022).

### Soils

- 6.6.3 Predominant soil types within the study area are slightly acidic loamy and clayey soils with impeded drainage with moderate to high fertility, and slowly permeable seasonally wet, slightly acidic but base-rich loamy and clayey with moderate fertility. The soil types through the southern section of the study area also show a high prevalence of soils described as freely draining, slightly acidic loamy soils. The study area also includes small areas of fen peat soils near Roydon and Diss in south Norfolk (presented on Figure 6.1 at Appendix A).
- 6.6.4 The main Soil Associations (representing a group of soil series (soil types) which are typically found occurring together in the landscape) have been identified within the study area (Soil Survey of England and Wales, 1983):
- Burlingham 3: Deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging. Some fine or coarse loamy over clayey soils and some deep well drained coarse loamy over clayey, fine loamy and sandy soils
  - Beccles 2: Slowly permeable seasonally waterlogged fine and coarse loamy over clayey soils. Some deep sandy soils affected by groundwater
  - Mendham: Deep peat soils associated with clayey over sandy soils, in part very acid with high groundwater levels and risk of flooding
  - Ashley: Fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging associated with similar but wetter soils. Some calcareous and non-calcareous slowly permeable clayey soils

- Hanslope: Slowly permeable calcareous clayey soils. Some slowly permeable non-calcareous clayey soils, all with a slight risk of erosion
- Beccles 3: Slowly permeable seasonally waterlogged fine loamy over clayey soils and similar soils with only slight seasonal waterlogging. Some calcareous clayey soils especially on steeper slopes
- Melford: Deep well drained fine loamy over clayey, coarse loamy over clayey and fine loamy soils, some with calcareous clayey subsoils
- Tendring: Deep often stoneless coarse loamy soils. Some slowly permeable seasonally waterlogged coarse and fine loamy over clayey soils
- Oak 2: Slowly permeable seasonally waterlogged fine loamy over clayey and fine silty over clayey soils. Some similar soils with slowly permeable subsoils and slight seasonal waterlogging. Some clayey soils with chalky subsoil
- Ludford: Deep well drained fine loamy, coarse loamy and sandy soils, locally flinty in places over gravel. Slight risk of water erosion
- Stretham: Deep well drained calcareous clayey soils associated with similar but slowly permeable soils
- Windsor: Slowly permeable seasonally waterlogged clayey soils mostly with brown subsoils. Some fine loamy over clayey and fine silty over clayey soils and, locally on slopes, clayey soils with only slight seasonal waterlogging
- Fyfield 4: Deep well drained often stoneless coarse loamy and sandy soils. Some fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging and some slowly permeable seasonally waterlogged fine loamy over clayey soils. Risk of water erosion

## Agricultural Land Classification

- 6.6.5 Provisional ALC mapping (presented on Figure 6.2 at Appendix A) shows that the study area comprises of predominately Grade 2 and Grade 3 land, with Grade 1 recorded around the Burnt Heath area. This mapping, at a scale of 1:250,000, does not distinguish between Grades 3a and 3b (and cannot be used to inform site specific assessments) but provides an indication of the likely land classification. The provisional ALC information available suggests that a large proportion of the study area may comprise BMV land.
- 6.6.6 Detailed ALC mapping is only partially available for the study area and is presented on Figure 6.3 at Appendix A. The small areas of surveyed land (MAGIC website (Defra, 2022)) show ALC grades ranging from Grade 1 through to Grade 3b, confirming the likelihood of BMV land being present within the study area.
- 6.6.7 Climate is unlikely to pose an overall limitation on ALC grade in relation to the criteria set out in the ALC Guidelines (MAFF, 1988). Climate does, however, have an important influence on the interactive limitations of soil wetness and soil droughtiness, which is the balance between rainfall and water losses from the soil. The study area has both relatively low rainfall and a long growing season, acting to decrease the severity of any potential soil wetness limitation, but increasing the severity of any potential soil droughtiness limitation.

## Land use

- 6.6.8 A desk-based study using aerial photography and OS Mapping shows the agricultural



land use across the Project appears to be a combination of arable and pasture land.

- 6.6.9 There are areas of land within the study area under Countryside Stewardship Agreements (Middle and Higher Tier), and areas of land to the south of Great Tey and Edney Common designated as being under both entry level plus higher-level stewardship, as well as organic entry level plus higher-level stewardship agreements (Figure 6.4 at Appendix A). Small areas of land across the study area are also under Woodland Grant schemes (Figure 6.5 at Appendix A).

## Future baseline

- 6.6.10 The future baseline relates to known or anticipated changes to the current baseline in the future which should be assessed as part of the Project in the ES.
- 6.6.11 It is considered that the baseline in relation to soils and ALC grades would not change from that described within the timeframe for the construction of the Project. While there may be potential changes in relation to climate change, including greater rainfall intensity and droughts, that could affect soil conditions, land grade, and farming practices, it is likely that these would only be visible over longer time frames.
- 6.6.12 There could potentially be changes to land management practices and business approaches across the landowners/ land managers over the construction and operation of the Project.

## 6.7 Further data to be gathered / processes in the ES

- 6.7.1 The assessment within the ES would be informed by third party data and data obtained through survey. These would include:
- Detailed agricultural land classification surveys of relevant areas. It is proposed that soil and ALC surveys, in accordance with published guidance, would be undertaken where there would be disturbance to the soils, for example where significant permanent infrastructure is proposed (this would exclude individual pylon locations based on the very limited footprint of the tower feet), land use change for Biodiversity Net Gain, sections of haul route and construction compound locations through particularly sensitive soils (such as heavy soils prone to compaction) and where undergrounding is proposed.
  - Climatic data and Land Information System Soil Site Report

## 6.8 Measures adopted as part of the Project

- 6.8.1 The Scoping Report Corridor has been designed to avoid as far as practicable sensitive agriculture and soils features as set out in the Corridor and Preliminary Routeing and Siting Study (National Grid, 2022). This includes minimising potential land take. Further embedded measures would be developed as the Project design evolves.
- 6.8.2 A range of standard measures for the Project would be adopted throughout the duration of the construction phase. Appendix B: Initial Outline CoCP outlines measures relevant to agriculture and soils. These include but are not limited to:
- A Landscape and Ecology Management Plan (LEMP) will be produced prior to construction (an outline LEMP would accompany the DCO application)

- Measures to manage dust, waste, water, noise, vibration and soil during construction with the Main Works Contractor undertaking daily site inspections to check conformance
- Earthworks and stockpiled soil will be protected by covering, seeding or using water suppression where appropriate
- Soil management measures will be detailed in a Soil Resources Plan (SRP) which will form part of the CoCP (a draft SPR would be appended to the outline CoCP within the DCO application). Measures would include but not be limited to the following:
  - Details of the soil resources present
  - How the topsoil and subsoil will be stripped and stockpiled
  - Suitable conditions for when soil handling will be undertaken, for example avoiding handling of waterlogged soil
  - Indicative soil storage locations
  - How soil stockpiles will be designed taking into consideration site conditions and the nature/ composition of the soil
  - Specific measures for managing sensitive soils
  - Suitable protective surfacing where soil stripping can be avoided, based on sensitivity of the environment and proposed works
  - Approach to reinstating soil that has been compacted, where required
  - Details of measures required for soil restoration
- Land required temporarily for construction will be returned to its former use/ condition or a use/ condition agreed with the landowner
- Where practicable and safe to do so, existing access to and from residential, commercial, community and agricultural land uses will be maintained throughout the construction period or as agreed through landowner discussions. This may require signed diversions or temporary restrictions to access. The means of access to affected properties, facilities and land parcels will be communicated to affected parties at the start of the Project / at the start of the relevant sections, with any changes communicated in advance of the change being implemented. Where field-to-field access points require alteration as a result of construction, alternative field access will be provided in consultation with the landowner/ occupier
- Existing water supplies for livestock will be identified before construction commences. Where supplies will be lost or access compromised by construction works, temporary alternative supplies will be provided where necessary. Water supplies will be reinstated following construction
- Consultation with affected landowners will be carried out to investigate the current extent of land drainage. If necessary pre-construction land drainage will be explored with the intent of maintaining the efficiency of the existing land drainage system and to assist in maintaining the integrity of the working areas during construction. The Project may include a system of 'cut-off' drains which feed into a new header drain and the Project will also take into account surface water runoff measures

- Should animal bones be discovered during construction, which may indicate a potential burial site, works will cease, and advice will be sought from the Animal Health Regional Office on how to proceed, relevant to the origin and age of the materials found
- All movement of plant and vehicles between fields will cease in the event of a notification by Defra of a disease outbreak in the vicinity of the site that requires the cessation of activities. Advice will be sought from Defra in order to develop suitable working methods required to reduce the biosecurity risk associated with the continuation of works
- Where deemed necessary clay bungs or other vertical barriers will be constructed within trench excavations by a suitably experienced person, to prevent the creation of preferential drainage pathways
- Stone pads will be installed in areas where heavy equipment, such as cranes and piling rigs, are to be used. The stone pads will provide stable working areas and will reduce disturbance to the ground. The stone pad area will be stripped of the topsoil, which will be stored and reinstated (following removal of the stone pad materials) in accordance with the soil management measures

## 6.9 Likely Significant Effects

6.9.1 This section sets out the likely significant effects of the Project on agriculture and soils. It assumes that the relevant embedded (design measures), standard and additional measures outlined within the Initial Outline CoCP at Appendix B, and the expected mitigation for any other consents or permits, are in place before assessing the effects. This is in accordance with guidance from the IEMA as part of preparing a proportional assessment (IEMA, 20227).

### Soils and agriculture

#### Soils and ALC - Construction

6.9.2 During construction there would be a potential loss of BMV land (ALC Grades 1, 2 and 3a) from agricultural productivity. There would also be disturbance to soils, either from access for OHL installation / removal or due to the excavation and soil stripping working areas for the underground cable trenches, pylon footings, CSE compounds, substation footprint and areas required temporarily (such as construction compounds). There would also be the potential for impacts on the ecosystem services the soils provide. Standard measures would be set out within the outline CoCP (submitted as part of the DCO application) for soil handling, storage and reinstatement which would reduce effects on soils. However, the baseline is not fully understood, and significant effects cannot be ruled out at this stage, therefore the impact of construction on the temporary loss of agricultural land is proposed to be **scoped into** the ES.

6.9.3 The stripping and stockpiling of soil resources would have a temporary effect on the soil ecosystem services provided. Successful reinstatement would therefore be critical in ensuring these functions are restored. As such the impact of the construction phase on soil quality and its associated ecosystem services is proposed to be **scoped into** the ES.

## Soils and ALC – Operation (inc. maintenance)

- 6.9.4 During operation, there would be a permanent loss of areas of agricultural land and associated soils for the permanent infrastructure. The impact of operation on the land grades and soil types would be fully assessed and confirmed and as such permanent impacts on soils and ALC is proposed to be **scoped into** the ES.
- 6.9.5 Any maintenance or repair works required which would result in disturbance to soils during operation of the Project would be undertaken in accordance with good practice soil handling methods. No likely significant effects on soils or ALC during operational maintenance or repair activities are predicted, therefore this matter is proposed to be **scoped out** of the ES.
- 6.9.6 The majority of the land required for construction would be returned to its pre-construction land use (as agreed with the landowner) and so impacts on soil ecosystem functions are likely to be limited. Therefore, operational effects on soil quality and associated ecosystem services are proposed to be **scoped out** of the ES.

## Land Use

### Land use - Construction

- 6.9.7 During construction there would be potential impacts on agricultural operations due to disturbance (in particular where livestock are present), fragmentation, access restrictions or disruption to water supplies or land drainage. Commitments set out within the outline CoCP (submitted as part of the DCO application) to maintain access throughout construction, would reduce the effects to agricultural land use. Potential effects on land drainage are covered in Chapter 12: Hydrology and Land Drainage.
- 6.9.8 By the end of construction, all land required temporarily would be reinstated and impacts on agricultural operations would be dealt with through compensation agreements (which lies outside of the EIA process). It is considered that, on completion of the reinstatement of land required temporarily, there would be no significant effects on agricultural landholdings. However, potential environmental effects during construction phase is proposed to be **scoped into** the assessment.

### Land use – Operation (inc. maintenance)

- 6.9.9 During operation and maintenance, there would be limited effects on agricultural operations. There is the potential for restrictions to existing activities immediately over or adjacent to buried cables or under OHLs, however, these would be dealt with through compensation agreements (which lie outside of the EIA process). Any maintenance or repair works required which would result in disturbance to agricultural operations would be undertaken in accordance with standard practice. Therefore, no significant effects on agricultural landholdings during operation are anticipated and this aspect is proposed to be **scoped out** of the ES.
- 6.9.10 The majority of the land required during construction would be reinstated by the end of the construction phase. Any claims regarding compensation would be addressed outside of the EIA process. As such, potential economic effects on individual landowners and farmers are **scoped out** of the ES.
- 6.9.11 During operation, there may be concerns from landowners that EMFs could affect land use. However, paragraph 2.10.8 of EN-5 states that, in relation to EMFs, “*there is little evidence that exposure of crops, farm animals or natural ecosystems to transmission line EMFs has any agriculturally significant consequence*”. Therefore, this is proposed to be **scoped out** of the ES. Refer to Chapter 10: Health and Wellbeing for further information regarding EMFs.

## 6.10 Proposed assessment methodology

- 6.10.1 This section sets out the proposed methodology for the soils and agriculture assessment of the ES. The assessment would be based on guidance set out by IEMA on how land and soil should be assessed in EIA (IEMA, 2022).
- 6.10.2 The IEMA guidance seeks to move practice away from a narrow focus on quantifying and financially compensating impacts on agricultural land and advocates a new and wider approach to assessing the soil functions, ecosystem services and natural capital provided by land and soils.

### Value / sensitivity

- 6.10.3 The criteria used to determine the value and sensitivity of receptors specific to agriculture and soils are set out in Table 6.2. These values are based on professional judgement and previous experience.

Table 6.2 - Criteria for determining value / sensitivity

Receptor sensitivity	Soil resource and soil functions
Very High	<p>Biomass production: ALC Grades 1 and 2</p> <p>Ecological habitat, soil biodiversity and platform for landscape: Soils supporting protected features within a European site (e.g., SAC, SPA, Ramsar); Peat soils; Soils supporting a National Park, or Ancient Woodland</p> <p>Soil carbon: Peat soils</p> <p>Soils with potential for ecological/landscape restoration</p> <p>Soil hydrology: Very important catchment pathway for water flows and flood risk management</p> <p>Archaeology, Cultural heritage, Community benefits and Geodiversity: Scheduled Monuments and adjacent areas; World Heritage and European designated sites; Soils with known archaeological interest; Soils supporting community/recreational/educational access to land covered by National Park designation</p> <p>Source of materials: Important surface mineral reserves that would be sterilised (i.e., without future access)</p>
High	<p>Biomass production: ALC Grade 3a</p> <p>Ecological habitat, soil biodiversity and platform for landscape: Soils supporting protected features within a UK designated site (e.g. United Nations Educational, Scientific and Cultural Organization (UNESCO) Geoparks, SSSI or AONB, Special Landscape Area and Geological Conservation Review sites); Native Forest and woodland soils; Unaltered soils supporting semi-natural vegetation</p> <p>Soil carbon: Organo-mineral soils (e.g. peaty soils)</p> <p>Soil hydrology: Important catchment pathway for water flows and flood risk management</p> <p>Archaeology, Cultural heritage, Community benefits and Geodiversity: Soils with probable but as yet unproven (prior to being revealed by construction) archaeological interest; Historic parks and gardens; Regionally Important Geological Site (RIGS); Soils supporting community/recreational/educational access to RIGS and AONBs;</p>

<b>Receptor sensitivity</b>	<b>Soil resource and soil functions</b>
	Source of materials: Surface mineral reserves that would be sterilised (i.e., without future access)
Medium	<p>Biomass production: ALC Grade 3b</p> <p>Ecological habitat, soil biodiversity and platform for landscape: Soils supporting protected or valued features within non-statutory designated sites (e.g. Local Nature Reserves (LNR), Local Geological Sites (LGSs), Sites of Nature Conservation Importance (SNCIs), Special Landscape Areas; Non-Native Forest and woodland soils</p> <p>Soil carbon: Mineral soils</p> <p>Soil hydrology: Important minor catchment pathway for water flows and flood risk management</p> <p>Archaeology, Cultural heritage, Community benefits and Geodiversity: Soils with possible but as yet unproven (prior to being revealed by construction) archaeological interest; Soils supporting community/recreational/educational access to land</p> <p>Source of materials: Surface mineral reserves that would remain accessible for extraction</p>
Low	<p>Biomass production: ALC Grade 4 and 5</p> <p>Ecological habitat, soil biodiversity and platform for landscape: Soils supporting valued features within non-designated notable or priority habitats/landscapes. Agricultural soils</p> <p>Soil carbon: Mineral soils</p> <p>Soil hydrology: Pathway for local water flows and flood risk management</p> <p>Archaeology, Cultural heritage, Community benefits and Geodiversity: Soils supporting no notable cultural heritage, geodiversity nor community benefits; Soils supporting limited community/recreational/educational access to land</p> <p>Source of materials: Surface mineral reserves that would remain accessible for extraction</p>
Negligible	As for low sensitivity, but with only indirect, tenuous, and unproven links between sources of impact and soil functions

## Impact magnitude

6.10.4 The criteria used to determine the magnitude of change for soils and agriculture are set out in Table 6.3. These values are based on the IEMA guidance and professional judgement.

Table 6.3 – Criteria for determining magnitude

<b>Magnitude of impact (change)</b>	<b>Description of impacts restricting proposed land use</b>
Major	<p>Permanent, irreversible loss of one or more soil functions or soil volumes (including permanent sealing or land quality downgrading), over an area of more than 20ha or loss of soil-related features set out in Table 6.2, as advised by other topic specialists (including effects from ‘temporary developments’)</p> <p>or</p>

<b>Magnitude of impact (change)</b>	<b>Description of impacts restricting proposed land use</b>
	Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of more than 20ha, or gain in soil-related features set out in Table 6.2, as advised by other topic specialists (including effects from ‘temporary developments’)
Moderate	Permanent, irreversible loss of one or more soil functions or soil volumes, over an area of between 5 and 20ha or loss of soil-related features set out in Table 6.2, as advised by other topic specialists (including effects from ‘temporary developments’) or Potential for improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of between 5 and 20ha, or gain in soil-related features set out in Table 6.2, as advised by other topic specialists
Minor	Permanent, irreversible loss over less than 5ha or a temporary, reversible loss of one or more soil functions or soil volumes), or temporary, reversible loss of soil-related features set out in Table 6.2, as advised by other topic specialists or Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of less than 5ha or a temporary improvement in one or more soil functions due to remediation or restoration or off-site improvement, or temporary gain in soil-related features set out in Table 6.2, as advised by other topic specialists
Negligible	No discernible loss or reduction or improvement of soil functions or soil volumes that restrict current or proposed land use

## Significance

6.10.5 Significance would be derived using the matrix set out in Table 5.1 within Chapter 5: EIA Approach and Method.

Table 6.4 – Criteria for determining significance

<b>Value / Sensitivity of Receptor</b>	<b>Magnitude of Change</b>			
	<b>Major</b>	<b>Moderate</b>	<b>Minor</b>	<b>Negligible</b>
<b>Very High</b>	Major	Major	Major	Moderate
<b>High</b>	Major	Major	Moderate	Minor / Negligible
<b>Medium</b>	Major	Moderate	Minor	Negligible
<b>Low</b>	Moderate	Minor	Negligible	Negligible
<b>Very Low</b>	Minor / Negligible	Negligible	Negligible	Negligible

6.10.6 Likely significant effects in the context of the EIA Regulations would be effects with a significance of moderate or greater.

## 6.11 Proposed scope of the ES

6.11.1 The matters that are scoped in and out of further assessment for agriculture and soils are outlined in Table 6.5.

Table 6.5 – Matters scoped in or out of the ES

Matter	Phase	Scoped in / out	Justification
Temporary loss of agricultural land (including BMV land)	Construction	Scoped in	Soil and ALC surveys would be undertaken in relation to areas of significant permanent infrastructure, sections of the haul route through particularly sensitive soils (such as heavy soils prone to compaction) and soil stripping for cable installation. The assessment would detail, as standard mitigation, the requirements for soil handling and reinstatement. Land required temporarily would be fully reinstated to its pre-construction condition (or a condition agreed with the landowner).
Permanent loss of agricultural land (including BMV land)	Operation	Scoped in	The permanent loss of BMV land would be fully assessed.
Agricultural landholdings	Construction	Scoped in	There is the potential for disruption during construction; a proportionate approach would be taken, focusing on the most sensitive land uses.
	Operation	Scoped out	The majority of land required for construction would be returned to its pre-construction land use during operation therefore, impacts on agricultural landholdings across the Project are likely to be limited and not significant.
Soil quality associated with ecosystem services	Construction	Scoped in	Stripping and stockpiling soils would have a temporary effect on the soil ecosystem services provided. Successful reinstatement would be critical in ensuring these functions are restored.
	Operation	Scoped out	The majority of land required for construction would be returned to its pre-construction land use and so impacts on soil ecosystem functions are likely to be limited and not significant.



<b>Matter</b>	<b>Phase</b>	<b>Scoped in / out</b>	<b>Justification</b>
Economic effects on landowners	Construction and Operation	Scoped out	The economic effects on landowners would be addressed through agreements which lie outside the scope of the ES.

\*Operation referred to above also includes maintenance.

# 7 Air Quality

## 7.1 Approach to scoping

- 7.1.1 The approach to scoping has drawn from previous experience of similar projects. Determining the scope of the Air Quality assessment has included the following stages:
- Regulatory and planning policy context
  - Defining the study area
  - Engagement with stakeholders
  - Stating sources of data collected
  - Outlining baseline conditions
  - Highlighting further data to be gathered
  - Outlining environmental measures
  - Predicting likely significant effects
  - Drafting the proposed assessment methodology
  - Stating the proposed scope of the ES
- 7.1.2 There are interrelationships related to the potential effects on other environmental topics. Therefore, please also refer to the following chapters:
- Chapter 8: Ecology and Biodiversity
  - Chapter 10: Health and Wellbeing
- 7.1.3 This chapter should also be read in parallel with Figure 7.1 at Appendix A.

## 7.2 Regulatory and planning policy context

### National policy

- 7.2.1 Chapter 2 Legislation and Planning Policy Context sets out the overarching policy relevant to the Project including the Overarching NPS for Energy EN-1 and NPS for Electricity Networks Infrastructure EN-5. EN-1 contains the following paragraphs relating to air quality which have been considered within this chapter:
- Paragraph 5.2.7 – *“Any significant air emissions, their mitigation and any residual effects distinguishing between the project stages, and taking account of any significant emissions from any road traffic generated by the project;*
    - *The predicted absolute emission levels of the proposed project, after mitigation methods have been applied;*
    - *Existing air quality levels and the relative change in air quality from existing levels; and*
    - *Any potential eutrophication impacts.”*
- 7.2.2 The policy set out in draft NPS EN-1 follows that of the existing NPS but also refers to

air quality at paragraph 5.2.11 “having regard to the Air Quality Strategy or any successor to it and should consider relevant advice within Local Air Quality Management guidance.”

7.2.3 The NPS EN-5 and the draft NPS EN-5 do not contain any specific policy relating to air quality.

## Regional and local policy

7.2.4 Chapter 2: Legislation and Planning Policy Context sets out relevant regional and local policy. Local policy, specific to air quality would be reviewed and assessments undertaken with regard to this policy in the ES.

## Guidance

7.2.5 Relevant guidance, specific to air quality, that has informed this Scoping Report and would inform the assessment within the ES, comprises:

- Guidance on the Assessment on Dust from Demolition and Construction V1.1 (Institute of Air Quality Management (IAQM), 2016)
- Land Use Planning and Development Control: Planning for Air Quality (IAQM, 2016)

## 7.3 Study area

7.3.1 At the time of writing this Scoping Report, traffic data and construction traffic routes were not available. For the purpose of defining the baseline for scoping, the Scoping Report Corridor and a 2km buffer around it has been used. This is based on professional judgement and knowledge of similar projects.

7.3.2 The ES would then present a refined study area for dust and traffic emissions which would be determined from construction traffic routes and predicted traffic numbers. Study areas in the ES would comprise:

- Dust – the air quality study area would be defined by the screening criteria within the IAQM Construction Dust Guidance (IAQM, 2016):
  - A human receptor within the proposed Order Limits plus a 350m area surrounding, or within 50m of the proposed routes used by construction traffic on the public highway up to 500m from the site entrance
  - Any ecological designated site within the proposed Order Limits plus a 50m area surrounding, or within 50m of the proposed routes used by construction traffic on the public highway up to 500m from the site entrance
- Traffic emissions – where an assessment of emissions from traffic on the public highway is undertaken, the Affected Road Network (ARN) is defined according to the predicted changes in traffic volumes according to the IAQM Planning Guidance (IAQM, 2017):
  - A change in Light Duty Vehicles of 100 Annual Average Daily Traffic (AADT) within or adjacent to an Air Quality Management Area (AQMA) or 500 AADT elsewhere, and/ or
  - A change in Heavy Duty Vehicles (HDVs) >3.5 tonnes of 25 AADT within or adjacent to an AQMA or 100 AADT elsewhere

7.3.3 In areas where the above criteria are met, ecological and human receptors within 200m

of the proposed Order Limits would be scoped into the assessment.

## 7.4 Data collection

7.4.1 The baseline has been informed by a desk study which has drawn on the following information sources:

- Defra Background Air Quality Archive (2018-base year) (Defra, 2021)
- Defra AQMA dataset (Defra, 2022)
- Local Air Quality Management Reports (various)

## 7.5 Engagement with stakeholders

7.5.1 A summary of engagement undertaken to date is presented in Table 7.1.

Table 7.1 – Summary of engagement

Organisation and date	Summary of response	Consideration in the Scoping Report
<p>Babergh Mid Suffolk Council, Thurrock, Norfolk County, Suffolk, Essex, Braintree Council, Chelmsford Council, Basildon, Colchester, Historic England, September 2022</p>	<p>A letter was issued to Local Planning Authorities setting out the proposed methodology and scope.</p> <p>Generally, responses outlined agreement with the proposed methodology proposed. Responses outlined that construction dust should be assessed fully in CoCP and that most recent available baseline data must be utilised for assessment.</p> <p>It was recommended that the basis for the sensitivity and magnitude criteria, and the assessment matrix, are provided in the Scoping Report to clarify under what conditions impacts would be regarded as significant.</p>	<p>Construction traffic emissions have been scoped into assessment, and consideration of construction dust is to be addressed through the outline CoCP.</p>

## 7.6 Baseline conditions (inc. future baseline)

7.6.1 The Scoping Report Corridor is located to avoid large residential and urban areas, as far practicable, and avoids areas of poor air quality. Within and in proximity to the corridor there are sensitive receptors such as, residential receptors, schools, ecological receptors, medical facilities and residential care homes, these would be further defined within the ES.

7.6.2 The corridor passes within 500m of sensitive human receptors in settlements at Mulbarton, Forncett End, Roydon, Gisingham, Stowupland, Needham Market, Offton, Capel St Mary, Stratford St Mary, Ardeigh, Great Horkesley, Little Waltham and Thurrock.

## Local air quality management

7.6.3 The Environment Act 2021 requires local authorities to report to Defra on local air quality and local air quality management within their local authority area. This also requires an assessment of compliance with the relevant limit or objective values. The Scoping Report Corridor passes through 10 local authorities. In addition, there are a further five local authorities within the air quality study area. These are listed below and also presented on Figure 7.1 at Appendix A):

- South Norfolk Council
- Mid Suffolk District Council
- Babergh District Council
- Colchester Borough Council
- Tendring District Council
- Braintree District Council
- Chelmsford City Council
- Basildon Borough Council
- Brentwood Borough Council
- Thurrock Council
- Breckland Council
- Ipswich Borough Council
- Maldon District Council
- Medway Council
- Gravesham Borough Council

7.6.4 Where compliance objectives are not predicted to be met, local authorities must declare the area as an AQMA. In addition, local authorities are required to produce an AQAP which includes measures to improve air quality in the AQMA.

7.6.5 There are three AQMAs within 2km of the Scoping Report Corridor:

- Area 4 – Lucy Lane North, Stanway (Colchester Borough Council)
- AQMA 24 (Thurrock Council)
- Gravesham A226 One-way system (Gravesham Borough Council)

7.6.6 These AQMAs have all been declared for exceedance of the NO<sub>2</sub> objective and limit value of 40µg/m<sup>3</sup>. These AQMAs have identified road traffic as a predominant source of pollution. AQMAs are presented on Figure 7.1 at Appendix A.

## Background pollutant concentrations

7.6.7 Background concentrations refer to the existing levels of pollution in the atmosphere, produced by a variety of stationary and non-stationary sources, such as roads and industrial processes. The Defra website (Defra, 2021) includes estimated background pollutant concentrations for NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> for each 1km by 1km OS Grid square in the UK.

7.6.8 The Defra background concentrations of NO<sub>2</sub> are found to be low across the study area. The highest background NO<sub>2</sub> concentration is 29.2µg/m<sup>3</sup> at East Tilbury, well below the limit value of 40µg/m<sup>3</sup>. The lowest NO<sub>2</sub> background concentration is 6.8µg/m<sup>3</sup> near to Gislingham.

7.6.9 The background concentrations of NO<sub>x</sub> (relevant to ecological receptors) are generally low within the study area, however there are exceedances of the limit value for the protection of vegetation of 30µg/m<sup>3</sup>. The highest background concentration of NO<sub>x</sub> is 49.3µg/m<sup>3</sup> in East Tilbury, the minimum concentration is 8.6µg/m<sup>3</sup>, near to Gislingham. Ecological sites (presented on Figure 7.1 at Appendix A) that are within areas of exceedance comprise:

- Grove House Wood Local Nature Reserve (LNR)
- Linford Wood LNR
- Thames Estuary and Marshes SPA and SSSI
- Hangman's Wood and Deneholes SSSI
- Bullock Wood SSSI
- Marks Tey Brickpit SSSI
- Globe Pit SSSI
- Mucking Flats and Marshes SSSI

7.6.10 The background concentrations of PM<sub>10</sub> do not exceed 50% of the objective (40µg/m<sup>3</sup>). The highest concentration within the study area is 20.0µg/m<sup>3</sup> at Aldham and the lowest is 14.0µg/m<sup>3</sup> at Mucking. Background concentrations of PM<sub>2.5</sub> also do not exceed 50% of the relevant site limit value, in this case 25µg/m<sup>3</sup>, where the maximum concentration within the study area is 12.3µg/m<sup>3</sup> north of Colchester and the minimum concentration is 8.8µg/m<sup>3</sup> at Newton Flotman.

## Future baseline

7.6.11 Background air pollutant concentrations are currently available using 2018 base year for projections (Defra, 2021). These are predicted to improve over time due to reductions in emissions resulting from:

- Reductions in transport emissions resulting from improvements in fuel efficiency and uptake in low emission vehicles
- General reduction in the use of fossil fuels
- Reductions in pollutant emissions from agricultural sources due to improvements in management envisaged in the 2019 Clean Air Strategy (Defra, 2019)
- Improved emission standards for Non-Road Mobile Machinery and static generators

7.6.12 The modelled concentrations for the year 2025 show reductions in both NO<sub>2</sub> and NO<sub>x</sub> levels within the study area compared to the 2021 forecast. The forecast shows negligible improvements in concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> between 2021 and 2025.

## 7.7 Further data to be gathered / processed in the ES

7.7.1 The assessment within the ES would be informed by third party data, such as:

- Local Authority air quality monitoring data
- AddressBase dataset points
- Construction programmes, locations, and methodologies
- Details of human receptors

7.7.2 Construction traffic data developed for the Project as a result of the iterative design process would also be utilised to inform assessments within the ES.

## 7.8 Measures adopted as part of the Project

7.8.1 The Scoping Report Corridor has been designed to avoid as far as practicable sensitive air quality features such as built-up residential areas as set out in the Corridor and Preliminary Routeing and Siting Study (National Grid, 2022). Further embedded measures would be developed as the Project design evolves.

7.8.2 A range of standard measures for the Project would be adopted throughout the duration of the construction phase. Appendix B: Initial Outline CoCP outlines measures relevant to air quality. These include but are not limited to:

- Any activity carried out or equipment located within a construction compound that may produce a noticeable nuisance, including but not limited to dust, noise, vibration and lighting, will be located away from sensitive receptors such as residential properties or ecological sites where practicable
- Plant and construction vehicles will conform to relevant applicable standards for the vehicle type as follows:
  - Euro 4 (NOx) for petrol cars, vans and minibuses
  - Euro 6 (NOx and PM) for diesel cars, vans and minibuses
  - Euro VI (NOx and PM) for lorries, buses, coaches and Heavy Goods Vehicles (excluding specialist AIL)
- Vehicles will be correctly maintained and operated in accordance with manufacturer's recommendations and in a responsible manner. All plant and vehicles will be required to switch off their engines when not in use and when it is safe to do so
- Materials and equipment will not be moved or handled unnecessarily. When loading and unloading materials from vehicles, including cable drums and excavated materials, drop heights will be limited
- Wheel washing will be provided at each main compound access point on to the highway. An adequate supply of water will be made available at these locations at all times. Road sweepers will be deployed on public roads where necessary to prevent excessive dust or mud deposits
- Earthworks and stockpiled soil will be protected (to avoid dust generation) by covering, seeding or using water suppression where appropriate
- Bonfires and the burning of waste material will be prohibited
- The Construction Traffic Management Plan (CTMP) (a draft CTMP would be submitted as part of the DCO application) will set out measures to reduce route and journey mileage to and from and around site, and reduce nuisance to the

residents, businesses and the wider community caused by parking, vehicle movements and access restrictions. It will also provide suitable control for the means of access and egress to the public highway and set out measures for the maintenance and upkeep of the public highway. The plan will also identify access for emergency vehicles. It will also set out measures to reduce safety risks through construction vehicle and driver quality standards and measures to manage abnormal loads

7.8.3 All of these standard measures would reduce impacts of air quality on identified receptors.

## 7.9 Likely significant effects

7.9.1 This section sets out the likely significant effects of the Project on air quality. It assumes that the relevant embedded (design measures), standard and additional measures within the Initial Outline CoCP at Appendix B and the expected mitigation for any other consents or permits are in place before assessing the effects. This is in accordance with guidance from the IEMA as part of preparing a proportional assessment (IEMA, 2022).

7.9.2 The likely effects of the Project have been split into:

- Construction – dust, generators and construction traffic, and
- Operation – traffic and maintenance activities

### Construction

#### Dust

7.9.3 Dust is generated from construction activities arising from handling waste, movement of earth, handling materials and tracking vehicles on unpaved/ unsurfaced haul roads and on the public highway. The effects of fugitive dust from construction are generally experienced through the suspension of dust particles in the air and deposition of dust and detritus on surfaces. Dust can affect human health, local amenity or ecological receptors (through deposition) within the local authority of the locality of the activities being undertaken. The concentrations of suspended dust particles reduce with increased distance from the construction works.

7.9.4 Appendix B: Initial Outline CoCP includes a number of standard measures which would reduce the generation of dust during construction. With these measures in place, the Project is unlikely to result in significant effects as a result of construction related dust as described in IAQM (2016) Construction Dust Guidance, therefore, this is proposed to be **scoped out** of the ES.

7.9.5 A dust risk assessment would be appended to the outline CoCP (submitted with the DCO application), to document the compliance assessment and to identify any further standard measures. This would follow the approach set out in the IAQM (2016) Construction Dust Guidance.

#### Generators

7.9.6 Emissions to air can arise from the use of generators. Such operations would be temporary and short-lived when considered on an annual basis. In addition, the standard good practice measures such as limiting use to only when a grid connections is not available, selecting generators with emissions abatement technology and locating generators as far away as possible from sensitive receptors described in the outline CoCP would reduce the effects further. With standard control measures in place, it is



not expected that the emissions from generator use during construction would result in a likely significant effect, therefore this is proposed to be **scoped out** of the ES.

### Construction traffic

- 7.9.7 During construction, there is the potential to change traffic flows on the local road network. Construction vehicles and plant would generate emissions from vehicles delivering materials and construction workings to and from the construction site. Emissions could affect receptors located close to the working areas and along construction routes along the local network.
- 7.9.8 While the emissions from the operation of construction plant are generally considered not significant given their short-term use at any given location within the construction period, the potential for emissions from construction traffic on the public highway to combine with existing emissions in areas of high sensitivity (particularly in AQMAs) has the potential to create a significant effect.
- 7.9.9 Air emissions from the Project would be reduced through the implementation of standard measures within the outline CoCP (submitted with the DCO application). With these measures in place, construction traffic related emissions would be reduced. In areas where concentrations of traffic-based pollutants are already in exceedance of the limit of  $40\mu\text{g}/\text{m}^3$  for  $\text{NO}_2$ , the addition of construction traffic in the area may result in a further deterioration of pollutant concentrations which may be significant. Emissions from construction traffic, is therefore proposed to be **scoped into** the ES. Construction traffic would only be scoped into the assessment within the ES if the criteria outlined within section 7.10 is met.
- 7.9.10 Diverted traffic is proposed to be **scoped out** as no likely significant effects are expected as it is anticipated that the volumes of diverted traffic would be lower than the relevant IAQM screening criteria, as detailed in 7.3.1.

### Operation (inc. maintenance)

- 7.9.11 There would be very small numbers of vehicles associated with operation and maintenance of the Project. In addition, no dust sources have been identified. Therefore, no likely significant effects in relation to air quality (including dust) are expected, and this is proposed to be **scoped out** of the ES.

## 7.10 Proposed assessment methodology

- 7.10.1 This section sets out the proposed methodology for the air quality assessment of the ES.
- 7.10.2 The assessment comprises assessing the value of the receptor, the magnitude of impact (change in the baseline conditions) the receptor would experience due to the Project and the resulting significance of effect, which is determined by combining the value and impact. Where there is any potential for an impact to a receptor resulting from the Project, this would be assessed in full in the ES.

### Construction traffic

- 7.10.3 Proposed traffic flows using the public highway as a result of construction of the Project could potentially meet the assessment criteria from the IAQM guidance (IAQM, 2017). Where flows meet the criteria for assessment, detailed dispersion modelling would be undertaken on the relevant road links to assess the changes in concentrations of air pollutants. The screening criteria are:

- A change in Light Duty Vehicle flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere, and
  - A change in HDV (>3.5 tonnes) flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere
- 7.10.4 The screening criteria would identify the ARN. Road links that do not meet the criteria would not be subject to assessment.
- 7.10.5 Sensitive receptors within 200m of the ARN would be considered. Beyond this distance concentrations are expected to have dispersed to concentrations equivalent to background levels and would not be assessed.
- 7.10.6 If the screening criteria is met or exceeded, then calculation of emissions from traffic would be undertaken using the latest available version of the Defra Emissions Factor Toolkit (currently v11.0). Dispersion modelling would be undertaken using the Air Dispersion Modelling System-Roads dispersion modelling program.
- 7.10.7 The conversion of road Nox to NO<sub>2</sub> would be undertaken using the latest version of the Defra Local Air Quality Management Nox to NO<sub>2</sub> Calculator (currently v8.1).

## Ascribing value

- 7.10.8 Sensitive receptors include locations where people are likely to be exposed to air pollutants for an averaging time commensurate with the pollutant objective or limit value being assessed against. Sensitive receptors include:
- Residential receptors
  - Commercial receptors, e.g., places of work
  - Community receptors, e.g., community centres
  - Ecological receptors (statutory, non-statutory and locally designated sites)
- 7.10.9 Receptors that merit particular attention due to the relative vulnerability of people who may occupy them include:
- Medical facilities
  - Residential care homes or sheltered accommodation
  - Schools, nurseries, and other places of education where children or young people are present
- 7.10.10 While the legal limit and objective values for air pollutants are established in law, it is widely recognised that the air pollutants identified in the Air Quality Standards Regulations 2007 are considered to be non-threshold pollutants (i.e., there is no safe exposure limit below which there are no health impacts). Therefore, all receptors that are exposed to air pollutants for a time period relevant to the limit or objective value for a given pollutant are considered to be highly sensitive receptors.
- 7.10.11 The criteria used to determine the value and sensitivity of the receiving environment to air quality effects can be found Tables 4 and 5 of Section 7 of the Dust Risk Assessment Guidance (IAQM, 2016). These tables take account of the number of receptors within a given distance of construction works, the sensitivity of receptors and the background pollutant concentration through a semi-quantitative method to establish the sensitivity according to dust soiling impacts, human health impacts and ecological impacts.

## Impact magnitude

- 7.10.12 The terminology for describing the magnitude of impact for construction traffic emissions would be assigned based on the criteria from IAQM Land-use Planning and Development Control: Planning for Air Quality. V1.2 (IAQM., 2017) which is presented in Table 7.2.

Table 7.2 – Criteria for quantifying the magnitude of impact (IAQM)

Long-term Average Concentration at Receptor in Assessment Year	% Change in Concentration Relative to the Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

## Significance

- 7.10.13 The impact descriptors at each of the assessed receptors would be used as a starting point to make a judgement on the overall significance of effect of the Project, however other influences would also be accounted for, such as:
- The existing future air quality in the absence of the Project
  - The extent of current and future population exposure to the impacts
  - The influence and validity of any assumptions adopted when undertaking the prediction of impacts
- 7.10.14 Professional judgement would be used to determine the overall significance of effects of the Project, however, in circumstances where the Project can be judged in isolation, the guidance suggests that a 'moderate' or 'substantial' impact is likely to give rise to a significant effect and a 'negligible' or 'minor' is not likely to result in a significant effect.
- 7.10.15 The significance of any air quality impacts on ecological receptors would require the evaluation of impacts by an ecologist.

## 7.11 Proposed scope of the ES

- 7.11.1 The matters that are proposed to be scoped in and out of the ES are summarised in Table 7.3.

Table.7.3 – Proposed Scope of the ES

Matter	Phase	Scoped in / out	Justification
Construction dust	Construction	Scoped out	No likely significant effects are expected following the implementation of standard measures set out in the outline CoCP

<b>Matter</b>	<b>Phase</b>	<b>Scoped in / out</b>	<b>Justification</b>
			(submitted with the DCO application) in accordance with IAQM guidance. A dust risk assessment would also be appended to the outline CoCP (submitted with the DCO application).
Construction generators	Construction	Scoped out	No likely significant effects expected due to highly localised and temporary operation and with the implementation of standard measures in the outline CoCP (submitted with the DCO application).
Construction traffic	Construction	Scoped in (if the screening criteria are met or exceeded)	Potential for deterioration in local air quality (NO <sub>2</sub> , NO <sub>x</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> ) at local human and ecological receptors. This would be scoped out if criteria are not met. Diverted traffic is scoped out as there are no likely significant effects due to low expected changes in traffic flows.
Operational vehicle emissions	Operation	Scoped out	No likely significant effects expected due to the low numbers of vehicle movements.

\*Operation referred to above also includes maintenance.

# 8 Ecology and Biodiversity

## 8.1 Approach to scoping

8.1.1 The approach to scoping has drawn from guidance provided in the Chartered Institute of Ecology and Environmental Management (CIEEM) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2019) (hereafter referred to as ‘the CIEEM guidelines’). However, the term ‘biodiversity receptor’ has been used in preference to ‘ecological feature’ which is used in the CIEEM guidelines. This is to provide consistency between different discipline sections. The approach to scoping has drawn from previous experience of similar projects. Determining the scope of the Ecology and Biodiversity assessment has included the following stages:

- Regulatory and planning policy context
- Defining the study area
- Engagement with stakeholders
- Stating sources of data collected
- Outlining baseline conditions
- Highlighting further data to be gathered
- Outlining environmental measures
- Predicting likely significant effects
- Drafting the proposed assessment methodology
- Stating the proposed scope of the ES

8.1.2 There are interrelationships related to the potential effects on ecology and biodiversity and other environmental topics. Therefore, the following chapters should be read in conjunction with Chapter 8:

- Chapter 7: Air Quality
- Chapter 12: Hydrology and Land Drainage
- Chapter 14: Noise and Vibration

8.1.3 This chapter should also be read in parallel with Figure 8.1 to Figure 8.4 at Appendix A, together with the following appendices:

- Appendix E: Sites Designated for Biodiversity
- Appendix F: Biodiversity Survey Methodology

8.1.4 A separate assessment relating to potential likely significant effects to European sites (SPA, SAC and Ramsar sites, including potential sites) has not been completed. Habitats Regulations Assessment (HRA) screening would be undertaken in parallel with the ES to determine whether the Project would have likely significant effects on European sites and if likely significant effects cannot be ruled out an AA would be prepared to ensure there would be no adverse effects.

8.1.5 Compliance with the legislation relating to the protection of species of fauna would be

assessed in a Biodiversity Legislation Compliance Report. This report would be provided as an appendix to the ES and would address all relevant legally protected and controlled species, regardless of whether these had been scoped in or out of the ES.

- 8.1.6 Draft European Protected Species (EPS) licences are proposed to be submitted to Natural England before close of the DCO examination to ensure 'Letters of No Impediment' (LONI) can be submitted to the Planning Inspectorate. These draft licence applications would be submitted to Natural England for review, to satisfy their requirements that a robust assessment has been undertaken and to agree any necessary mitigation measures. Full submission of any necessary protected species licence applications to Natural England would be required prior to construction, if the DCO is granted.
- 8.1.7 It is currently proposed that great crested newt (GCN) (*Triturus cristatus*) would be subject to a District Level Licence (DLL) which would cover mitigation for GCN. Under a DLL, there would be no requirement for any fieldwork for GCN or additional mitigation beyond that included in the DLL agreement, therefore they are not considered further in this chapter. Please see paragraph 8.11.82 for further detail. A letter of comfort which sets out Natural England's agreement to deliver DLL for the Project in principle is included at Appendix K.
- 8.1.8 The Scoping Report Corridor would ultimately be refined to comprise the proposed Order Limits within the ES.

## 8.2 Regulatory and planning policy context

- 8.2.1 This assessment would be undertaken in accordance with, and with reference to, the following legislation, policy and guidance.

### National policy

- 8.2.2 Chapter 2: Legislation and Planning Policy Context sets out the overarching policy relevant to the Project, including the Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change, 2011).
- 8.2.3 EN-1 contains the following sections relating to ecology which have been considered within this chapter: Sections 4.3 (Habitats and Species Regulations), 4.10 (Pollution control and other environmental regulatory regimes) and 5.3 (Biodiversity and geological conservation). One section which is of particular relevance to the Project and the potential impact on ancient woodland is found in:
- Paragraph 5.3.14 - "*Ancient woodland is a valuable biodiversity resource both for its diversity of species and for its longevity as woodland. Once lost it cannot be recreated. The IPC should not grant development consent for any development that would result in its loss or deterioration unless the benefits (including need) of the development, in that location outweigh the loss of the woodland habitat. Aged or 'veteran' trees found outside ancient woodland are also particularly valuable for biodiversity and their loss should be avoided. Where such trees would be affected by development proposals the applicant should set out proposals for their conservation or, where their loss is unavoidable, the reasons why.*"
- 8.2.4 Draft NPS for Energy (EN-1) (Department for Business, Energy and Industrial Strategy, 2021) contains the following sections relating to ecology which have been considered within this chapter: Sections 4.2 (Environmental Principles), 4.5 (Environmental and Biodiversity Net Gain), 4.11 (Pollution Control and Other Environmental Regulatory Regimes) and 5.4 (Biodiversity and Geological Conservation). The extracts below have

been highlighted as some of the key policies that would be assessed as part of the ES.

- Draft EN-1 states that “*Although achieving biodiversity net gain is not an obligation for projects under the Planning Act 2008, energy NSIP proposals should seek opportunities to contribute to and enhance the natural environment by providing net gains for biodiversity where possible. Applicants are encouraged to use the most current version of the Department for Environment Food and Rural Affairs (Defra) biodiversity metric to calculate their biodiversity baseline and inform their biodiversity net gain outcomes and to present this data as part of their application. Biodiversity net gain should be applied in conjunction with the mitigation hierarchy and does not change or replace existing environmental obligations*”. The Project is therefore seeking to deliver BNG (in line with National Grid corporate commitment – see 8.2.11). Any additional biodiversity gain objectives would be incorporated into the Project (where practicable) as and when published.
- Draft EN-1 also states that “*sites identified, or required, as compensatory measures for adverse effects on other HRA sites*’ should be ‘*given the same protection as sites covered by the Habitat’s Regulations*”, implying that any land identified/used by other Projects to compensate for impacts to European Sites should be included within the HRA. This would be taken into account when producing the HRA.
- Draft EN-1 also states that the applicant should demonstrate that “*the timing of construction has been planned to avoid or limit disturbance to birds during the breeding season*”. This would be taken into account during Project design.

8.2.5 NPS for Electricity Networks Infrastructure (EN-5) (Department of Energy and Climate Change, 2011) states:

- Section 2.7 (Biodiversity and Geological Conservation) that “*large birds such as swans and geese may collide with overhead lines associated with power infrastructure, particularly in poor visibility. Large birds in particular may also be electrocuted when landing or taking off by completing an electric circuit between live and ground wires. Even perching birds can be killed as soon as their wings touch energised parts*”. In relation to the applicant’s assessment, it states “*The applicant would need to consider whether the proposed line would cause such problems at any point along its length and take this into consideration in the preparation of the EIA and ES (see Section 4.2 of EN-1). Consideration should be given to feeding and hunting grounds, migration corridors and breeding grounds.*” Potential collision risk would be assessed, at areas as agreed with Natural England, (such as rivers and green corridors) through bird survey work.

8.2.6 Draft NPS EN-5, 2021 makes similar reference to bird collisions in section 2.10 and refers to the need to make lines more visible.

## Regional and local policy

8.2.7 Chapter 2: Legislation and Planning Policy Context sets out relevant regional and local policy.

## Guidance

8.2.8 Relevant guidance, specific to ecology and biodiversity, that has informed this Scoping Report and would inform the assessment within the ES comprises:

- A Green Future: Our 25 Year Plan to Improve the Environment (HMSO, 2018)
- The UK Post-2010 Biodiversity Framework (2011-2020) (JNCC and Defra, 2012)

- Guidelines for Ecological Impact Assessment (EclA) in the UK and Ireland: terrestrial, freshwater, coastal and marine (CIEEM, 2019)
- Biodiversity Net Gain: Good Practice Principles for Development (CIEEM, 2019)
- BS 42020:2013 Biodiversity: Code of Practice for Planning and Development (BSI 42020: 2013)

## Biodiversity Net Gain

- 8.2.9 The Environment Act 2021 introduces a mandatory requirement for 10% biodiversity net gain for new developments to ensure that they enhance biodiversity and create new green spaces for local communities to enjoy. Integrating biodiversity net gain into the planning system would provide a step change in how planning and development is delivered.
- 8.2.10 In line with the 25 Year Plan for the Environment (HMSO, 2018), new development should identify and pursue opportunities for securing measurable net gains for biodiversity and for the wider environment.
- 8.2.11 National Grid has committed to 10% Net Gain in Environmental value\* including as a minimum 10% biodiversity net gain across all its construction projects. The 10% target for the Project is voluntary as it is not mandated for Nationally Significant Infrastructure Projects until November 2025.
- 8.2.12 In pursuit of achieving this commitment across the Project, the Defra biodiversity metric (the most up to date version, currently 3.1) would be used to set a biodiversity baseline, quantify the impacts of change to the Project, inform landscaping design and action and calculate the extent to which mitigation, compensation and enhancement measures incorporated into the design of the Project would deliver long term Net Gains for the environment and biodiversity.
- 8.2.13 Where required, biodiversity enhancement measures may include creation of new habitats, and improvement of existing biodiversity receptors, for example, improving existing areas of grassland to improve their habitat condition by bringing them into more favourable management or planting in strategic areas to create new ecological connections.
- 8.2.14 Delivery of these potential improvements would be sought through the provisions of the DCO where possible and/or via third party agreements with landowners.
- 8.2.15 Subject to their delivery, the identification of these potential improvements would allow effective and valuable environmental benefits to be identified and would assist in meeting the aspirations of stakeholders with an interest in achieving wider environmental benefits on development projects.

## 8.3 Study area

- 8.3.1 The study area for the Project varies with the different biodiversity receptors based on the CIEEM guidelines (CIEEM, 2019). In summary the study areas to inform scoping are presented in Table 8.1 and on Figure 8.1 to Figure 8.4 at Appendix A.



Table 8.1 – Initial study areas

<b>Biodiversity Receptor</b>	<b>Initial Study Area to Inform Scoping</b>
International sites designated for biodiversity	SACs within 2km, extending to 30km for SACs where bats are the qualifying interest, and European sites.  SPAs and Wetlands of International Importance (Ramsar sites) within 20km of the Scoping Boundary.
National and local sites designated for biodiversity (statutory and non-statutory)	2km from the Scoping Report Corridor
Protected / notable species	2km from the Scoping Report Corridor
Protected / notable habitat (including ancient woodland)	200m from the Scoping Report Corridor (extended as necessary for account for hydrological connectivity)

8.3.2 Scoping sets out the initial study area as a starting point for baseline data collection, which would ultimately be amended to form a Zone of Influence (Zol - the area over which changes arising from construction and operation could lead to ecologically significant impacts), following further assessment. The CIEEM guidelines (CIEEM, 2019) require the assessment to be focused on 'Zol'.

8.3.3 It is noted here that the Zol varies between different biodiversity receptors and would be formalised through professional judgement of perceived impact pathways, survey work, desk base assessment, best practice guidelines, and consultation with stakeholders. The Zol for any receptors would be refined as more information becomes available regarding the potential ecological effects of the Project.

## 8.4 Data collection

8.4.1 The baseline has been informed by a desk study which has drawn on the following information sources:

- APEM aerial imagery (2022) - Digital surface model (DSM) tiles, Digital terrain model (DTM) tiles, Ortho-mosaic tiles and tree crown mapping were provided for the Scoping Report Corridor. Imagery at a resolution of 3cm Ground Sampling Distance were captured using fixed-wing aircraft
- Google Earth (2022) - Review of freely available aerial photography has allowed habitats within the study area to be assessed in a wider (landscape-scale) context; assessment and identification of potential ephemeral biodiversity receptors that may not be evident on the ground during the field survey (e.g. ephemeral ponds); identification of potential wildlife corridors or barriers to animal movements (e.g. road networks, built development and major watercourses); and a review of changes to habitats over time so that an assessment of reliability/longevity can be made
- Multi-agency Geographic Information for the Countryside (MAGIC) (2022) - The location of statutory designated sites for nature conservation, Priority Habitats, Ancient Woodland, granted EPS Licence applications, National Habitat Network Maps and Living England Habitat Map
- As some biodiversity receptors are not always apparent on aerial photographs, relevant OS mapping has been studied to identify ponds, issues and/ or drains

- Norfolk Biodiversity Information Service (NBIS, 2022) – Protected/ notable species and non-statutory sites designated for biodiversity
- Suffolk Biodiversity Information Service (SBIS, 2022) – Protected/ notable species and non-statutory sites designated for biodiversity
- Essex Field Club (2022) - Protected/ notable species and non-statutory sites designated for biodiversity

## 8.5 Engagement with stakeholders

8.5.1 A summary of engagement undertaken to date is presented in Table 8.2.

Table 8.2 – Summary of engagement

Organisation and date	Summary of engagement	Consideration in the Scoping Report
Natural England – June to September 2022	Agreement of wintering/ passage bird survey scope with Natural England. Agreed on 13 <sup>th</sup> September 2022.	The agreed scope is also set out at Appendix F, Annex I.
Natural England District Licensing Team – August 2022	Broad agreement that District Level Licencing can be used for the Project as set out in the letter of comfort (see Appendix K).	GCN have been scoped out of the ES.

## 8.6 Baseline conditions (inc. future baseline)

8.6.1 Field survey work is yet to commence for this Project, however, this section outlines existing desk study data identified through a review of the available sources outlined in Section 8.4.

### Sites designated for biodiversity

8.6.2 A summary of the sites designated for biodiversity within the study area are listed below with full details provided at Appendix E and shown in Figures 8.1, 8.2 and 8.4 at Appendix A.

#### Statutory designated sites

8.6.3 Four international sites designated for biodiversity are located within 2km from the Scoping Report Corridor boundary. These are listed in Table 8.3.

Table 8.3 – International sites designated for biodiversity within 5km

Site	Appropriate location and distance from the Scoping Report Corridor boundary
Norfolk Valley Fens SAC	0.18km south-east of the Scoping Report Corridor
Thames Estuary and Marshes Ramsar site and SPA	0.33km east of the Scoping Report Corridor
Redgrave and South Lopham Fens Ramsar site	1.84km west of the Scoping Report Corridor

<b>Site</b>	<b>Appropriate location and distance from the Scoping Report Corridor boundary</b>
Waveney and Little Ouse Valley Fens SAC	1.87km west of the Scoping Report Corridor

8.6.4 Beyond 2km, a further fourteen SPAs are located within 20km (search area requested by Natural England):

- Broadland
- Breckland
- Sandlings
- Stour and Orwell Estuaries
- Deben Estuary
- Abberton Reservoir
- Colne Estuary (Mid-Essex Coast Phase 2)
- Crouch and Road Estuaries (Mid-Essex Coast Phase 3)
- Dengie (Mid-Essex Coast Phase 1)
- Benfleet and Southend Marshes
- Outer Thames Estuary
- Medway Estuary and Marshes
- Hamford Water
- Blackwater Estuary (Mid-Essex Coast Phase 4)

8.6.5 No SAC's designated for bats are located within 30km.

8.6.6 The Scoping Report Corridor falls within 22 SSSI Impact Risk Zones (IRZs) for projects involving pylons and overhead lines. Two of these IRZs are associated with sites of bird interest (Stour and Orwell Estuaries and Thames Estuary and Marshes).

8.6.7 Twenty-two national sites designated for biodiversity (21 SSSIs and one National Nature Reserve (NNR)) are located within 2km from the Scoping Report Corridor.

8.6.8 Twelve local sites designated for biodiversity (statutory) (all Local Nature Reserves (LNRs)) were located within 2km from the Scoping Report Corridor boundary. The sites referenced above and three additional SSSI identified for consideration by Natural England are listed in Table 8.4.

**Table 8.4 – Sites designated for biodiversity**

<b>National Sites Designated for Biodiversity</b>		
Flordon Common SSSI	Bullock Wood SSSI	River Ter SSSI
Forngett Meadows SSSI	Cattawade Marshes SSSI*	Thorndon Park SSSI
Aslacton Parish Land SSSI	Barking Woods SSSI	Langdon Ridge SSSI
Shelfanger Meadows SSSI	Middle Wood, Offton SSSI	Mucking Flats and Marshes SSSI
Wortham Ling SSSI	Elmsett Park Wood SSSI	South Thames Estuary and Marshes SSSI

<b>National Sites Designated for Biodiversity</b>		
Gypsy Camp Meadows, Thrandeston SSSI	Hintlesham Woods SSSI	Redgrave and Lopham Fen NNR
Burgate Wood SSSI	Redgrave and Lopham Fens SSSI	Aslacton Parish Land SSSI
Gipping Great Wood SSSI	Hangman's Wood and Dene Holes SSSI*	Stour Estuary SSSI*
Combs Wood SSSI		
<b>Local Sites Designated for Biodiversity (Statutory)</b>		
Dunston Common LNR	Church Meadow LNR	Bramford Meadows LNR
Smockmill Common LNR	Fen Alder Carr LNR	Railway Walk, Hadleigh LNR
Roydon Fen LNR	Needham Lake LNR	Hutton Country Park LNR
Grove House Wood LNR	Linford Wood LNR	Brockwell Meadows LNR

\* Located outside of the 2km study area but included on request from Natural England.

### **Non-statutory designated sites**

8.6.9 Seventy-six non-statutory sites designated for biodiversity fall within the Scoping Report Corridor, with 293 additional non-statutory sites located within 2km from the Scoping Report Corridor.

## **Habitats**

### **Ancient woodland**

8.6.10 Fifty-nine blocks of ancient woodland fall within the study area, with twenty-seven blocks located within the Scoping Report Corridor (see Figure 8.3 at Appendix A).

8.6.11 Ancient woodland identified above includes all woodland that appears on maps before 1600. However, any woodland less than 2ha was not included on the inventory, and so small woodlands and linear features are excluded from the inventory. A field survey would determine if wooded areas support ancient woodland ground flora species and veteran and or ancient trees. The ecological field survey would be undertaken in combination with an arboricultural survey (refer to Chapter 13: Landscape and Visual) when assessing ancient woodland.

### **Habitats of Principal Importance in England**

8.6.12 The following Habitats listed on the Priority Habitat Inventory (Natural England, 2021) have been identified within the Scoping Report Corridor as shown on Figure 8.3 at Appendix A:

- Deciduous woodland
- Good quality semi-improved grassland
- Lowland fens
- Coastal and floodplain grazing marsh
- Lowland heathland
- Lowland calcareous grassland
- Lowland meadows and pastures

- Traditional orchards

8.6.13 The Priority Habitat Inventory replaces Natural England’s previous separate Biodiversity Action Plan (BAP) habitat inventories which include a range of semi-natural habitats that were identified as being the most threatened and requiring conservation action. All habitats would be further assessed during field survey work to confirm the presence and extent of Priority Habitat.

## Future baseline

8.6.14 The future baseline relates to known or anticipated changes to the current baseline in the future which should be assessed as part of the Project in the ES.

8.6.15 Large parts of land within the Scoping Report Corridor are located on agricultural land. The ecological conditions are unlikely to change significantly in the short term as current agricultural practices are likely to be maintained therefore the future baseline is likely to be the similar to the current baseline. Where changes arise from other future developments these would be considered in the cumulative assessment of the ES, as appropriate.

## 8.7 Further data to be gathered / processed in the ES

8.7.1 The assessment within the ES would be informed by third party data gathered through further desk study work.

8.7.2 A preliminary assessment would provide an appraisal of the likely impacts of the Project on the habitats and species present within and adjacent to the Scoping Report Corridor, to inform the need for further detailed species and habitat surveys, and to make a preliminary assessment of the requirements for mitigation and/ or compensation.

8.7.3 The preliminary assessment would comprise two elements, a desk study and a field survey. The initial field survey would build on the habitat data mapped as part of the APEM high quality imagery fixed-wing survey which was commissioned by the Project.

8.7.4 The following additional sources of information (in addition to those listed in section 8.4.1) would be used as part of the desk study to inform the baseline:

- Natural England Open Data Geoportal would be consulted for protected species licence returns and risk zones, and freshwater ecology datasets
- The Royal Society for the Protection of Birds
- British Trust for Ornithology
- Norwich Bat Group
- Suffolk Bat Group
- Suffolk Mammals Group
- Suffolk Amphibian and Reptile Group
- Suffolk Otters
- National Water Vole Database and Mapping Project (The Wildlife Trusts 2022) - Location of water vole (*Arvicola amphibius*) and American mink (*Neovison vison*) records (2009 – 2018) and information on trends in water vole populations at a regional and national level

- Environment Agency - Results of Environment Agency freshwater river macroinvertebrate surveys for locations within the study area

8.7.5 The preliminary assessment would ultimately inform the decisions around further survey works for habitat and protected/ notable species.

## 8.8 Measures adopted as part of the Project

8.8.1 The Scoping Report Corridor has been designed to avoid as far as practicable statutory designated sites and ancient woodland as set out in the Corridor and Preliminary Routing and Siting Study (National Grid, 2022). The design would also include embedded measures to avoid or reduce potential environmental effects on receptors, for example adopting a trenchless method to cross the River Stour. Further embedded measures would be developed as the Project design evolves.

8.8.2 A range of best practice standard measures for ecology and biodiversity would be adopted throughout the duration of the construction phase as presented within Appendix B: Initial Outline CoCP. These would include but are not limited to:

- The Main Works Contractor will comply with relevant protected species legislation. Appropriate licences will be obtained where necessary from Natural England for all works affecting protected species as identified by the Environmental Statement and through pre-construction surveys. All applicable works will be undertaken in accordance with the relevant requirements and conditions set out in those licences
- The assumption will be that vegetation with the potential to support breeding birds will not be removed during the breeding bird season (March to August inclusive). If any works become necessary during the breeding bird season, works will be supervised by the Environmental Clerk of Works. Appropriate protection measures will be put in place should active nests be found. These will include exclusion zones around active nests until chicks fledge or nests become inactive as determined by monitoring by the Environmental Clerk of Works
- Where there would be a risk of animal entrapment, a means of escape would be installed into all excavations that cannot be covered overnight
- To control the spread of invasive weeds in accordance with the Wildlife and Countryside Act 1981, any plant or machinery that has been used in areas infested with invasive species (both terrestrial and aquatic), such as Japanese Knotweed and Himalayan Balsam, would be thoroughly cleaned. Water used to clean vehicles would be controlled to prevent the spread of the plant (through seeds, rhizomes, fragments, etc.). The area would be cordoned off to prevent any inadvertent spreading
- All habitats suitable for common reptiles would be subject to two-stage habitat manipulation that would take place between mid-March and mid-October. Firstly, vegetation would be cut to approximately 150mm (with the arisings removed) under the supervision of an Environmental Clerk of Works and the site left for a minimum of 24 hours to allow reptiles to naturally disperse from the area. Secondly, vegetation would be cleared down to ground level under the supervision of an Environmental Clerk of Works. Vegetation would be cleared using appropriate equipment based on the type of vegetation to be removed, the area affected, and the risk of mortality or injuring reptiles. Construction works could commence immediately after completion of the second stage. Reptile hibernacula

would be retained and protected during construction where practicable. If unavoidable, the removal of vegetation and groundworks at hibernacula would be timed to avoid the hibernation season (late October to early March). Replacement hibernacula and refugia would be provided

- Alternative roost structures (bat boxes) would be provided (with landowner consent) on retained trees within the proposed Order Limits or areas outside of the proposed Order Limits agreed with landowners. Three boxes would be provided for each tree with moderate bat roost potential to be felled. Five boxes would be provided for each tree with high bat roost potential to be felled
- Where the works require the crossing or removal of hedgerows, the gap will be reduced to a width required for safe working. Where hedge removals are necessary, 'dead hedging' should be used, where practicable, in the interim periods to retain connectivity during construction. Dead hedging can comprise vegetation arisings or artificial provision, such as willow screening panels or Heras fencing covered in camouflage netting. New hedgerow planting will contain native, woody species of local provenance

## 8.9 Likely significant effects

- 8.9.1 This section sets out the likely significant effects of the Project on ecology and biodiversity. It assumes that the relevant embedded (design measures), standard measures outlined within the Initial Outline CoCP at Appendix B and the expected mitigation for any other consents or permits, are in place before assessing the effects. This is in accordance with guidance from IEMA as part of preparing a proportional assessment (IEMA, 2022).
- 8.9.2 There is the potential for the Project to affect both terrestrial and freshwater habitats and species of biodiversity value within the ZoI. As a linear development which is largely in the air (overhead line) and below-ground (cabling), the Project would result in predominantly short-term and temporary impacts to facilitate construction (mainly associated with the construction of temporary compounds and haul road). The only permanent infrastructure would be a new substation, works at existing substations, cable sealing end compounds, pylons to support the new overhead lines and sections of underground cabling. As such the majority of biodiversity receptors would only be subject to negative effects during construction. Operational effects are considered to be limited to areas affected by permanent infrastructure only.
- 8.9.3 The identification of biodiversity receptors would be informed by a combination of desk study, field survey, stakeholder engagement and professional judgement. Biodiversity receptors would be selected based on an understanding of their value and the potential for the Project to result in direct and indirect significant effects.

## Identification of impact pathways

8.9.4 The potential impacts from the Project are outlined in Table 8.5. The physical area covered by the Zol would vary depending on the predicted impact and the biodiversity receptor. For example, the Zol relating to terrestrial habitats would be larger for the underground cable sections, compared to the far more restricted overhead line sections where impacts would mainly be limited to the construction footprint of a haul road and the pylon bases. An appraisal has been made as to whether significant effects may arise. This enables a decision on whether the impact pathway and/ or biodiversity receptors can be scoped out of the ES.

Table 8.5 - Summary of potential impact pathways and Zol

Impact pathway	Zone of influence and rationale	Biodiversity receptors potentially sensitive to the impact pathway for construction and operation
Potential killing/ injury of protected species	<p><u>Construction</u></p> <p>Physical interaction between species and project machinery or activities e.g., vegetation clearance and groundworks, that would be limited to areas within the construction working area.</p>	<ul style="list-style-type: none"> <li>● Fish and other aquatic fauna</li> <li>● Invertebrates (terrestrial and aquatic)</li> <li>● Reptiles</li> <li>● Birds</li> <li>● Badger</li> <li>● Bats</li> <li>● Hazel dormouse</li> <li>● Otter (<i>Lutra lutra</i>)</li> <li>● Water vole</li> <li>● Other notable species</li> </ul>
	<p><u>Operation</u></p> <p>Physical interaction between species and new permanent overhead line infrastructure (specifically conductors and pylons).</p>	<ul style="list-style-type: none"> <li>● Birds</li> </ul>



Impact pathway	Zone of influence and rationale	Biodiversity receptors potentially sensitive to the impact pathway for construction and operation
Habitat loss, fragmentation or severance	<p><u>Construction</u></p> <p>Habitat loss would be restricted to areas cleared for construction activities e.g., temporary habitat loss at construction compounds, haul routes, cable trenches and cable sealing end compounds.</p> <p>There would be permanent habitat loss at the area proposed for the new substation, cable sealing end compounds, and pylon bases. Retained habitats within the Project may be temporarily fragmented between the period when vegetation/ topsoil clearance works start and habitat reinstatement and creation are completed.</p>	<ul style="list-style-type: none"> <li>● Ancient woodland and veteran trees</li> <li>● Habitats of Principal Importance in England</li> <li>● ‘Important’ hedgerows</li> <li>● Other notable habitats</li> <li>● Vascular, non-vascular plants and fungi</li> <li>● Fish and other aquatic fauna</li> <li>● Invertebrates (terrestrial and aquatic)</li> <li>● Reptiles</li> <li>● Birds</li> <li>● Badger</li> <li>● Bats</li> <li>● Hazel dormouse</li> <li>● Otter</li> <li>● Water vole</li> <li>● Other notable species</li> </ul>
	<p><u>Operation</u></p> <p>This assumes once habitat has established as part of construction phase mitigation, no operational impacts are anticipated.</p>	<ul style="list-style-type: none"> <li>● None</li> </ul>
Disturbance of protected / notable fauna (from changes in levels of noise, vibration, visual and lighting).	<p><u>Construction</u></p> <p>Disturbance could arise from construction activities, including construction plant and machinery. Temporary security lighting would be required to illuminate site compounds, where trenchless crossing works extend into night-time hours or in winter at specific works areas.</p>	<ul style="list-style-type: none"> <li>● Fish</li> <li>● Birds</li> <li>● Badger</li> <li>● Bats</li> <li>● Hazel dormouse</li> <li>● Otter</li> <li>● Water vole</li> <li>● Other notable species</li> </ul>

Impact pathway	Zone of influence and rationale	Biodiversity receptors potentially sensitive to the impact pathway for construction and operation
	<p><u>Operation</u></p> <p>There would be no changes to noise or vibration during operation. There is the potential for limited operationally lighting to impact nocturnal fauna (specifically bats), which would require further assessment. Operational lighting is anticipated to be switched on at substations only when operational staff are on site, and it is needed.</p>	<ul style="list-style-type: none"> <li>Bats</li> </ul>
Air quality changes (resulting in habitat loss/modification)	<p><u>Construction</u></p> <p>Air quality changes could occur through dust and changes in pollutant levels caused by emissions from construction plant and machinery. Vehicle emissions can occur up to 200m from their origin (Holman <i>et al.</i>, 2020) and the impact of dust on biodiversity can occur up to 50m from the works (Holman <i>et al.</i>, 2014)</p>	<ul style="list-style-type: none"> <li>Statutory designated sites</li> <li>Non-statutory designated sites</li> <li>Ancient woodland and veteran trees</li> <li>Habitats of Principal Importance in England</li> <li>'Important' hedgerows</li> <li>Other notable habitats</li> <li>Vascular, non-vascular plants and fungi</li> </ul>
	<p><u>Operation</u></p> <p>Changes in air quality are not anticipated during operation.</p>	<ul style="list-style-type: none"> <li>None</li> </ul>
Hydrological changes in surface water and groundwater (resulting in mortality/injury of species and/or habitat loss/modification)	<p><u>Construction</u></p> <p>Changes to groundwater flows or levels due to temporary dewatering works at locations of cable trenching, trenchless crossings and during construction of foundations.</p>	<p>Ground Water Dependent Terrestrial Ecosystems (GWDTEs) which could include:</p> <ul style="list-style-type: none"> <li>Statutory and non-statutory designated sites</li> <li>Habitats of Principal Importance in England</li> <li>Vascular plants</li> <li>Fish and other aquatic fauna</li> </ul>
	<p><u>Operation</u></p> <p>Changes to groundwater flows or levels due to underground features such as cables and foundations.</p>	<p>GWDTEs which could include:</p> <ul style="list-style-type: none"> <li>Statutory and non-statutory designated sites</li> </ul>

Impact pathway	Zone of influence and rationale	Biodiversity receptors potentially sensitive to the impact pathway for construction and operation
		<ul style="list-style-type: none"> <li>● Habitats of Principal Importance in England</li> <li>● Vascular plants</li> <li>● Fish and other aquatic fauna</li> </ul>
Introduction and / or spread of Invasive Non-Native Species (INNS) (resulting in habitat loss / modification).	<p><u>Construction</u></p> <p>Effects associated with INNS would only likely be experienced within the immediate vicinity of areas where machinery movements, soil stripping, storage and habitat reinstatement would be undertaken.</p> <p>There is potential for wider effects to occur where works would be within the vicinity of flowing watercourses.</p>	<ul style="list-style-type: none"> <li>● Ancient woodland</li> <li>● Habitats of Principal Importance in England</li> <li>● ‘Important’ hedgerows</li> <li>● Other notable habitats</li> <li>● Vascular, non-vascular plants and fungi</li> </ul>
	<p><u>Operation</u></p> <p>No impacts from INNS are predicted during operation.</p>	<ul style="list-style-type: none"> <li>● None</li> </ul>

\*Operation referred to above also includes maintenance.

### Potential killing/injury of protected species

#### Construction

8.9.5 During the construction phase, the following activities could potentially result in mortality and injury of species receptors: vegetation clearance; topsoil clearance; watercourse crossings; and entrapment in excavations. Significant effects could arise if protected or notable species are affected because they cannot avoid the works. Good practice measures would be set out in the CoCP to reduce the risk, for example regarding works avoiding bird nesting season and through using escape measures in excavations. These are likely to avoid any significant effect but until there is certainty on the extent and presence of certain species, this impact pathway is proposed to be **scoped into** the ES for relevant species.

8.9.6 Species could be killed or injured through collision with construction machinery. This is not expected to affect any nocturnal species since construction is assumed to not (in the main) be undertaken at night. The likelihood that significant effects could arise from this pathway is low and is therefore proposed to be **scoped out** of the ES.

#### Operation (inc. maintenance)

8.9.7 Once the Project is operational there is a potential risk of mortality and injury of species through collision with overhead lines.

8.9.8 Paragraph 2.7.1 of the draft EN-5 identifies a risk of bird collision with overhead lines. It

states “large birds such as swans and geese may collide with overhead lines associated with power infrastructure, particularly in poor visibility. Large birds in particular may also be electrocuted when landing or taking off by completing an electric circuit between live and ground wires. Even perching birds can be killed as soon as their wings touch energised parts”.

- 8.9.9 There is the potential for a significant effect in relation to birds but until there is certainty on the extent and presence of certain species, this impact pathway is proposed to be **scoped into** the ES for relevant species.

### **Habitat loss, fragmentation or severance**

#### Construction

- 8.9.10 Construction work would require the temporary loss of terrestrial and aquatic habitats likely to be used by protected and notable species. Permanent habitat loss would be limited to the footprint of permanent infrastructure (excluding underground cabling). As far as practicable, all other habitats would be reinstated on completion of construction and additional areas of planting and BNG would be implemented. All proposed habitat mitigation would be discussed with relevant stakeholders and would be set out in the outline LEMP.
- 8.9.11 Habitat fragmentation would occur where any linear features such as hedgerows, lines of trees or watercourses are temporarily removed. This can affect protected and notable species when foraging, commuting, or dispersing. This impact pathway is proposed to be **scoped into** the ES for construction for relevant biodiversity receptors in the underground cable sections.
- 8.9.12 Fragmentation in the overhead line sections would be reduced to the minimum required to allow safe working. Where practicable, the Main Works Contractor would retain vegetation. Where vegetation is lost and trees cannot be replaced in situ, native shrub planting would be discussed with the Local Planning Authority (LPA) as a replacement, in accordance with the Initial Outline CoCP at Appendix B. As such, habitat fragmentation is proposed to be **scoped into** the ES for the overhead line sections.

#### Operation (inc. maintenance)

- 8.9.13 Habitat loss as part of routine maintenance is expected to be minimal during the operation phase. As such, significant effects are not anticipated, and this is proposed to be **scoped out** of the ES

### **Disturbance of protected/ notable fauna (from changes in levels of noise, vibration, visual and lighting).**

#### Construction

- 8.9.14 Disturbance to aquatic and terrestrial species could occur during construction from: lighting, compound set up, vegetation removal, construction and reinstatement. There is the potential for disturbance to protected or notable species. Noise, vibration and lighting for the Project are all controllable by existing good practice measures that would be set out within the CoCP. However, noise and vibration would be scoped in during the construction phase on a precautionary basis as extent and presence is uncertain for some species. This is likely to be focused on areas of static working such as at the substation areas, and the temporary construction compounds.
- 8.9.15 Provision of artificial lighting is likely to be confined to where 24-hour works are required for example at trenchless crossings and where security lighting is required at the site compounds. Lighting would be controlled to be the lowest luminosity necessary for safe delivery of each task and would be designed to avoid spill into adjacent habitats.

Therefore, effects from lighting are proposed to be **scoped out** of the ES.

#### Operation (inc. maintenance)

- 8.9.16 No change to noise, vibration, or visual stimuli during the operational phase is anticipated, with only limited lighting provided at the new substation for occasional maintenance visits. As such, no significant effects are expected, and operational disturbance is proposed to be **scoped out** of the ES.

### **Air quality changes (resulting in habitat loss/ modification)**

#### Construction

- 8.9.17 Air quality changes can occur through dust and changes in pollutant levels caused by emissions from construction plant and machinery. Further details are set out in Chapter 7: Air Quality.
- 8.9.18 Dust can be controlled by existing good practice measures that would be set out in the CoCP that would contain specific good practice measures required to control dust. No significant effects are anticipated and therefore effects due to dust are proposed to be **scoped out** of the ES.
- 8.9.19 There would be an increase in traffic during construction, which could result in a deterioration in local air quality see Chapter 7: Air Quality. As traffic numbers are not known or construction traffic routes this is currently proposed to be **scoped into** the ES.

#### Operation (inc. maintenance)

- 8.9.20 There would be limited emissions to air during the operational phase from maintenance activities due to the very low vehicles numbers (see Chapter 7: Air Quality). Therefore, this pathway to ecological sites and therefore the potential to generate likely significant effects are proposed to be **scoped out** of the ES.

### **Hydrological changes in surface water and groundwater (resulting in mortality/ injury of species and/or habitat loss/ modification)**

#### Construction

- 8.9.21 Changes in hydrology, fluvial geomorphology and hydrogeology are important to terrestrial and aquatic ecology due to the following factors:
- Water quality has an important role in structuring flora and fauna communities in watercourses, ponds and wetlands
  - Sediment and other pollutant releases have the potential to adversely affect sensitive biodiversity receptors
  - Biodiversity receptors can be sensitive to alterations of runoff regimes changing the quality of surface and groundwater
  - Change in the hydrological regime due to the excavation and subsequent presence of the underground cables can affect groundwater levels and subsequently GWDTE
- 8.9.22 There may be direct impacts on watercourses in sections of underground cable, where open cut trenches are necessary to cross them, but potential impacts on surface water changes can be controlled with existing good practice measures to be set out in the CoCP to avoid significant effects. As such, potential impacts on surface water are **scoped out** for biodiversity receptors in the ES during construction.

### Operation (inc. maintenance)

8.9.23 There would be no generation of emissions to surface or groundwater in the operational phase. As such, potential impacts on surface water are proposed to be **scoped out** of the ES during operation.

8.9.24 There is potential for excavation and presence of new subsurface infrastructure, such as underground cables and foundations, to impact groundwater flow (quality and amount). Further details can be found in Chapter 9: Geology and Hydrogeology. These could directly or indirectly affect GWDTEs, including wetlands, fens and wet woodland during both construction and operation. Changes to groundwater regime during operation is proposed to be **scoped into** the ES and would be focused on areas where deeper excavations are required, such as trenchless crossings, the substation areas and compounds.

### **Introduction and/ or spread of INNS (resulting in habitat loss/ modification).**

#### Construction

8.9.25 The introduction or spread of INNS could potentially cause significant negative effects to sensitive habitats and species. Invasive species can easily dominate native species and lead to their decline.

8.9.26 During construction, topsoil or subsoil which potentially contains INNS plant material could cause the spread of seed or 'propagules' during such activities as excavation and vehicle movements. Invasive fauna, particularly waterborne macroinvertebrates and vascular plants can be transferred between watercourses by construction machinery and personnel. These risks would be controlled adequately through good practice measures to be set out in the outline CoCP to avoid adverse significant effects. Further good practice measures would be set out within the outline LEMP (which would form part of the outline CoCP), which would be provided at DCO submission. Therefore, this is proposed to be **scoped out**.

#### Operation (inc. maintenance)

8.9.27 Although minimal vegetation management may be required as part of routine maintenance, the spread of INNS plants during the operation is not anticipated. As such, INNS are proposed to be **scoped out** of the ES for operation.

## **8.10 Proposed assessment methodology**

### **Preliminary assessment – field survey**

8.10.1 Habitats would be mapped with reference to definitions outlined in the Joint Nature Conservation Committee (JNCC) *Phase 1 Handbook* (JNCC, 2010) and also *UK Habitat Classification* (Butcher *et al* 2020).

8.10.2 The field survey would be undertaken in two phases:

- Initially the habitats within the Scoping Report Corridor would be mapped based on aerial imagery (APEM), with a classification of the habitats to Phase 1 Habitat and UK Habitat Classification Survey standard
- Following development of the preferred route a field survey would be undertaken to finalise the habitat classifications

8.10.3 The survey would provide information on the habitats within the proposed Order Limits and identify actual or potential presence of legally protected and/ or otherwise notable species/ habitats. Dominant flora would be noted, and Target Notes would be included,

highlighting the presence of any INNS, habitats suitable to support protected flora/ fauna, and areas where further surveys are recommended.

- 8.10.4 An assessment would be made as to whether habitat meets the criteria for Habitat of Principal Importance in England (HPIE) under the Natural Environment and Rural Communities (NERC) Act 2006.
- 8.10.5 During the survey as described above, an assessment of habitat condition would be taken, using the Natural England’s Biodiversity Metric (the most up to date version available at the time).
- 8.10.6 It is acknowledged that there may be large sections of habitat considered of low ecological value such as intensively farmed arable land and hard standing which would not be subjected to preliminary survey.

## Secondary assessment

- 8.10.7 To establish a robust baseline, further survey work would be undertaken based on the recommendations in the preliminary assessment. In relation to the potential Zol, the following field survey areas (Table 8.6) are proposed as part of the baseline data collection. It is acknowledged here that not all surveys may be required, or possible, and the requirements for survey would be reviewed following further design updates and the preliminary assessment.

**Table 8.6 - Survey areas and timings**

<b>Survey</b>	<b>Field Survey Area</b>
Preliminary assessment – Field Survey	Within the proposed Order Limits and immediately adjacent habitat.
Habitat survey	Within the proposed Order Limits and immediately adjacent habitat.
Hedgerow survey	Intersected hedgerows within the proposed Order Limits.
Biodiversity Net Gain Habitat Condition Assessment	Within the proposed Order Limits.
Modular river survey	All applicable watercourses within the proposed Order Limits (and beyond as required for the BNG assessment).
National Vegetation Classification (NVC) or other targeted botanical surveys (including macrophytes, non-vascular plants and fungi)	Within the proposed Order Limits. Targeted locations only, where applicable.
Invertebrate surveys	Within the proposed Order Limits (and beyond as required). Targeted locations only, where applicable.
Fish surveys	Within the proposed Order Limits (and beyond as required). Targeted locations only, where applicable.
Reptile survey	Within the proposed Order Limits. Targeted locations only, where applicable.
Breeding Bird survey	Within the proposed Order Limits and up to 200m. Targeted locations only, where applicable.
Wintering / passage bird survey	Within the proposed Order Limits and up to 200m. Locations for specific Vantage Point surveys to be determined. Targeted locations only, where applicable.

<b>Survey</b>	<b>Field Survey Area</b>
Badger survey	Within the proposed Order Limits and up to 50m.
Bat surveys	Within the proposed Order Limits (extended where applicable). Trees / buildings to be lost only, or where an indirect impact is anticipated (for examples, through habitat severance / fragmentation).
Otter survey	Within the proposed Order Limits and 300m up and downstream (and associated riparian habitat) of all intersected watercourses.
Water vole survey	Within the proposed Order Limits and 300m up and downstream (and associated riparian habitat) of all intersected watercourses.
Dormouse survey	Within the proposed Order Limits. Targeted locations only where applicable.

8.10.8 Phase 2 botanical surveys are likely to be required where the preliminary assessment has identified a perceived/ potential impact from the Project on the following:

- Statutory and non-statutory designated wildlife sites where botanical receptors (habitats or plants) are designated features
- Priority Habitats recognised on the Priority Habitat Inventory (Natural England, 2021) or identified during the preliminary assessment
- Other habitats considered to be particularly high quality/ value examples of their type or likely to contain uncommon plant species

8.10.9 Phase 2 botanical survey methodologies would follow published good practice guidance, including but not limited to Rodwell (2006) for NVC survey and Defra (2007) for hedgerow survey. The need for Phase 2 surveys would be based on targeted areas of interest as identified in the preliminary assessment, with hedgerow surveys to be undertaken where five or more woody species have been identified.

8.10.10 Where the Project would impact watercourses, Modular River Surveys would be required to complete a River Condition Assessment for Biodiversity. Surveys would assess the quality of physical habitat and functioning of river systems in line with the latest survey requirements.

## **Impact assessment**

8.10.11 The impact assessment would be undertaken in accordance with the CIEEM guidelines, which represent the current best practice for assessing the ecological impact of development projects.

### **Determining importance**

8.10.12 The criteria used to determine the value of biodiversity receptors are set out in Table 8.6. These values are based on the CIEEM Guidelines. In the ES, the term 'value' would be used in preference to 'importance' to provide consistency in terminology between different topics within the EIA. The corresponding importance and value categories are detailed in Table 8.7.



Table 8.7 - Ascribing value / sensitivity

<b>CIEEM importance</b>	<b>Value</b>	<b>Criteria</b>
International	Very high	European designated sites: SPAs; potential SPAs; SACs; candidate or possible SACs, and Wetland of International Importance (Ramsar sites).
National	High	<p>Statutory designated sites, comprising SSSIs and NNRs. 'Irreplaceable natural habitat' e.g., ancient woodland, veteran trees, blanket bog, limestone pavement, sand dunes, saltmarsh and lowland fen.</p> <p>Species recorded as 'critically endangered' under the International Union for Conservation of Nature Red List of Threatened Species; resident or regularly occurring populations of species which may be considered at an international or national level where either of the following criteria is met:</p> <ul style="list-style-type: none"> <li>• The loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale; or</li> <li>• The population forms a critical part of a wider population at this scale. Nationally Rare or Scarce taxa: Nationally Rare taxa are those occurring in 15 or fewer 10x10km OS grid-squares in the UK; Nationally Scarce species are those occurring in 16-99 10x10km squares.</li> </ul>
County/regional	Medium	<p>Statutory designated sites: Local Nature Reserves. Non-statutory designated sites; (i.e., Essex Local Wildlife Sites Suffolk County Wildlife Sites (CWSs) and Roadside Nature Reserves. Areas of key/Priority habitats or species identified in the Local Biodiversity Action Plan (LBAP). Species or habitats listed in accordance with the requirements of Section 41 of the NERC Act 2006. Resident or regularly occurring populations of species which may be considered at a regional or county level where either of the following criteria is met: the loss of these populations would adversely affect the conservation status or distribution of the species at this scale; or the population forms a critical part of a wider population at this scale.</p>
Local	Low	Receptor is relatively common and widespread (e.g., it is listed in accordance with the requirements of Section 41 of NERC Act 2006, LBAPs, Birds of Conservation Concern Red or Amber listed, Red Data Book listed and/or is legally protected).
Site	Negligible	Receptor is abundant and widespread, receives no legal protection and is not of elevated conservation concern status.

8.10.13 Assigning importance to biodiversity receptors is based on professional judgement

informed by available guidance and information and where necessary expert advice.

- 8.10.14 Those biodiversity receptors of sufficient value to be considered in decision-making (i.e., those considered to be of ‘Local’ importance or above), and which it is considered could experience significant effects as a result of the Project (i.e., effects that could adversely affect the integrity of the habitat or the favourable conservation status of a species’ population), would be classified receptors and thus would be considered in the detailed assessment as outlined in the CIEEM Guidelines.
- 8.10.15 Other biodiversity receptors (i.e., those which are of less than ‘Local’ importance) would be scoped out, and not subject to any further assessment within the ES.
- 8.10.16 In accordance with the CIEEM guidelines, where there is the potential for a breach of legislation in relation to protected species (regardless of their importance), those species are also considered biodiversity receptors.
- 8.10.17 Following identification and valuation of the biodiversity receptors, it is then necessary to investigate potential impacts on those features to understand how they might be affected by the Project.

**Characterisation of effect**

- 8.10.18 The impact assessment would be based on an understanding of the likely activities associated with the Project, the biophysical changes that are predicted as a result of these activities and the area over which such effects might be experienced by different biodiversity receptors.
- 8.10.19 When describing ecological impacts and effects, reference would be made to the following characteristics:
  - Positive or negative
  - Extent
  - Magnitude
  - Duration (assessed as either ‘short-term’ (up to 1 year), ‘medium-term’ (1-10 years) or ‘long-term’ (greater than 10 years))
  - Frequency and timing
  - Reversibility

**Impact magnitude**

- 8.10.20 The criteria used to determine the magnitude of change for Biodiversity are set out in Table 8.8. These values are based on the CIEEM guidance.

Table 8.8 - Criteria for determining magnitude

Magnitude	Description
Large	<p><u>Negative:</u> Total loss or major alteration to key elements or features of the baseline conditions to the extent that post-development character composition of baseline conditions would be fundamentally changed</p> <p><u>Positive:</u> Large-scale or major improvement of quality; extensive restoration or enhancement; major improvement in attribute quality.</p>
Medium	<p><u>Negative:</u> Loss or alteration to one or more key elements or features of the baseline conditions to the extent that post-development character or composition of the baseline conditions would be materially changed.</p>

<b>Magnitude</b>	<b>Description</b>
	<u>Positive</u> : benefit to, or addition of key characteristics, features or elements; improvements of attribute quality
<b>Small</b>	<u>Negative or Positive</u> : Changes arising would be detectable but not material; the underlying character or composition of the baseline conditions would be similar to the pre-development situation.
<b>Negligible</b>	<u>Negative or Positive</u> : no change from baseline conditions

### **Determining significance of effects**

- 8.10.21 The assessment of likely significant environmental effects as a result of the Project would consider the construction and operational phases.
- 8.10.22 The assessment of significant effects on biodiversity receptors would be made using:
- Consideration of best practice/ guidance
  - Professional judgement
  - Consideration of the baseline information obtained, the Project details and comments raised through stakeholder consultation
  - Prediction of potential effects based on baseline information and the Project details
  - Quantification of potential effects
  - Identification of appropriate mitigation measures.
  - Prediction of residual effects based on baseline information, the Project details and mitigation measures.
- 8.10.23 The significance of an effect on a receptor would be determined following an analysis of the factors that characterise the effect. The CIEEM guidelines define significant effects as those that:
- “...either supports or undermines biodiversity conservation objectives for ‘important ecological features’ or for biodiversity in general... In broad terms, significant effects encompass impacts on the structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution).”*
- 8.10.24 Significant effects, as defined by the CIEEM guidelines, are determined by assessing any deviation in baseline conditions of a receptor that may occur as a result of individual and cumulative impacts during the construction and operational phases of the Project.
- 8.10.25 Significance would be determined on the basis of a likely effect on the integrity or favourable conservation status of a receptor, at a given geographic scale. The geographical scale at which an effect is significant can vary from the geographical importance of the biodiversity receptor being assessed and in accordance with the CIEEM guidelines, this would be a function of the assessment

### **Biodiversity Net Gain assessment**

- 8.10.26 The following industry best practice methodologies would be followed<sup>8</sup>:

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<sup>8</sup> This is the latest version at the time of writing this report. Consideration will be made as to the use of any further updates to the Biodiversity Metric once survey work begins.

- Biodiversity Net Gain: Good Practice Principles for Development (CIEEM, 2019)
- Panks *et al.* (2022a and 2022b) Biodiversity metric 3.1: Auditing and accounting for biodiversity – User Guide and Technical Supplement (or the most recent version at the time of assessment)

- 8.10.27 The application of the standardised methods as a BNG assessment, results in the calculation of: a baseline biodiversity value; a post-development biodiversity value; and a net change in biodiversity value due to the Project.
- 8.10.28 Baseline data would be collected in UK habitat classification typology to enter this data into the metric.
- 8.10.29 Calculations for both on- and off-site biodiversity units pre- and post-development would be included within a BNG technical report. Habitat creation from the DLL process would not be included as per instruction from Natural England.
- 8.10.30 The quantitative outcome of the assessment would be dependent on the biodiversity units and linear units if the Project is to achieve an overall net gain.
- 8.10.31 Quantitative outcomes of the calculations are a singular element of a BNG assessment. The outcome of a BNG assessment also requires consideration of adherence to the Good Practice Principles (CIEEM, 2019).

## 8.11 Proposed scope of the ES

- 8.11.1 The matters scoped in or out of further assessment for ecology and biodiversity are outlined in Table 8.9.

Table 8.9 - Matters scoped in or out of the ES

Matter	Phase	Scoped in/out	Justification
<p>International sites designated for biodiversity:</p> <ul style="list-style-type: none"> <li>● Thames Estuary and Marshes Ramsar and SPA</li> <li>● Stour and Orwell Estuaries Ramsar and SPA</li> <li>● Norfolk Valley Fens SAC</li> </ul>	Construction and Operation	Scoped in	<p>Although these sites sit outside the Scoping Report Corridor, they have been scoped in for potential indirect impacts (e.g., pollution events) during construction. A HRA would be undertaken to determine any significant effects, and this would include an assessment of any land that is 'Functionally Linked' to the site.</p> <p>There is the potential to impact birds associated with these sites during the operation phase. The addition of new overhead lines poses a collision risk to birds which would be fully assessed through bird survey work.</p>
<p>International sites designated for biodiversity:</p> <ul style="list-style-type: none"> <li>● Norfolk Valley Fens SAC</li> </ul>	Construction	Scoped in	<p>Although this site sits outside the Scoping Report Corridor, it has been scoped in for potential indirect impacts (e.g., pollution events) during construction. A HRA would be undertaken to determine any significant effects, and this would include an assessment of any land that is 'Functionally Linked' to the site.</p>
	Operation	Scoped out	<p>There are no perceivable pathways to impact this statutory designated site during operation.</p>
<p>International sites designated for biodiversity:</p> <ul style="list-style-type: none"> <li>● Redgrave and South Lopham Fens Ramsar site</li> <li>● Waveney and Little Ouse Valley Fens SAC</li> </ul>	Construction and Operation	Scoped out	<p>These sites are located away from the Scoping Report Corridor with no functionally linked land between them (this includes potential impacts that have been avoided through HDD under watercourses).</p> <p>Waveney and Little Ouse Valley Fens SAC is located upstream of the Scoping Report Corridor. The Project is not anticipated to impact the hydrology supporting the SAC and is therefore unlikely to impact the conservation objectives and designating features of these sites.</p>

Matter	Phase	Scoped in/out	Justification
			<p>Although the Ramsar site is designated for its bird assemblages, the Project is considered sufficiently far enough away (and not located within functionally linked land) to avoid potential adverse effects on the qualifying features of these sites. The Project does not intersect any large bodies of water and is predominantly between 15-40km in land, significantly reducing collision risk.</p> <p>These sites are scoped out of further assessment.</p>
National sites designated for biodiversity (see Appendix E)	Construction	Scoped in	<p>Although all these designated sites sit outside the Scoping Report Corridor, they have been scoped in for potential indirect impacts (e.g., pollution events) during construction due to being located within 200m or with potential hydrological links to the Scoping Report Corridor.</p> <p>These sites are scoped in for further assessment.</p>
	Operation	Scoped out	<p>There are no perceivable pathways to impact any of these statutory designated sites during operation.</p>
Local (statutory) sites designated for biodiversity (see Appendix E).	Construction	Scoped in	<p>Although only Linford Wood site is within the Scoping Report Corridor, these sites have been scoped in for potential indirect impacts (e.g., pollution events) during construction due to being located within 200m or with potential hydrological links to the Scoping Report Corridor.</p> <p>These sites are scoped in for further assessment.</p>
	Operation	Scoped out	<p>There are no perceivable pathways to impact any of these sites during operation.</p>
Ancient woodland	Construction	Scoped in	<p>Although careful consideration would be made to avoid ancient woodland as far as practically possible at the design phase, there is the potential for habitat damage/ modification through deterioration in local air quality arising from construction traffic. Fifty-nine blocks of ancient woodland are located within the Scoping Report Corridor and a 200m buffer. Given the air quality impacts are unknown, impacts to ancient woodland are scoped in for further assessment.</p>

<b>Matter</b>	<b>Phase</b>	<b>Scoped in/out</b>	<b>Justification</b>
	Operation	Scoped out	There are no perceivable pathways to impact ancient woodland during operation.
Habitats of Principal Importance in England (HPIE)	Construction	Scoped in	The Project would pass through and in close proximity to HPIE, e.g., sections of hedgerow would require removal to facilitate an open cut method of cable installation. The potential therefore exists for direct physical impacts during construction (e.g., direct loss of habitat) and indirect impacts (e.g., pollution events) during construction and HPIE are therefore scoped in for further assessment.
	Operation	Scoped out	There are no perceivable pathways to impact HPIE during operation.
'Important' hedgerows	Construction	Scoped in	Sections of hedgerow would require removal to facilitate construction (e.g., an open cut method of cable installation). It is currently unknown if any hedgerows within the Scoping Report Corridor meet the criteria to be classified as 'Important' under the Hedgerows Regulations (HMSO, 1997). The potential therefore exists for direct physical impacts during construction (e.g., direct loss of habitat) and indirect impacts (e.g., pollution events) during construction and 'Important' hedgerows are therefore scoped in for further assessment.
	Operation	Scoped out	There are no perceivable pathways to impact 'Important' hedgerows during operation.
GWDTEs	Construction	Scoped in	There is potential for excavation and presence of new subsurface infrastructure, such as underground cables and foundations, to impact groundwater flow. These could directly or indirectly affect GWDTEs, including wetlands, fens and wet woodland in the ZoI.
	Operation	Scoped out	There are no perceivable pathways to impact GWDTEs during operation.
Vascular and non-vascular plants, fungi and INNS	Construction	Scoped in	Given the extent of the Scoping Report Corridor and numerous watercourses it contains, there is potential for terrestrial and aquatic protected/ notable vascular and non-vascular plants, fungi and INNS to be present. Further desk study and survey work is required to inform potential impacts. If present, in the absence of appropriate

<b>Matter</b>	<b>Phase</b>	<b>Scoped in/out</b>	<b>Justification</b>
			mitigation, the Project has the potential for adverse effects and these receptors are therefore scoped in for further assessment.
	Operation	Scoped out	There are no perceivable pathways to impact these receptors during operation.
Fish	Construction	Scoped in	The Project crosses several watercourses. For underground cable sections, it is anticipated that major watercourses would be crossed using trenchless techniques while crossings of minor watercourses would typically use open cut techniques. For the OHL sections, scaffolding would be used to support stringing over the watercourse. However, the exact nature and location of watercourse crossings are unknown at the current time. At open-cut locations there is a risk of direct impacts during construction as a result of, for example, dewatering while indirect impacts and disturbance due to increased noise and vibration and/or pollution events may be experienced at trenchless crossings during construction. Fish are therefore scoped in for further assessment.
	Operation	Scoped out	There are no perceivable pathways to impact fish during operation
Invertebrates	Construction	Scoped in	The Project extends through a largely agricultural landscape which is considered unsuitable for large invertebrate populations, protected species or notable assemblages. Areas/habitats of potentially high value for invertebrates, would be identified during the preliminary assessment. However, this is not yet confirmed and there is, therefore, potential for direct impacts during construction (e.g., habitat loss/ fragmentation) and indirect impacts (e.g., as a result of pollution events) during construction. This receptor is scoped in for further assessment.
	Operation	Scoped out	There are no perceivable pathways to impact invertebrates during operation.
Reptiles	Construction	Scoped in	Widespread presence and large populations of reptiles are thought to be unlikely due to the unsuitable nature of most of the habitats (predominately structurally poor agricultural fields) within the Scoping



<b>Matter</b>	<b>Phase</b>	<b>Scoped in/out</b>	<b>Justification</b>
			Report Corridor. However, reptile species are anticipated to be present within suitable habitat (where present) and are therefore at risk of direct impacts during construction (e.g., habitat loss/ fragmentation). In the absence of appropriate mitigation, reptiles are also at risk of killing/injury during construction. This would constitute a breach of legislation. Reptiles are therefore scoped in for further assessment.
	Operation	Scoped out	There are no perceivable pathways to impact reptiles during operation.
Breeding birds	Construction	Scoped in	It is anticipated that a range of habitats within the Scoping Report Corridor would be suitable to support nesting birds, particularly those associated with farmland. In the absence of appropriate mitigation, habitat removal to facilitate construction could lead to a breach of legislation in relation to breeding birds (e.g., killing/ injury of individuals and damage/destruction of nests/ eggs). Breeding birds are therefore scoped in for further assessment.
	Operation	Scoped out	There are no perceivable pathways to impact breeding birds during operation.
Wintering / passage birds	Construction	Scoped in	There is the potential for disturbance of birds associated with SPA/ Ramsar sites using functionally linked land <sup>9</sup> (FLL) within the Scoping Report Corridor during construction. Further survey work is required to understand the use of the Scoping Report Corridor by wintering/ passage birds and are therefore scoped in for further assessment.
	Operation	Scoped in	Potential for collision with new overhead lines and risk of mortality through electrocution. The receptor is therefore scoped in for further assessment.

<sup>9</sup> A term used to describe areas of land or sea occurring outside a designated site which is considered to be critical to, or necessary for the ecological or behavioural functions in a relevant season of a qualifying feature for which a Special Area of Conservation (SAC) / Special Protection Area (SPA) / Ramsar site has been designated (Natural England).

<b>Matter</b>	<b>Phase</b>	<b>Scoped in/out</b>	<b>Justification</b>
Badgers	Construction	Scoped in	Based on the habitats present and rural location of the Project, it is anticipated that badgers are widespread throughout the Scoping Report Corridor. Badgers may be impacted during construction through, for example, habitat loss/fragmentation and loss of/ damage to/ disturbance of setts which would constitute a breach of legislation. Badgers are therefore scoped in for further assessment.
	Operation	Scoped out	There are no perceivable pathways to impact badger during operation.
Bats	Construction and Operation	Scoped in	<p>Given the rural location of the Project and wider landscape connectivity, bats are anticipated to forage/ commute and roost within the Scoping Report Corridor. Bats are therefore at risk of direct impacts during construction (e.g., habitat loss/ fragmentation). However, negative impacts to foraging/ commuting bats from habitat removal to facilitate construction are not expected to be significant, as it is anticipated that hedgerow and woodland severance (if unavoidable) would be minimised, where practicable, by narrowing construction corridors and using replacement dead hedging (or appropriate alternative) to reduce gaps overnight. Replacement hedgerow planting and woodland enhancement would ensure no net loss of foraging/ commuting habitat in the long-term.</p> <p>Site clearance to facilitate construction has the potential to result in the loss of tree roosts, which would constitute a breach of legislation. Bats may also be impacted by operational lighting and any temporary lighting required during construction. In the absence of appropriate mitigation, breaches of legislation are possible e.g., loss of a tree(s) containing roosting bats during site clearance. Bats are therefore scoped in for further assessment.</p>
Hazel dormouse	Construction	Scoped in	The Project crosses through areas where dormouse is known to be present (particularly in Essex). Habitats such as woodland, scrub and hedgerows are on the Scoping Report Corridor and further desk study and survey work would be required to further understand where there is the potential for impact. There is a risk of direct impacts during

Matter	Phase	Scoped in/out	Justification
			construction as a result of, for example, loss / damage to nests (which would constitute a breach of legislation) while indirect disturbance due to increased noise and vibration and/ or pollution events (impacting prey availability) may be experienced at trenchless crossings during construction. Dormouse may also be impacted by operational lighting and any temporary lighting required during construction. Dormouse is therefore scoped in for further assessment.
	Operation	Scoped out	There are no perceivable pathways to impact dormouse during operation.
Otter	Construction	Scoped in	The Project crosses several watercourses and otter is likely to be widespread throughout East Anglia. It is anticipated that major watercourses would be crossed using trenchless techniques or clear spanned cabling while crossings of minor watercourses would typically use open cut techniques which would be prevalent for the underground cabling sections. However, the exact nature and location of watercourse crossings are unknown at the current time. At open-cut locations there is a risk of direct impacts during construction as a result of, for example, loss/ damage to holts/ couches during construction (which would constitute a breach of legislation) while indirect disturbance due to increased noise and vibration and/ or pollution events (impacting prey availability) may be experienced at trenchless crossings during construction. Otter is therefore scoped in for further assessment.
	Operation	Scoped out	There are no perceivable pathways to impact otter during operation. Any maintenance works would be assessed on a case-by-case basis, depending on the potential impacts of the work (as done for existing National Grid infrastructure).
Water vole	Construction	Scoped in	The Project crosses several watercourses and water vole is known to be widespread throughout East Anglia. It is anticipated that major watercourses would be crossed using trenchless techniques while crossings of minor watercourses would typically use open cut techniques or scaffolding to support the stringing of overhead lines.

Matter	Phase	Scoped in/out	Justification
			However, the exact nature and location of watercourse crossings are unknown at the current time. At open-cut locations there is a risk of direct impacts during construction as a result of, for example, loss/ damage to burrows (which would constitute a breach of legislation) while indirect disturbance due to increased noise and vibration and/or pollution events may be experienced at trenchless crossings during construction. Water vole is therefore scoped in for further assessment.
	Operation	Scoped out	There are no perceivable pathways to impact water vole during operation.
White-clawed crayfish ( <i>Austropotamobius pallipes</i> )	Construction	Scoped in	The Project crosses several watercourses and although white-clawed crayfish are largely absent throughout East Anglia, further desk study work and consultation with the Environment Agency would be required to confirm the Project would avoid any remnant or ark populations. It is anticipated that major watercourses would be crossed using trenchless techniques while crossings of minor watercourses would typically use open cut techniques or scaffolding to support the stringing of overhead lines. However, the exact nature and location of watercourse crossings are unknown at the current time. At open-cut locations there is a risk of direct impacts during construction as a result of, for example, loss/ damage to burrows while indirect disturbance due to increased noise and vibration and/ or pollution events may be experienced at trenchless crossings during construction. White-clawed crayfish is therefore scoped in for further assessment.
	Operation	Scoped out	There are no perceivable pathways to impact white-clawed crayfish during operation.
Amphibians (excluding great crested newts)	Construction	Scoped in	Amphibians may be negatively affected by direct impacts during construction (e.g., habitat loss/ fragmentation) and indirect impacts (e.g., as a result of pollution events) during construction. Amphibians are therefore scoped in for further assessment.

Matter	Phase	Scoped in/out	Justification
	Operation	Scoped out	There are no perceivable pathways to impact amphibians during operation.
Great crested newt (GCN)	Construction and Operation	Scoped out	GCN are widespread throughout the region and therefore licensing and mitigation would be required to minimise impacts to this species. It is currently proposed that mitigation would be implemented via a DLL scheme prepared by Natural England. When the Project enters into the DLL scheme, Natural England would undertake an impact assessment and determine the likelihood of significant effect on GCN. This approach includes strategic area assessment and a mechanism to ensure adequate compensation is provided and by obtaining an Impact Assessment and Conservation Payment Certificate IACPC (or equivalent), GCN can therefore be scoped out of further assessment.
Other notable mammals (brown hare ( <i>Lepus europaeus</i> ), hedgehog ( <i>Erinaceus europaeus</i> ), and harvest mouse ( <i>Micromys minutus</i> ))	Construction and Operation	Scoped out	Given the rural location of the Project and wider landscape connectivity, terrestrial mammals such as hedgehog and brown hare are anticipated to be present within the Scoping Report Corridor. Harvest mouse are also present within East Anglia. Negative impacts to these species could occur during construction as a result of habitat removal/ fragmentation. In addition, nocturnal species may also be impacted by operational lighting and any temporary lighting required during construction. These impacts are anticipated to be largely temporary and as habitats would be reinstated to equal or better condition, impacts are not anticipated to be significant. As a result, other notable mammals are scoped out of further assessment.

\*Operation referred to above also includes maintenance.

# 9 Geology and Hydrogeology

## 9.1 Approach to scoping

9.1.1 The approach to scoping has drawn from previous experience of similar projects. Determining the scope of the Geology and Hydrogeology assessment has included the following stages:

- Regulatory and planning policy context
- Defining the study area
- Engagement with stakeholders
- Stating sources of data collected
- Outlining baseline conditions
- Highlighting further data to be gathered
- Outlining environmental measures
- Predicting likely significant effects
- Drafting the proposed assessment methodology
- Stating the proposed scope of the ES

9.1.2 There are interrelationships related to the potential effects on geology and hydrogeology and other topics. Therefore, please also refer to the following chapters:

- Chapter 6: Agriculture and Soils
- Chapter 8: Ecology and Biodiversity
- Chapter 12: Hydrology and Land Drainage

9.1.3 This chapter should also be read in parallel with Figures 9.1, 9.2 and 9.3 at Appendix A.

## 9.2 Regulatory and planning policy context

### National policy

9.2.1 Chapter 2: Legislation and Planning Policy Context sets out the overarching policy relevant to the Project including the Overarching NPS for Energy EN-1 and NPS for Electricity Networks Infrastructure EN-5. EN-1 contains the following paragraphs relating to geology and hydrogeology which have been considered within this chapter:

- Paragraph 5.10.9 – *“Applicants should safeguard any mineral resources on the proposed site as far as possible, taking into account the long-term potential of the land use after any future decommissioning has taken place”*. Paragraph 5.10.22 also states *“Where a proposed development has an impact upon a Mineral Safeguarding Area, the IPC should ensure that appropriate mitigation measures have been put in place to safeguard mineral resources”*
- Paragraph 5.3.7 – *“...development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and*

*consideration of reasonable alternatives, where significant harm cannot be avoided, then appropriate compensation measures should be sought”*

- Paragraph 5.15.3 – the ES should describe “...any impacts of the proposed project on... source protection zones (SPZs) around potable groundwater abstractions”

9.2.2 NPS EN-5 states:

- Paragraph 2.8.9 – “...the IPC should consider for each specific project “the environmental and archaeological consequences (undergrounding a 400kV line may mean disturbing a swathe of ground up to 40 metres across, which can disturb sensitive habitats, have an impact on soils and geology, and damage heritage assets, in many cases more than an overhead line would)”

9.2.3 Draft versions of NPS EN-1 and EN-5 are consistent with the current NPSs in relation to geology and hydrogeology.

## Regional and local policy

9.2.4 Chapter 2: Legislation and Planning Policy Context sets out the relevant regional and local policy. Specific to geology and hydrogeology this includes:

- Norfolk Minerals and Waste Development Framework (Norfolk County Council, 2011)
- Norfolk Minerals and Waste Local Plan Publication (Norfolk County Council, 2022) (emerging plan)
- Suffolk Minerals and Waste Local Plan (Suffolk County Council, 2020)
- Essex Minerals Local Plan (Essex County Council, 2014)
- Thurrock Core Strategy and Policies for Management of Development (Thurrock Council, 2015)

## Guidance

9.2.5 Relevant guidance, specific to geology and hydrogeology, that has informed this Scoping Report and would inform the assessment within the ES, comprises:

- Land Contamination: Risk Management (LCRM) (Environment Agency, 2021)
- CIRIA 552: Contaminated Land Risk Assessment, A guide to good practice (CIRIA, 2001)
- BS 10175:2011+A2:2017 Investigation of potentially contaminated sites. Code of Practice (British Standards Institution, 2017)
- The Environment Agency’s Guiding Principles for Managing and Reducing Land Contamination (GPLC2) (Environment Agency, 2016)
- DMRB LA 109: Geology and soils (National Highways, 2019)
- DMRB LA 113: Road drainage and the water environment (National Highways, 2020)

## 9.3 Study area

9.3.1 The study area for geology and hydrogeology comprises land directly affected by the

Project, plus a 250m buffer for geology, as shown on Figure 9.1 and 9.2 at Appendix A, and up to a 500m buffer for hydrogeology, as shown on Figure 9.3 at Appendix A. Given the scale and nature of the Project, this is considered a robust yet proportionate approach. The study area is also based on professional judgement, knowledge of similar projects and the DMRB LA109: Geology and Soil (National Highways, 2019)<sup>10</sup>. In addition, although not directly relevant for this project type, the proposed study area accords with the study area recommended in Guidance for the Safe Development of Housing on Land Affected by Contamination (NHBC, 2008).

9.3.2 The land directly affected by the Project is assumed to be the Scoping Report Corridor within this chapter. However, this would be refined to the proposed Order Limits within the ES.

## 9.4 Data collection

9.4.1 The baseline assessment has been informed by a desk study which has drawn on the following information sources:

- British Geological Survey (BGS) 1:50,000 scale geological mapping, solid and drift edition
- BGS GeoIndex Viewer (British Geological Survey, 2022)
- BGS Hydrogeological Maps (British Geological Survey, 1976, 1977, 1981)
- Natural England, Designated Sites View (Natural England, 2022)
- Multi-Agency Geographic Information for the Countryside (MAGIC) interactive map (Defra, 2022)
- Local Minerals Plans for mineral reserves/mineral safeguarded areas
- Coal Authority Interactive Map (Coal Authority, 2022)

## 9.5 Engagement with stakeholders

9.5.1 A summary of engagement undertaken to date is presented in Table 9.1.

Table 9.1 – Summary of engagement

Organisation and date	Summary of Engagement	Consideration in the Scoping Report
Thematic Meeting held with the Environment Agency, July 2022.	Discussion regarding the proposed methodology including a tiered risk-based approach for contaminated land assessment. Introduction of a non-standard 'Tier 0' assessment to screen the whole route, effectively a high level Tier 1 assessment. Anything not screened out at Tier 0 will go forward through standard Tier 1,	The methodology presented in this Scoping Report accords with the approach presented during the thematic meeting.

<sup>10</sup> DMRB has been used in the absence of other guidance. DMRB is deemed to be relevant and appropriate guidance which is representative of long linear schemes.



Organisation and date	Summary of Engagement	Consideration in the Scoping Report
	2,3 approach as appropriate. Environment Agency noted that this is a reasonable approach.	
	<p>Discussion regarding the proposed methodology in relation to hydrogeology. Where groundwater dewatering is required to facilitate construction, assessment would be undertaken to determine potential impacts and the level of assessment would be determined by the specific site conditions and design proposals at each location.</p> <p>The Environment Agency requested that private domestic wells should be included within the assessment.</p>	<p>The methodology presented in this Scoping Report accords with the approach presented during the thematic meeting.</p> <p>This requirement is included in section 9.7.</p>
	Discussion regarding the proposed issues and topics to be scoped in and scoped out of the ES.	The proposed scope of the geology and hydrogeology chapter of the ES, is presented in this Scoping Report in Table 9.7 and is the same as presented in the thematic meeting.

## 9.6 Baseline environment (inc. future baseline)

### Published geology – superficial deposits

#### South Norfolk and Mid Suffolk superficial deposits

- 9.6.1 Superficial deposits are present beneath the whole of the Scoping Report Corridor in South Norfolk and predominantly comprise the Lowestoft Formation, described by the BGS (British Geological Survey, 2022) as “*chalky till, together with outwash sands and gravels, silts and clays*”. The BGS term this deposit “*Diamicton*”, which is commonly referred to as boulder clay – refer to Figure 9.1 at Appendix A.
- 9.6.2 Other superficial geological strata include Alluvium, Head Deposits, Sheringham Cliffs Formation, Happisburgh Glacigenic Formation, granular Lowestoft, River Terrace Deposits, Ingham Sand and Gravel Formation and Croxton Sand and Gravel Member (British Geological Survey, 2022).

#### Babergh, Tendring and Colchester superficial deposits

- 9.6.3 Superficial deposits are present beneath the majority of the Scoping Report Corridor in Babergh, Tendring and Colchester. However, superficial deposits are absent within small discrete parts, mostly associated with the river valley sides – refer to Figure 9.1 at Appendix A. The superficial strata comprises Lowestoft Formation (Diamicton and Granular), Alluvium, Head Deposits, Kesgrave Catchment Subgroup, River Terrace

Deposits and Cover Sand (British Geological Survey, 2022).

### **Braintree superficial deposits**

9.6.4 Superficial deposits are present beneath the whole of the Scoping Report Corridor in Braintree – refer to Figure 9.1 at Appendix A. The superficial strata comprises the Lowestoft Formation (Diamicton), Kesgrave Catchment Subgroup, Head Deposits, Alluvium and Glaciofluvial Deposits (British Geological Survey, 2022).

### **Chelmsford superficial deposits**

9.6.5 Superficial deposits are present beneath the whole of the Scoping Report Corridor in the northern part of Chelmsford – refer to Figure 9.1 at Appendix A. The superficial strata comprises the Lowestoft Formation (Diamicton), Glaciofluvial Deposits, Alluvium, Head Deposits, Kesgrave Catchment Subgroup and the Stanmore Gravel Formation (British Geological Survey, 2022).

### **Basildon and Brentwood superficial deposits**

9.6.6 Superficial deposits are present beneath approximately 60% of the Scoping Report Corridor in Basildon and Brentwood. The coverage of superficial deposits decreases moving southwards – refer to Figure 9.1 at Appendix A. The superficial strata comprises Head Deposits, River Terrace Deposits, Alluvium, Lowestoft Formation (Diamicton) and Glaciofluvial Deposits (British Geological Survey, 2022).

### **Thurrock superficial deposits**

9.6.7 Superficial deposits are present beneath approximately 90% of the Scoping Report Corridor in Thurrock – refer to Figure 9.1 at Appendix A. The superficial strata comprises Head Deposits, Alluvium and Terrace Gravel Deposits (British Geological Survey, 2022).

## **Published geology – bedrock**

### **South Norfolk bedrock geology**

9.6.8 Figure 9.2 at Appendix A presents bedrock geology. It comprises undifferentiated deposits of the Lewes Nodular Chalk Formation, the Newhaven Chalk Formation, the Culver Chalk Formation and the Portsdown Chalk Formation, together referred to as the White Chalk Subgroup (British Geological Survey, 2022). The White Chalk Subgroup is described by the BGS (British Geological Survey, 2022) as “*Chalk with flints. With discrete marl seams, nodular chalk, sponge-rich and flint seams throughout*”.

### **Mid-Suffolk bedrock geology**

9.6.9 Figure 9.2 at Appendix A presents bedrock geology. It comprises the White Chalk Subgroup, Crag Group, Newhaven Chalk Formation, Red Crag Formation, Chillesford Church Sand Member, Undifferentiated deposits of the Thanet Formation and the Lambeth Group and the Thames Group (comprising the London Clay Formation and the Harwich Formation) (British Geological Survey, 2022).

### **Babergh, Tendring and Colchester bedrock geology**

9.6.10 Figure 9.2 at Appendix A presents bedrock geology. A large portion of this section is underlain by bedrock geology of the Thames Group (comprising the London Clay Formation and the Harwich Formation) (British Geological Survey, 2022), described as “*silty clays and clays, some sandy or gravelly, with some silts, sands, gravels and calcareous mudstones*” (British Geological Survey, 2022).

9.6.11 The other bedrock strata present within this section comprises the Red Crag Formation and Undifferentiated deposits of the Thanet Formation and the Lambeth Group (British

Geological Survey, 2022).

### **Braintree bedrock geology**

- 9.6.12 Figure 9.2 at Appendix A presents bedrock geology. It comprises the London Clay Formation (British Geological Survey, 2022), described by the BGS as “*laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay*” (British Geological Survey, 2022).

### **Chelmsford bedrock geology**

- 9.6.13 Figure 9.2 at Appendix A presents bedrock geology. The majority of this section is underlain by bedrock geology of the London Clay Formation (British Geological Survey, 2022), described by the BGS as “*laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay*” (British Geological Survey, 2022).
- 9.6.14 Other bedrock strata present within this section comprises the Bagshot Formation and the Claygate Member (British Geological Survey, 2022).

### **Basildon and Brentwood bedrock geology**

- 9.6.15 Figure 9.2 at Appendix A presents bedrock geology. The majority of this section is directly underlain by bedrock geology of the London Clay Formation (British Geological Survey, 2022), described by the BGS as “*laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay*” (British Geological Survey, 2022), however in some areas the London Clay is overlain by the Claygate Member and the Bagshot Formation.

### **Thurrock bedrock geology**

- 9.6.16 Figure 9.2 at Appendix A presents bedrock geology. The northern half of this section is underlain by bedrock geology of the London Clay Formation, described by the BGS as “*laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay*” (British Geological Survey, 2022). The southern half of this section is underlain by the Lambeth Group, Thanet Sand and the White Chalk Sub group.
- 9.6.17 The other bedrock strata present within this area comprises the Harwish Formation, the Lambeth Group, Thanet Formation and the White Chalk Subgroup (British Geological Survey, 2022).

## **Minerals**

### **Norfolk Mineral and Waste Development Framework**

- 9.6.18 The Norfolk Mineral and Waste Development Plan shows that the Scoping Report Corridor crosses through multiple Mineral Safeguarding Areas (MSAs) for sand and gravel.
- 9.6.19 There is no safeguarded minerals infrastructure or allocated sites for minerals extraction located within the Scoping Report Corridor in Norfolk.

### **Suffolk Minerals and Waste Local Plan**

- 9.6.20 There is a safeguarded concrete products site located within the Scoping Report Corridor at approximate National Grid Reference (NGR) 608415E, 256750N, refer to Figure 9.4 at Appendix A. No further areas of safeguarded minerals infrastructure or allocated sites for minerals extraction are identified within the Scoping Report Corridor in Suffolk. No further areas of safeguarded minerals infrastructure or allocated sites for minerals extraction are identified within the Scoping Report Corridor in Suffolk.

## Essex Minerals Local Plan

9.6.21 The Essex Minerals Local Plan shows that the Scoping Report Corridor crosses through multiple MSAs for sand and gravel, Mineral Consultation Areas (MCA) for brick clay and also crosses safeguarded minerals infrastructure and preferred / reserved sites for minerals extraction. MCAs and waste sites are presented on Figure 9.4 at Appendix A.

## Geo-conservation

9.6.22 There are no County Geodiversity Sites (CGS) or Local Geological Sites (LGS) located within the Scoping Report Corridor.

9.6.23 There are no geological SSSIs within the Scoping Report Corridor, however there are two within the study area (these are also labelled and presented on Figure 9.4 at Appendix A):

- A geological conservation review site called 'Marks Tey Brickpit' located directly north of Marks Tey
- A geological conservation review site called the River Ter, located to the southwest of Fuller Street

## Hydrogeology

### Groundwater Source Protection Zones

9.6.24 Groundwater SPZs) are presented on Figure 9.3 at Appendix A.

9.6.25 SPZs are zones around a drinking water supply, which show the level of risk to the source from contamination. The zones are defined by how long it would take for a pollutant to travel to the source. A SPZ1 is defined as the inner zone which is a 50-day travel time of a pollutant to the source. A SPZ2, Outer Zone, is defined as a 400-day travel time of a pollutant to a source. A SPZ3 is defined as the total catchment, which is the area around a source within which all the groundwater ends at the abstraction point

9.6.26 Approximately one third of the Scoping Report corridor within Norfolk is located within a groundwater SPZ3. An SPZ2 is present approximately half-way through Norfolk, centred on a SPZ1 (partially crossed by the Scoping Report corridor) located at Cargate Common.

9.6.27 The whole of the Scoping Report corridor within Suffolk section is located within a groundwater SPZ3, in addition to this the following SPZs are crossed by the Scoping Report corridor within Suffolk:

- An SPZ1 and associated SPZ2 located at Worthham Ling
- An SPZ2 located to the west of Needham Market
- An SPZ2 located to the south-east of Offton
- An SPZ2 located at Stratford St Mary
- An SPZ1 and associated SPZ2 located at Higham

9.6.28 In Essex part of the Scoping Report Corridor is located within a groundwater SPZ 3, between Colchester and Witham and between Stanford-le-Hope and Tilbury. In addition to this an SPZ1 and associated SPZ2, both located at Linford, are crossed by the Scoping Report Corridor.

## Aquifer designation

9.6.29 Aquifer designations were reviewed within the study area using readily available information. Table 9.2 presents aquifer designation details found within the Scoping Report Corridor split by area.

9.6.30 Aquifer designations comprise:

- Secondary A Aquifers are described by the Environment Agency as “*permeable layers that can support local water supplies, and may form an important source of base flow to rivers*” (Environment Agency, 2017)
- Secondary B Aquifers are described by the Environment Agency as “*mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (called fissures) and openings or eroded layers*” (Environment Agency, 2017)
- The Secondary Undifferentiated Aquifer classification is applied by the Environment Agency “*where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value*”. Unproductive Strata are described by the Environment Agency as “*largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them*” (Environment Agency, 2017)

Table 9.2 – Aquifer designation

Area	Superficial Aquifer	Bedrock Aquifer
South Norfolk	<ul style="list-style-type: none"> <li>• Lowestoft Formation – Diamicton = Secondary Undifferentiated Aquifer</li> <li>• Alluvium = Secondary A Aquifer</li> <li>• Head = Secondary Undifferentiated Aquifer</li> <li>• Sheringham Cliffs Formation = Secondary A Aquifer</li> <li>• Undifferentiated Lowestoft Formation and Happisburgh Glacigenic Formation = Secondary A Aquifer</li> <li>• Lowestoft Formation – Sand and Gravel = Secondary A Aquifer</li> <li>• Peat = Unproductive Strata</li> <li>• River Terrace Deposits = Secondary A Aquifer</li> </ul>	<p>The bedrock of the White Chalk Subgroup is classified by the Environment Agency as a Principal Aquifer (Defra, 2022), defined by the Environment Agency as rock layers that “<i>provide significant quantities of drinking water, and water for business needs. They may also support rivers, lakes and wetlands</i>” (Environment Agency, 2017).</p>
Mid-Suffolk	<ul style="list-style-type: none"> <li>• Lowestoft Formation – Diamicton = Secondary Undifferentiated Aquifer</li> <li>• Alluvium = Secondary A Aquifer</li> <li>• River Terrace Deposits = Secondary A Aquifer</li> </ul>	<ul style="list-style-type: none"> <li>• White Chalk Subgroup = Principal Aquifer</li> <li>• Crag Group = Principal Aquifer</li> </ul>

Area	Superficial Aquifer	Bedrock Aquifer
	<ul style="list-style-type: none"> <li>● Head = Secondary Undifferentiated Aquifer</li> <li>● Ingham Sand and Gravel Formation = Secondary A Aquifer</li> <li>● Croxton Sand and Gravel Member = Secondary A Aquifer</li> <li>● Lowestoft Formation – Sand and Gravel = Secondary A Aquifer</li> </ul>	<ul style="list-style-type: none"> <li>● Newhaven Chalk Formation = Principal Aquifer</li> <li>● Red Crag Formation = Principal Aquifer</li> <li>● Chillesford Church Sand Member = Secondary A Aquifer</li> <li>● Undifferentiated Thanet Formation and Lambeth Group = Secondary A Aquifer</li> <li>● Thames Group = Unproductive Strata</li> </ul>
Babergh, Tendring and Colchester	<ul style="list-style-type: none"> <li>● Lowestoft Formation – Diamicton = Secondary Undifferentiated Aquifer</li> <li>● Lowestoft Formation – Sand and Gravel = Secondary A Aquifer</li> <li>● Alluvium = Secondary A Aquifer</li> <li>● Head = Secondary Undifferentiated Aquifer and Secondary B Aquifer</li> <li>● Kesgrave Catchment Subgroup = Secondary A Aquifer</li> <li>● River Terrace Deposits = Secondary A Aquifer</li> <li>● Cover Sands = Secondary B Aquifer</li> </ul>	<ul style="list-style-type: none"> <li>● Thames Group = Unproductive Stratum and Principal Aquifer. It is noted that this is an unusual designation and it is considered likely that the parts of this formation indicated as a Principal Aquifer relate to deposits of the Harwich Formation, albeit a geological boundary is not recorded on the BGS mapping</li> <li>● Red Crag Formation = Principal Aquifer</li> <li>● Undifferentiated Thanet Formation and Lambeth Group = Secondary A Aquifer</li> </ul>
Braintree	<ul style="list-style-type: none"> <li>● Lowestoft Formation – Diamicton = Secondary Undifferentiated Aquifer</li> <li>● Kesgrave Catchment Subgroup = Secondary A Aquifer</li> <li>● Head = Secondary Undifferentiated Aquifer</li> <li>● Alluvium = Secondary A Aquifer</li> <li>● Glaciofluvial Deposits = Secondary A Aquifer</li> </ul>	A review of the aquifer designations provided on Defra’s MAGIC online map viewer (2022) indicates that the bedrock geology of the London Clay Formation is classified as an Unproductive Strata.
Chelmsford	<ul style="list-style-type: none"> <li>● Lowestoft Formation – Diamicton = Secondary Undifferentiated Aquifer</li> </ul>	<ul style="list-style-type: none"> <li>● London Clay Formation = Unproductive Strata</li> </ul>

Area	Superficial Aquifer	Bedrock Aquifer
	<ul style="list-style-type: none"> <li>● Glaciofluvial Deposits = Secondary A Aquifer</li> <li>● Alluvium = Secondary A Aquifer</li> <li>● Head = Secondary Undifferentiated Aquifer</li> <li>● Kesgrave Catchment Subgroup = Secondary A Aquifer</li> <li>● Stanmore Gravel Formation = Secondary Undifferentiated Aquifer</li> </ul>	<ul style="list-style-type: none"> <li>● Claygate Member = Secondary A Aquifer</li> <li>● Bagshot Formation = Secondary A Aquifer</li> <li>●</li> </ul>
Basildon and Brentwood	<ul style="list-style-type: none"> <li>● Head = Secondary Undifferentiated Aquifer</li> <li>● River Terrace Deposits = Secondary A Aquifer</li> <li>● Alluvium = Secondary A Aquifer</li> <li>● Lowestoft Formation – Diamicton = Secondary Undifferentiated Aquifer</li> <li>● Glaciofluvial Deposits = Secondary A Aquifer</li> </ul>	<ul style="list-style-type: none"> <li>● London Clay Formation = Unproductive Strata</li> <li>● Claygate Member = Secondary A Aquifer</li> <li>● Bagshot Formation = Secondary A Aquifer</li> </ul>
Thurrock	<ul style="list-style-type: none"> <li>● Head = Secondary Undifferentiated Aquifer</li> <li>● Alluvium = Secondary A Aquifer</li> <li>● Maidenhead Formation = Secondary A Aquifer</li> </ul>	<ul style="list-style-type: none"> <li>● London Clay Formation = Unproductive Strata</li> <li>● Harwich Formation = Secondary A Aquifer</li> <li>● Bagshot Formation = Secondary A Aquifer</li> <li>● Lambeth Group = Secondary A Aquifer</li> <li>● Thanet Formation = Secondary A Aquifer</li> <li>● White Chalk Subgroup = Principal Aquifer</li> </ul>

## Future baseline

- 9.6.31 The future baseline relates to known or anticipated changes to the current baseline in the future which should be assessed as part of the Project in the ES.
- 9.6.32 There are no foreseeable significant changes anticipated in relation to geology and hydrogeology either prior to, or during, the construction and operational phases. It is assumed that any man-made changes (i.e. new developments) would be appropriately permitted and operated to prevent the creation of potentially adverse ground conditions

or impacts to controlled waters.

## 9.7 Further data to be gathered / processed in the ES

9.7.1 The assessment within the ES would be informed by third party data such as:

- Britain from Above, historical aerial imagery archive details
- National Library of Scotland, georeferenced historical maps for the period 1885 – 1970 (National Library of Scotland, 2022)
- Environment Agency Report SC040016/R, New Groundwater Vulnerability Mapping Methodology in England and Wales (Environment Agency, 2017)
- Details of private domestic wells
- Environment Agency, Catchment Data Explorer (Environment Agency, 2022)

9.7.2 In addition, data requests would be made to the Environment Agency and Local Planning Authorities to provide further information on landfills, potentially contaminated land and groundwater abstractions.

## 9.8 Measures adopted as part of the Project

9.8.1 The Scoping Report Corridor has been designed to avoid as far as practicable sensitive geology and hydrological features through the CPRSS (National Grid., 2022). These include permitted waste sites, landfills and historical landfills and international sites designated for nature conservation, including those which support ecosystems that rely on groundwater. Further embedded measures would be developed as the Project design evolves.

9.8.2 A range of standard measures for the Project would be adopted throughout the duration of the construction phase. Appendix B: Initial Outline CoCP outlines measures relevant to geology and hydrogeology. These include but are not limited to:

- Intrusive ground investigations and assessment would be undertaken prior to construction which would inform appropriate geotechnical design in relation to the site / structure specific ground conditions including ground instability/ adverse ground conditions
- Construction methods such as appropriate piling techniques (if required) to minimise the risk of mixing of aquifer bodies through the creation of new pathways would be utilised. This includes the provision of a Foundation Works Risk Assessment (FWRA), (secured by the outline CoCP) which would be undertaken once the proposed foundation solutions are known, in accordance with Environment Agency guidance Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination (Environment Agency, 2001)
- Use of appropriate occupational health and safety measures e.g. Personal Protective Equipment (PPE), and statutory health and safety compliance (e.g. compliance with the Confined Spaces Regulations, 1997 in relation to ground gas from working in confined spaces/ trenches) to minimise the risks associated with anticipated/ unexpected contamination
- All use and storage of chemicals to be undertaken in accordance with Environment Agency and Government Pollution prevention for business



(Environment Agency, 2022), and controlled and monitored through the CoCP (an outline CoCP would be submitted with the DCO application) and general construction site good environmental and waste management procedures

- The control of earthworks or materials movement (including any re-use of materials) under appropriate Environmental Permits, exemptions or CL:AIRE The definition of Waste: The development industry Code of Practice (CL:AIRE, 2011)
- Any temporary dewatering activities during construction would be undertaken in accordance with Environment Agency guidance, and if required, an Abstraction Licence and Environmental Permit (for the discharge) and would be limited to the depth and time required to facilitate construction activities
- A protocol for dealing within any unexpected contamination (this would be included within the outline CoCP submitted with the DCO application)

## 9.9 Likely significant effects

- 9.9.1 This section sets out the likely significant effects of the Project on geology and hydrogeology. It assumes that the relevant embedded (design measures), standard and additional measures outlined within the Initial Outline CoCP at Appendix B, and the expected mitigation for any other consents or permits are in place before assessing the effects. This is in accordance with guidance from IEMA as part of preparing a proportional assessment (IEMA, 2022).

### Geology

#### **Geohazards and ground instability – Construction and operation (inc. maintenance)**

- 9.9.2 Ground stability in relation to site specific ground conditions and geohazards would be considered within the engineering design of the Project and not within the ES. The Project, and design of structures, would include (in accordance with best practice and industry guidance) suitable consideration of site-specific ground conditions, potential ground instability and geohazard risks such that new infrastructure would not be adversely affected and would not generate any significant effects and therefore Geohazards and Ground instability is proposed to be **scoped out** of the ES during construction and operation (inc. maintenance).

#### **Sites of geological importance – Construction and operation (inc. maintenance)**

- 9.9.3 There are no sites of geological importance within the Scoping Report Corridor, although two geological SSSI's have been identified within the study area; Marks Tey Brickpit and the River Tay. Due to the specific location of these sites located outside of the Scoping Report Corridor, and therefore outside of any areas for temporary or permanent works associated with the Project, Sites of Geological Importance are proposed to be **scoped out** of the ES during construction and operation (inc. maintenance).

### Minerals

#### **Mineral reserves – Construction and operation (inc. maintenance)**

- 9.9.4 The Scoping Report Corridor crosses a limited number of existing mineral extraction sites, and both preferred and reserved mineral extraction sites, as described in the relevant minerals plans. As the potential for significant effects cannot be ruled out at this stage potential effects on current mineral sites and preferred and reserved extraction

sites are proposed to be **scoped into** the ES for both construction and operation.

- 9.9.5 The Scoping Report Corridor crosses through multiple Minerals Consultation and Minerals Safeguarding Areas. As possible interactions and thus significant effects cannot be ruled out at this stage potential effects on MCAs and MSAs are proposed to be **scoped into** the ES for both construction and operation (inc. maintenance).

## Contaminated Land

### Disturbance and mobilisation of existing contamination – Construction

- 9.9.6 There is the potential for existing contamination to be encountered within the study area and therefore significant effects during the construction phase from exposure of sensitive receptors (such as human health or controlled waters) to existing contamination through ground disturbance and from the mobilisation of existing contamination cannot be ruled out.

- 9.9.7 Further assessment of the study area is required to identify any potential sources of significant existing contamination, and potential source-pathway-receptor linkages. Therefore, the potential for existing contamination is proposed to be **scoped into** the ES during construction.

### Disturbance and mobilisation of existing contamination – Operation (inc. maintenance)

- 9.9.8 In the event contamination is identified on land required to construct the Project and which has the potential to impact on sensitive receptors, this would be appropriately dealt with during the enabling and construction phases of the Project, to ensure the Project is suitable for the proposed end use. Therefore, significant effects from existing contamination during the operation phase are considered unlikely and proposed to be **scoped out** of the ES during operation (inc. maintenance).

### Discovery of unexpected contamination – Construction and operation (inc. maintenance)

- 9.9.9 The discovery of unexpected contamination during construction could also present a risk to sensitive receptors, however these risks would be mitigated by standard mitigation measures identified within the outline CoCP (submitted with the DCO application) and potential significant effects are unlikely. Therefore, unexpected contamination is proposed to be **scoped out** of the ES during both construction and operation (inc. maintenance).

### Introduction of new contamination – Construction and operation (inc. maintenance)

- 9.9.10 Pollution releases and the introduction of new sources of contamination into the environment (for example uncontrolled leaks, spills from machinery and bentonite/drilling mud breakout) during the construction and operational phase have the potential to affect sensitive receptors. To mitigate this risk, standard mitigation and control measures would be included within the outline CoCP (submitted with the DCO application) and implemented during the construction phase. Standard control measures would also be adopted for operation related activities. As such, significant effects are unlikely, and this is therefore proposed to be **scoped out** of the ES during both construction and operation (inc. maintenance).

## Hydrogeology

### Dewatering – Construction

- 9.9.11 Dewatering during construction has the potential to affect groundwater as a result of

reducing groundwater levels, impacting groundwater quality and affecting groundwater flows, which could have a potential impact on surrounding sensitive receptors such as groundwater abstractions. Where dewatering is required, significant effects are unlikely to occur when all the following criteria is met:

- Drawdown from dewatering is less than 1.5m below rest water level
- Dewatering lasts for 100 days or less
- There are no groundwater sensitive receptors within 500m of the dewatering

9.9.12 All instances of groundwater dewatering would be assessed to see if they meet the above criteria. Where these criteria are met, the discharge would not be considered further, as significant effects are unlikely. However, further assessment would be undertaken where these criteria are not met. Therefore, dewatering is proposed to be **scoped into** the ES during construction.

#### **Dewatering – Operation (inc. maintenance)**

9.9.13 Dewatering would not be required during operation (including maintenance), therefore is proposed to be **scoped out** of the ES during operation (inc. maintenance).

#### **Discharge – Construction, operation (inc. maintenance)**

9.9.14 Any discharges of pumped groundwater would be managed in accordance with relevant permits and agreements with the relevant authorities. Therefore, significant effects are unlikely as they are dealt with under the permitting regime. As such, effects relating to potential discharges of groundwater are proposed to be **scoped out** of the ES.

#### **Connection of aquifer units – Construction**

9.9.15 At trenchless crossings there is the potential for connection of aquifers that are currently not connected. This could lead to the creation of preferential pathways between aquifer bodies, therefore significant effects cannot be ruled out. Further assessment is required and therefore this is proposed to be **scoped into** the ES during construction.

#### **Connection of aquifer units – Operation (inc. maintenance)**

9.9.16 There would be no works that have the potential to connect aquifers during operation (including maintenance). Therefore, this is proposed to be **scoped out** of the ES during operation (inc. maintenance).

#### **Groundwater Flow – Construction and Operation (inc. maintenance)**

9.9.17 Ground disturbance during construction has the potential to create new groundwater flow pathways, where permeable materials or flow routes are introduced through drilling or through permeable backfill material. Where these flow pathways intersect a sensitive receptor, they have the potential to create an impact.

9.9.18 Installation of impermeable structures or backfill below ground could impede groundwater flow and installation of more permeable structures or backfill below ground could enhance groundwater flow. However, based on the small overall dimensions of any foundations and cable ducts both of these are likely to be insignificant compared to the groundwater body as a whole.

9.9.19 The scale and nature of the planned works are such that no significant barriers to flow are envisaged. The same is true for the creation of flow pathways during the construction of overhead, open cut and trenchless crossings. Piled foundations within new pylon bases have the potential to introduce new pathways, the Initial Outline CoCP at Appendix B includes a commitment to undertake a Foundation Works Risk Assessment once the proposed foundation solutions are known. This would provide an

assessment of the risk of the creation of new flow pathways and any appropriate mitigation measures required.

9.9.20 Therefore, the risk of the creation of new flow pathways and barriers to flow is proposed to be **scoped out** of the ES during construction and operation (inc. maintenance).

## 9.10 Proposed Assessment Methodology

9.10.1 This section sets out the proposed methodology for the geology and hydrogeology assessment of the ES. This is based on professional judgement and previous experience together with highways guidance as set out in the Design Manual for Roads and Bridges (DMRB) LA 109: Geology and Soils (National Highways, 2019) and DMRB, LA 113: Road drainage and the water environment (National Highways, 2020).

9.10.2 The baseline information would be used to identify potential source-pathway-receptor linkages and inform a risk-based assessment of the effects of the Project in relation to geology and hydrogeology. The risk based assessment would be undertaken following a tiered approach as supported by guidance provided in land contamination risk management (LCRM) (Environment Agency, 2021), with progression through the different Tiers (Tier 1 Preliminary Risk Assessment, Tier 2 Generic Quantitative Risk Assessment and Tier 3 Detailed Quantitative Risk Assessment) dependent on the outcome of each previous Tier (therefore proportionate).

9.10.3 The proposed assessment approach in the chapter is based on desk study information. ‘Reasonable worst case’ assumptions regarding the likely ground conditions would be made when assessing effects in the ES, determined from the desk study information.

9.10.4 In the context of the length and size of the study area, and to provide a comprehensive yet proportionate assessment, an additional Tier (Tier 0) is proposed for the ES relating to geology and hydrogeology.

9.10.5 A Tier 0 assessment would be undertaken as a first stage screening of the Scoping Report Corridor and wider study area to identify potential pollutant linkages and assign a risk rating based on potential for significant contamination to be present. Those sources/ areas which are assessed to have a moderate, high or very high potential risk of contamination would be taken forward for further assessment to ensure the assessment is targeted in areas where significant effects are most likely. Where a very low or low contamination risk rating is assessed, these areas would not be taken forward for further assessment in the ES on the basis that significant effects are unlikely. The potential risk of contamination would be identified based on the historical and current land use. Table 9.3 presents the criteria used for classifying the potential contamination risk of a specific source.

Table 9.3 – Criteria for classifying potential for generating contamination

<b>Classification Score</b>	<b>Potential for generating contamination</b>
Very Low	Land Use Examples: Residential, retail or office use, agriculture. Contamination Potential: Limited
Low	Land Use Examples: Recent small scale industrial and light industry Contamination Potential: Locally slightly elevated concentrations
Moderate	Land Use Examples: Railway yards, collieries, scrap yards, inert landfills

<b>Classification Score</b>	<b>Potential for generating contamination</b>
	Contamination Potential: Possible widespread slightly elevated concentrations and locally elevated
High	Land Use Examples: Heavy industry, non-hazardous landfills Contamination Potential: Possible widespread elevated concentrations
Very High	Land Use Examples: Hazardous waste landfills, gas works, chemical works Contamination Potential: Likely widespread significantly elevated concentrations

- 9.10.6 Risks associated with unexpected contamination would be managed through the protocols and good practice measures identified within the outline CoCP (submitted with the DCO application).
- 9.10.7 In order to evaluate whether the presence of a source of contamination could potentially lead to harmful consequences, a source-pathway-receptor methodology is adopted, with the underlying principle that the identification of pollutant linkages consists of the following three elements
- A source/ hazard (a substance or situation that has the potential to cause harm or pollution)
  - A pathway (a means by which the hazard moves along/ generates exposure)
  - A receptor/ target (an entity that is vulnerable to the potential adverse effects of the hazard)
- 9.10.8 Whilst the contamination may be a hazard it would not constitute a risk unless a pathway and receptor are also present and a pollutant linkage can be determined. Therefore, in assessing the potential for contamination to cause a significant effect: the extent and nature of the potential source or sources of contamination must be assessed; any pathways present must be identified; and sensitive receptors or resources identified and appraised to determine their value and sensitivity to contamination related impacts.
- 9.10.9 The methodology adopted in this chapter is qualitative with a progression from factual information regarding the baseline conditions, to appraisal informed by professional judgement and expression of opinions on the relative significance.
- 9.10.10 The risk assessment approach proposed in this methodology would be transposed into EIA classification. For each potential effect the receptor sensitivity and impact magnitude would be assigned using the criteria in Tables 9.4 and 9.5 which would then be combined to give a significance of effect using the matrix provided in Table 9.6.
- 9.10.11 There is no equivalent published assessment methodology that relates to impacts relating to geology (for example geo-conservation). For consistency, a source – pathway – receptor approach would be adopted to assess these effects (combination of receptor identification and associated sensitivity and magnitude of potential impacts) as stated above, which is also advocated by DMRB LA 109.
- 9.10.12 A source-pathway-receptor linkage approach, as detailed above, would also be applied to assessing the potential effects on groundwater which relate to the geological/ hydrogeological settings between the proposed Order Limits and identified groundwater abstractions and receptors. Further, localised Hydrogeological Risk Assessment may also be required where dewatering is proposed. Assessment of the impacts on

groundwater receptors from dewatering, would be undertaken based on the approach and methodology described in Environment Agency, Hydrogeological Impact Appraisal for Dewatering Guidance (Environment Agency, 2007).

- 9.10.13 A preliminary Minerals Resource Assessment (MRA) would be completed to identify where the Project has the potential to impact on mineral resources and provide qualitative assessment of the potential for significant effects. The preliminary MRA would have regard to Minerals Safeguarding Practice Guidance (Minerals Products Association, 2019).

## Sensitivity of receptors

- 9.10.14 The criteria used to determine the value and sensitivity of receptors specific to geology and hydrogeology are set out in Table 9.4. These values are based on Table 3.70 of DMRB LA 113: Road drainage and the water environment, Table 3.11 of DMRB LA 109: Geology and soils and professional judgement.

Table 9.4 - Criteria for determining value/ sensitivity

Value/Sensitivity	General Criteria
Very High	<p>Very high importance and rarity. International scale and limited potential for substitution</p> <p><b>Geology:</b> Very rare and of international importance with no potential for replacement (e.g. UNESCO World Heritage Sites, UNESCO Global Geoparks, SSSI and Geological Conservation Review (GCR) where citations indicate features of international importance). Geology meeting international designation citation criteria which is not designated as such.</p> <p><b>Minerals:</b> Existing Mineral sites</p> <p><b>Contamination:</b> 1) human health: very high sensitivity land use such as residential or allotments; 2) surface water: Watercourse having a Water Framework Directive (WFD) classification shown in a River Basin Management Plan (RBMP) and Q95 ≥ 1.0 m<sup>3</sup>/s. Site protected/designated under European Commission (EC) or United Kingdom (UK) legislation ((SAC), (SPA), SSSI, Ramsar site) 3) groundwater: Principal aquifer providing a regionally important resource and regionally important public water supplies, SPZ 1</p> <p><b>Hydrogeology:</b> Principal aquifer providing a regionally important source and regionally important public water supplies. Groundwater quality associated with SPZ 1 associated with licensed abstractions. Water feeding Groundwater Dependant Terrestrial Ecosystems (GWDTEs) with a high groundwater dependence with a high environmental importance and international or national value, such as Ramsar sites, SACs, SPAs and SSSIs.</p>
High	High importance and rarity. National scale and limited potential for substitution

Value/Sensitivity	General Criteria
	<p><b>Geology:</b> Rare and of national importance with little potential for replacement (e.g. geological SSSI, (NNR). Geology meeting national designation citation criteria which is not designated as such.</p> <p><b>Minerals:</b> Mineral preferred areas</p> <p><b>Contamination:</b> 1) human health: high sensitivity land use such as public open space; 2) surface water: Watercourse having a WFD classification shown in a RBMP and Q95 &lt;1.0m<sup>3</sup>/s. 3) groundwater: Principal aquifer providing locally important resource or supporting a river ecosystem, SPZ2.</p> <p><b>Hydrogeology:</b> Principal aquifer providing a locally important source and locally important public water supplies, SPZ 2. Water feeding GWDTEs with a moderate groundwater dependence with high environmental importance and international or national value, such as Ramsar sites, SACs, SPAs and SSSIs; or water feeding highly groundwater dependent GWDTE with a national non-statutory UK Biodiversity Action Plan (BAP) priority</p>
Medium	<p>Medium or high importance and rarity, regional scale, limited potential for substitution</p> <p><b>Geology:</b> Regional importance with limited potential for replacement (e.g. RIGS). Geology meeting regional designation citation criteria which is not designated as such.</p> <p><b>Minerals:</b> Mineral Safeguarded Areas and Mineral Consultation Area</p> <p><b>Contamination:</b> 1) human health: medium sensitivity land use such as commercial or industrial; 2) surface water: Watercourses not having a WFD classification shown in a RBMP and Q95 &gt;0.001m<sup>3</sup>/s. 3) groundwater: Secondary A Aquifers. Extensive non-licensed private water abstractions (i.e. feeding ten or more properties or supplying large farming / animal estates). SPZ2 (Outer Protection Zone) associated with licenced abstractions.</p> <p><b>Hydrogeology:</b> Secondary A aquifer. Groundwater flow and yield and quality associated with extensive non-licensed private water abstractions (i.e. feeding ten or more properties or supplying large farming / animal estates). Groundwater quality associated with SPZ2 (Outer Protection Zone) associated with licensed abstractions. Residential and commercial properties.</p>

Value/Sensitivity	General Criteria
	<p>Water feeding GWDTEs of low groundwater dependence with a high environmental importance and international or national value, such as Ramsar sites, SACs, SPAs and SSSIs; or water feeding moderately groundwater dependent GWDTE with a national non-statutory UK Biodiversity Action Plan (BAP) priority</p>
Low	<p>Low or medium importance and rarity, local scale</p> <p><b>Geology:</b> Local importance / interest with potential for replacement (e.g. non designated geological exposures, former quarry's / mining sites).</p> <p><b>Minerals:</b> Mineral present but outside of any MPS/MSA/MCA</p> <p><b>Contamination:</b> 1) human health: low sensitivity land use such as highways and rail; 2) surface water: Watercourses not having a WFD classification shown in a RBMP and Q95 <math>\leq 0.001\text{m}^3/\text{s}</math>. 3) groundwater: Secondary B or Secondary Undifferentiated aquifer. Small scale private water abstractions (i.e. feeding fewer than ten properties). SPZ3.</p> <p><b>Hydrogeology:</b> Secondary B or Secondary Undifferentiated aquifer. Groundwater flow and yield and quality associated with small scale private water abstractions (i.e. feeding fewer than ten properties). Groundwater quality associated with SPZ3 (Source Catchment Protection Zone) associated with licensed abstractions and with licensed abstractions for which no SPZ is defined.</p> <p>Water feeding GWDTEs of low groundwater dependence with a national non-statutory UK BAP priority; or water feeding highly or moderately groundwater dependent GWDTE sites with no conservation designation.</p>
Negligible	<p>Very low importance and rarity, local scale</p> <p><b>Geology:</b> No geological exposures, little / no local interest.</p> <p><b>Mineral:</b> No mineral identified</p> <p><b>Contamination:</b> 1) human health: undeveloped surplus land / no sensitive land use proposed; 2) surface water: not present 3) groundwater: Unproductive strata</p> <p><b>Hydrogeology:</b> Very poor groundwater quality and/or very low permeability make exploitation of groundwater unfeasible. No active groundwater supply.</p> <p>Water feeding GWDTEs of low groundwater dependence with no designation or groundwater that supports a wetland not classified as a</p>



Value/Sensitivity	General Criteria
	GWDTE, although may receive some minor contribution from groundwater

## Impact magnitude

9.10.15 The criteria used to determine the magnitude of change for geology and hydrogeology are set out in Table 9.5. These values are based on Table 3.71 of DMRB LA 113, Table 3.12 of DMRB LA 109 and professional judgement.

Table 9.5 – Criteria for determining magnitude

Magnitude	General Criteria
Large	<b>Geology Adverse:</b> Permanent loss of geological feature / designation and/or quality and integrity, severe damage to characteristics, features or elements.
	<b>Contamination Adverse:</b> Significant contamination identified, and contamination level significantly exceed human health and environmental assessment criteria with the potential for significant harm to be caused. Contamination heavily restricts future use of land
	<b>Contamination Benefit:</b> Substantial betterment of ground or groundwater quality/contamination conditions through remediation and/or mitigation.
	<b>Hydrogeology Adverse:</b> Major or irreversible change to groundwater aquifer(s) flow, water level, quality or available yield which endangers the resources currently available. Groundwater resource use / abstraction is irreparably impacted upon, with a major or total loss of an existing supply or supplies. Changes to water table level or quality would result in a major or total change in, or loss of, a groundwater dependent area, where the value of a site would be severely affected. Changes to groundwater aquifer(s) flow, water level and quality would result in major changes to groundwater baseflow contributions to surface water and/ or alterations in surface water quality. <b>Hydrogeology Beneficial:</b> Major increase in groundwater resource availability. Results in the achievement of Good Status for a WFD groundwater body or GWDTE which is currently failing its WFD objectives. Removal of existing or potential polluting discharge to groundwater
Medium	<b>Geology Adverse:</b> partial loss of geological feature / designation, potentially adversely affecting the integrity; partial loss of/damage to characteristics, features or elements.
	<b>Contamination Adverse:</b> Contamination levels marginally exceed human health and environment assessment criteria. Control / remediation measures are required to reduce risks to human health / make land suitable for intended use.
	<b>Contamination Benefit:</b> Moderate Betterment of ground or groundwater quality/contamination conditions through remediation and/or mitigation.
	<b>Hydrogeology Adverse:</b> Moderate long term or temporary significant changes to groundwater aquifer(s) flow, water level, quality or available yield which results in moderate long term or temporarily significant decrease in resource availability. Groundwater resource use / abstraction is impacted

Magnitude	General Criteria
	<p>slightly, but existing supplies remain sustainable. Changes to water table level or groundwater quality would result in partial change in or loss of a groundwater dependent area, where the value of the site would be affected, but not to a major degree. Changes to groundwater aquifer(s) flow, water level and quality would result in moderate changes to groundwater baseflow contributions to surface water and/ or alterations in surface water quality, resulting in a moderate shift from baseline conditions</p> <p><b>Hydrogeology Beneficial:</b> Moderate increase in groundwater resource availability. Contributes, in combination with other effects, to the achievement of Good Status for a WFD groundwater body or GWDTE which is currently failing its WFD objectives. Significant reduction of existing or potential polluting discharge to groundwater.</p>
Small	<p><b>Geology Adverse:</b> minor measurable change in geological feature / designation attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) characteristics, features or elements.</p> <p><b>Contamination Adverse:</b> Contamination levels below human health and environment assessment criteria and remediation is not required. Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health;</p> <p><b>Contamination Benefit:</b> Slight betterment of ground or groundwater quality/contamination conditions through remediation and/or mitigation.</p> <p><b>Hydrogeology Adverse:</b> Minor changes to groundwater aquifer(s) flow, water level, quality or available yield leading to a noticeable change, confined largely to the Project area. Changes to water table level, groundwater quality and yield result in little discernible change to existing resource use. Changes to water table level or groundwater quality would result in minor change to groundwater dependent areas, but where the value of the site would not be affected. Changes to groundwater aquifer(s) flow, water level and quality would result in minor changes to groundwater baseflow contributions to surface water and / or alterations in surface water quality, resulting in a minor shift from baseline conditions.</p> <p><b>Hydrogeology Beneficial:</b> Minor increase in groundwater resource availability. Leads to improvement of a WFD groundwater body which is currently failing its WFD objectives but insufficient effect to achieve Good Status. Minor reduction of existing or potential polluting discharge to groundwater.</p>
Negligible	<p><b>Geology Adverse:</b> Very minor loss or detrimental alteration to one or more characteristics, features or elements of geological feature / designation. Overall integrity of resource not affected.</p> <p><b>Contamination:</b> Contamination levels substantially below human health and environment assessment criteria and remediation is not required. No requirement for control measures to reduce risks to human health / make land suitable for intended use.</p>

<b>Magnitude</b>	<b>General Criteria</b>
	<b>Hydrogeology Adverse:</b> Very slight change from groundwater baseline conditions, approximating to 'no change' conditions. Dewatering effects create no or no noticeable effects.

## Significance

- 9.10.16 Significance would be derived using the matrix set out in Table 9.6. This may be informed by professional judgement, which where used would be explained to give the rationale behind the values assigned. Significant effects, in the context of the EIA Regulations 2017 would be effects of moderate or greater significance.

Table 9.6 – Significance matrix

		<b>Value/ Sensitivity of Receptor</b>				
		<b>Very High</b>	<b>High</b>	<b>Medium</b>	<b>Low</b>	<b>Negligible</b>
<b>Magnitude</b>	<b>Large</b>	Major	Major/ Moderate	Major/ Moderate/ Minor	Moderate/ Minor	Minor/ Negligible
	<b>Medium</b>	Major/ Moderate	Major/ Moderate	Moderate/ Minor	Minor/ Negligible	Negligible
	<b>Small</b>	Major/ Moderate	Moderate/ Minor	Moderate/ Minor	Minor/ Negligible	Negligible
	<b>Negligible</b>	Minor/ Negligible	Minor/ Negligible	Minor/ Negligible	Negligible	Negligible

## 9.11 Proposed scope of the ES

- 9.11.1 The matters that are proposed to be scoped in and out of the ES are summarised in Table 9.7.

Table 9.7 – Matters scoped in or out of the ES

<b>Matter</b>	<b>Phase</b>	<b>Scoped in / out</b>	<b>Justification</b>
<b>Geology</b>			
Geohazards and Ground Instability	Construction and operation	Scoped out	Ground stability in relation to site specific ground conditions and geohazards would be considered within the engineering design of the Project and designed such that new infrastructure would not be adversely affected.
Sites of Geological Importance	Construction and operation	Scoped out	No sites of Geological Importance have been identified within the Scoping Report Corridor.

<b>Matter</b>	<b>Phase</b>	<b>Scoped in / out</b>	<b>Justification</b>
Mineral Reserves	Construction and operation	Scoped in	Potential for the Project to impact on safeguarded minerals and mineral infrastructure.
<b>Contaminated Land</b>			
Disturbance and mobilisation of existing contamination	Construction	Scoped in	Potential for existing contamination to be encountered within the study area. Therefore, the potential for sensitive receptors to be exposed to contamination from ground disturbance during construction.
	Operation	Scoped out	Any existing contamination would be dealt with during the construction phase of the Project and ground disturbance is unlikely therefore significant effects during operation are unlikely.
Discovery of Unexpected Contamination	Construction and operation	Scoped out	The discovery of unexpected contamination during construction could also present a risk to sensitive receptors, however these risks would be mitigated by good practise measures identified within the outline CoCP (submitted with the DCO application).
Introduction of new contamination	Construction and operation	Scoped out	Pollution releases and introduction of new sources would be mitigated by additional measures within the outline CoCP (submitted with the DCO application). These measures would seek to minimise the potential for any leaks and spills during construction and operation.
<b>Hydrogeology</b>			
Dewatering	Construction	Scoped in	Dewatering has the potential to change groundwater levels, quality and groundwater flow direction caused by dewatering.
	Operation	Scoped out	Dewatering would not be required during the operation phase.
Discharge	Construction and operation	Scoped out	Any discharges of pumped groundwater would be managed in accordance with relevant permits and agreements with the relevant authorities.
Connection of aquifer units	Construction	Scoped in	There is the potential during the excavation of trenchless crossings that two aquifer units could be connected that could lead to the creation of preferential pathways.
	Operation	Scoped out	There would be no works that have the potential to connect aquifers during operation.

\*Operation referred to above also includes maintenance.

# 10 Health and Wellbeing

## 10.1 Approach to scoping

10.1.1 The approach to scoping has drawn from previous experience of similar projects. Determining the scope of the Health and Wellbeing assessment has included the following stages:

- Regulatory and planning policy context
- Defining the study area
- Stating sources of data collected
- Outlining baseline conditions
- Highlighting further data to be gathered
- Outlining environmental measures
- Predicting likely significant effects
- Drafting the proposed assessment methodology
- Stating the proposed scope of the ES

10.1.2 There are interrelationships related to the potential effects on health and wellbeing and other environmental topics. Therefore, please also refer to the following chapters:

- Chapter 7: Air Quality
- Chapter 9: Geology and Hydrogeology
- Chapter 12: Hydrology and Land Drainage
- Chapter 14: Noise and Vibration
- Chapter 16: Traffic and Transport

10.1.3 This chapter should also be read in parallel with Figure 10.1 at Appendix A.

10.1.4 It is considered that the potential for effects on health and wellbeing in relation to the above topics would be limited to the construction phase. No potential for operational effects have been identified.

10.1.5 Given the type, temporary duration and level of potential construction phase effects, and recognising that any likely significant effects from various topics on health and wellbeing would already be reported within separate chapters, it is not considered that general health and wellbeing requires additional separate reporting in the ES. A health and wellbeing chapter is therefore, not proposed within the ES. However, where there is an intra-project effect i.e. where a receptor is potentially affected by more than one source of direct environmental impact resulting from the same development during construction, this would be considered within Chapter 17: Cumulative Effects, as part of the intra-project cumulative effects assessment. This assessment would include a specific section on health and wellbeing.

### Electric and Magnetic Fields (EMF)

10.1.6 All equipment that generates, distributes or uses electricity produces EMFs, and these also occur naturally. The UK power frequency is 50 hertz (Hz) which is the principal

frequency of the EMFs produced. Electric fields depend on the operating voltage of the equipment producing them and are measured in volts per metre (V/m). The voltage applied to equipment is a relatively constant value. Magnetic fields depend on the electrical currents flowing, which vary according to the electrical power requirements at any given time and are measured in  $\mu\text{T}$  (microteslas). Both fields diminish rapidly with distance from the source and are present in all areas where electricity is in use (e.g. offices and homes), arising from electric cabling and equipment in the area.

- 10.1.7 All overhead lines produce EMFs, and these tend to be highest directly under an overhead line and decrease to the sides at increasing distance. Underground cables produce no external electric fields, and the magnetic field falls more rapidly, falling to the levels typically found in UK homes within around 20m compared to around 150m for an overhead line. Substations and CSE compounds do not produce significant EMFs outside their boundaries.
- 10.1.8 As EMFs are only generated when electricity is flowing through the equipment no discernible EMF generation is anticipated during the construction stage. Only the Project's operational phase (when power is being transmitted) has the potential to generate EMFs.

## General Health and Wellbeing

- 10.1.9 During construction, the Project would result in noise from machinery and traffic movements, dust from earth moving, and emissions from exhausts and machinery. These could have an effect on health in isolation (as assessed under the relevant chapters) or in combination.

## 10.2 Regulatory and planning policy context

### National policy

- 10.2.1 Chapter 2: Legislation and Planning Policy Context sets out the overarching policy relevant to the Project including the Overarching NPS for Energy (EN-1) and NPS for Electricity Networks Infrastructure EN-5. EN-1 contains the following paragraphs relating to health and wellbeing and EMF which have been considered within this chapter:
- 10.2.2 EN-1 and Draft EN-1 state that energy production infrastructure may have impacts on the health and wellbeing of the population which should be considered in any assessment, including:
- Paragraph 4.13.1 - *“Energy production has the potential to impact on the health and well-being (“health”) of the population. Access to energy is clearly beneficial to society and to our health as a whole. However, the production, distribution and use of energy may have negative impacts on some people’s health.”*
  - Paragraph 4.13.2 - *“...where the proposed project has an effect on human beings, the ES should assess these effects for each element of the project, identifying any adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate. The impacts of more than one development may affect people simultaneously, so the applicant and the IPC should consider the cumulative impact on health.”*
  - Paragraph 4.13.3 - *“The direct impacts on health may include increased traffic, air or water pollution, dust, odour, hazardous waste and substances, noise, exposure to radiation, and increases in pests.”*

- Paragraph 4.13.4 - “New energy infrastructure may also affect the composition, size and proximity of the local population, and in doing so have indirect health impacts, for example if it in some way affects access to key public services, transport or the use of open space for recreation and physical activity.”
- Paragraph 4.13.45 - “Generally, those aspects of energy infrastructure which are most likely to have a significantly detrimental impact on health are subject to separate regulation (for example for air pollution) which will constitute effective mitigation of them, so that it is unlikely that health concerns will either constitute a reason to refused consents or require specific mitigation under the Planning Act 2008. However, the IPC will want to take account of health concerns when setting requirements relating to a range of impacts such as noise.”

10.2.3 NPS EN-5 states:

- Paragraph 20.10.15 – “The applicant should have considered the following factors [in relation to EMF]:
  - Height, position, insulation and protection (electrical or mechanical as appropriate) measures subject to ensuring compliance with the Electricity Safety, Quality and Continuity Regulations 2002
  - That optimal phasing of high voltage overhead power lines is introduced wherever possible and practicable in accordance with the Code of Practice to minimise effects of EMFs
  - Any new advice emerging from the Department of Health relating to Government policy for EMF exposure guidelines
  - However, where it can be shown that the line will comply with the current public exposure guidelines and the policy on phasing, no further mitigation should be necessary”
- Paragraph 20.10.16 – “Where EMF exposure is within the relevant public exposure guidelines, re-routing a proposed overhead line purely on the basis of EMF exposure, or undergrounding a line solely to further reduce the level of EMF exposure are unlikely to be proportionate mitigation measures.”

10.2.4 Draft versions of NPS EN-1 and EN-5 are consistent with the current NPS’s in relation to health and wellbeing.

## Regional and local policy

10.2.5 Chapter 2: Legislation and Planning Policy Context sets out the relevant regional and local policy.

## Guidance

10.2.6 Relevant guidance, specific to Health and Wellbeing, that has informed this Scoping Report and comprises:

- Government White Paper: Healthy Lives, Healthy People (HM Government, 2011)
- A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2019)
- Planning Practice Guidance (PPG) – The Role of Health and Wellbeing in Planning (Department for Levelling Up, Housing and Communities Ministry of Housing and Communities and Local Government, 2014)

- Putting Health into Place (Public Health England (PHE), 2018)
- Health Impact Assessment in spatial planning (PHE, 2020)
- Advice on the content of Environmental Statements accompanying an application under the NSIP Regime (PHE, 2021)
- Health in Environmental Impact Assessment – A Primer for a Proportionate Approach (IEMA, 2017)

10.2.7 Relevant guidance, specific to EMF, that has informed this Scoping Report comprises:

- 1999/519/EC: Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (EU Council, 1999)
- International Commission on Non-Ionizing Radiation Protection (ICNIRP): Guidelines for limiting exposure to electromagnetic fields (100 kHz to 300 GHz) (ICNIRP, 2020)
- Power Lines: Demonstrating compliance with EMF public exposure guidelines. A Voluntary Code of Practice (DECC, 2012)
- Optimum Phasing of high voltage double-circuit Power Lines. A voluntary Code of Practice (DECC, 2012)
- Power lines: Control of microshocks and other indirect effects of public exposure to electric fields. A voluntary Code of Practice (DECC, 2013)
- Technical Specification 1 – Ratings and General requirements for plant, equipment and apparatus for the National Grid system (National Grid, 2007)
- National Grid SHES Standard- Non-ionising radiational standard – UK/T1/8.7.4/S (National Grid, 2020)
- Policy Statement (Transmission) 103 – EMF Policy applied to overhead line designs (National Grid, 2013)

## 10.3 Study area

### Health and wellbeing

10.3.1 In the absence of standard methodology and guidance, the study area for health and wellbeing has been defined using professional judgement and experience of similar linear projects and is defined by Local Authority boundaries. The Scoping Report Corridor includes the following Local Authorities: Thurrock, Brentwood, Basildon, Chelmsford, Braintree, Colchester, Tendring, Babergh, Mid Suffolk and South Norfolk). The Local Authority areas are presented on Figure 10.1 at Appendix A.

## 10.4 EMFs

10.4.1 Previous studies and calculations (Swanson and Renew, 1994) have shown that equipment operating at the proposed voltage and rating do not produce EMFs greater than typical background levels at distances of more than 200m. Therefore, a 200m study area has been assumed around the Scoping Report Corridor for the EMF assessment – this is presented on Figure 10.1 at Appendix A.



## 10.5 Data collection

10.5.1 The baseline has been informed by a desk study which has drawn on the following information sources:

- Health and wellbeing
  - Regional health profile and local health reports (Office of Health Inequalities and Disparities (OHID), 2021)
  - Local authority joint strategic needs assessments (JSNAs)
  - Local authority health and wellbeing strategies
  - OS 1:25,000 mapping and aerial mapping/photography
  - Baseline information from other topic chapters (i.e., air quality, noise and vibration, traffic and transport, land quality, socioeconomics)
- EMFs
  - Policy and legislation (see section 10.1)

## 10.6 Engagement with stakeholders

10.6.1 A summary of engagement undertaken to date is presented in Table 10.1.

Table 10.1 – Summary of engagement

Organisation and date	Summary of response	Consideration in the Scoping Report
Babergh Mid Suffolk Council, Thurrock, Norfolk County, Suffolk, Essex, Braintree Council, Chelmsford Council, Basildon, Colchester, Historic England, September 2022	A letter was issued to Local Planning Authorities setting out the proposed methodology and scope.	Planning developments would be identified and considered in the Planning Statement and cumulative impact assessment in Chapter 17, visual impacts would be considered in Chapter 13: Landscape and Visual. Impacts on property value are not considered in the EIA as this is not a matter for assessment under the EIA Regulations 2017. However, potential impacts on farm business would be included in the agriculture and soils assessment, Chapter 6.
	Suffolk County Council: Outlined the need to consider what land around pylon locations is used for within assessment (relating to planning developments, allotments, leisure activities, etc.). Assessment should also consider visual impacts on local area and affects on property value.	
	Letter does not mention security and access to pylons	This has not been considered within the Scoping report as it relates to the Project design.

Organisation and date	Summary of response	Consideration in the Scoping Report
	Requested a psychological impact assessment to consider research and evidence of safety from EMF.	National Grid, recognises public concern regarding EMFs and therefore comprehensive information on EMFs and compliance of the proposed Project with the requirements of NPS EN-5 would be provided in a standalone EMF report which would be submitted as part of the DCO application.
	To ensure this assessment will review any pre-planning demolition if required before pylon towers are built and to follow the necessary guidance to ensure public safety against air pollution.	Air Quality would be assessed within Chapter 7: Air Quality.

## 10.7 Baseline conditions (inc. future baseline)

### Health and wellbeing

#### Health related environmental change

- 10.7.1 Population and deprivation data are described in Chapter 15: Socio-economics, Recreation and Tourism. Baseline information relating to health-related environmental changes is set out in:
- Chapter 7: Air Quality – considers the potential for dust and vehicle emissions which could affect people’s health
  - Chapter 9: Geology and Hydrogeology – considers potential for contaminated land and how this could affect the health of people either directly or indirectly through pollution of soil and water
  - Chapter 14: Noise and Vibration – considers the potential for construction and operational noise which could affect people’s health
  - Chapter 16: Traffic and Transport – considers the potential for disruption to rights of way which could affect people’s health, and access to services
- 10.7.2 The Scoping Report Corridor is located to avoid as far as practicable large residential and urban areas and sensitive receptors including residential receptors, schools, medical facilities and residential care homes. The corridor passes within 500m of residential receptors in settlements, including Mulbarton, Fornsett End, Roydon, Gislingham, Stowupland, Needham Market, Offton, Capel St Mary, Stratford St Mary, Ardeigh, Great Horkesley, Little Waltham and Thurrock, receptors would be defined and identified within the relevant chapters of the ES.

## Local health

- 10.7.3 The health baseline across the study area, as set out in the 2021 local health reports from OHID (OHID, 2021) varies, reflecting the unique characteristics, populations and health challenges experienced across the region.
- 10.7.4 Generally, the study area has an ageing population, indicating a lower birth rate, that younger people and families are moving out of the area, and/or that a greater proportion of people are moving into the area to retire. Thurrock and Colchester show an opposite trend, with a greater proportion of younger people and those of a working age compared to the rest of the study area. Thurrock and Colchester, along with Chelmsford, also have the highest population densities in the study area. With the exception of Tendring, the remaining areas have a lower population density when compared to England as a whole.
- 10.7.5 In terms of ethnic diversity, most of the study area is less diverse than England as a whole, apart from Thurrock. Colchester and Brentwood, whilst not as diverse as Thurrock, have greater ethnic diversity than the rest of the study area.
- 10.7.6 Much of the study area benefits from low levels of deprivation. Colchester and Thurrock have higher levels of deprivation compared to most of the other local authority areas in the study area. However, Tendring has higher levels of deprivation than England as a whole and therefore the highest levels in the study area. Fuel poverty in Tendring is also the highest in the study area and higher compared to England, with the other local authority areas performing the same or better on this indicator compared to England.
- 10.7.7 The housing and living conditions in study area are also better when compared to England as a whole, with the exception of Thurrock where there is no difference, which indicates poorer conditions compared to the rest of the study area.
- 10.7.8 Much of the study area experiences better performance across employment indicators compared to England as a whole, with the exception of Tendring, which has higher levels of unemployment and long-term unemployment. In Basildon, long-term unemployment is higher compared to England as a whole, whereas in Thurrock unemployment is higher. This indicates that those out of work in Basildon find it harder to return to employment, whereas there is a greater turnover of people out of work for a limited period in Thurrock.
- 10.7.9 There are (statistically) significantly less people living with long-term illness or disability in most of the study area when compared to England as a whole, with the exception of South Norfolk and Tendring, where (statistically) significantly more people are living with long-term illness or disability. In Babergh, there is no difference compared to England as whole.
- 10.7.10 Across the child weight indicators, approximately half of the study area performed better compared to England as a whole. Performance in Tendring, Braintree and Brentwood was mixed, and (statistically) significantly worse in Thurrock compared to England as a whole. This indicates that opportunities for exercise, active travel, outdoor recreation and accessing healthy food is a challenge during childhood in these three areas.

## EMFs

- 10.7.11 There is existing electricity transmission and distribution equipment in the study area including 400kV and 132kV OHL's and the 400kV substations at Norwich Main, Bramford and Tilbury. The existing electricity infrastructure produces EMFs as it distributes or uses electricity.
- 10.7.12 Typical EMFs from a 400kV OHL are in the range of 5 to 10 $\mu$ T (magnetic field) and 3 to

5kV/m (electric field) directly under the OHL, decreasing to a background level within 150m of the OHL. Typical EMFs for a 132kV OHL would be 0.5 to 2µT (magnetic field) and 1 to 2kV/m (electric field).

## Future baseline

- 10.7.13 The future baseline relates to known or anticipated changes to the current baseline in the future which should be assessed as part of the Project in the ES.
- 10.7.14 The future baseline is not expected to materially change in the reasonably foreseeable future.

## 10.8 Further data to be gathered / processed in the ES

- 10.8.1 No further data is proposed to be gathered.

## 10.9 Measures adopted as part of the Project

### Health and wellbeing

- 10.9.1 The Scoping Report Corridor has been located to avoid as far as practicable sensitive health features such as built-up residential areas as set out in the Corridor and Preliminary Routeing and Siting Study (National Grid, 2022). Further embedded measures would be developed as the Project design evolves.
- 10.9.2 A range of standard measures for the Project would be adopted throughout the duration of the construction phase. Those relevant to health and wellbeing are included in Chapter 7: Air Quality (section 7.8), Chapter 9: Geology and Hydrogeology (Section 9.8), Chapter 14: Noise and Vibration (Section 14.8) and Chapter 16: Traffic and Transport (section 16.8) Chapters. Appendix B: Initial Outline CoCP, also outlines these measures.

### EMFs

- 10.9.3 As part of the embedded measures, the Project would be compliant with existing legal requirements and standards, including:
- Technical Specification 1 – Ratings and General requirements for plant, equipment and apparatus for the National Grid system (National Grid, 2007)
  - National Grid SHES Standard- Non-ionising radiational standard – UK/T1/8.7.4/S (National Grid, 2020)
  - Policy Statement (Transmission) 103 – EMF Policy applied to overhead line designs (National Grid, 2013)
- 10.9.4 These technical specifications and policies ensure that the proposed design would be compliant with the requirements of NPS EN-5.

## 10.10 Likely significant effects

- 10.10.1 This section sets out the likely significant effects of the Project on health and wellbeing. It assumes that the relevant embedded (design measures), standard and additional measures outlined within the Initial Outline CoCP at Appendix B, and the expected mitigation for any other consents or permits are in place before assessing the effects. This is in accordance with guidance from IEMA, Delivering Proportionate EIA (IEMA,

2022).

## Health and wellbeing

- 10.10.2 During construction, the Project has the potential to result in noise from machinery and traffic movements, dust from earth moving, and emissions from exhausts and machinery. These could have an effect on health in isolation or in combination.
- 10.10.3 In relation to health and wellbeing, the likely significant effects are related to contributory factors considered by other environmental topics within this Scoping Report:
- Chapter 7: Air Quality – considers the potential for dust and vehicle emissions which could affect people’s health
  - Chapter 9: Geology and Hydrogeology – considers potential for contaminated land and how this could affect the health of people either directly or indirectly through pollution of soil and water
  - Chapter 14: Noise and Vibration – considers the potential for construction and operational noise which could affect people’s health
  - Chapter 16: Traffic and Transport – considers the potential for disruption to rights of way which could affect people’s health, and also access to services
- 10.10.4 Intra-project cumulative effects assessment are also detailed within Chapter 17: Cumulative Effects.
- 10.10.5 It is considered that the potential for effects on health and wellbeing in relation to the above topics would be limited to the construction phase only. The Project would be designed, as far as practicable to avoid sensitive health receptors, including residential receptors. There would be no likely significant traffic movements or air quality and noise emissions associated with the operation of the Project that may have an adverse effect on health and wellbeing. Likely significant operational effects have been scoped out of the air quality, noise, geology and hydrogeology and traffic and transport assessments.
- 10.10.6 Given that any likely significant effects from the topics on health and wellbeing would already be reported within the separate chapters, listed above, in the interests of reducing duplication and to making the ES more accessible a separate health and wellbeing chapter is not proposed within the ES. Where there are intra-project effects of the above (i.e., where a receptor is potentially affected by more than one source of direct environmental impact resulting from the same development) during construction, this would be considered within the cumulative effects assessment (Chapter 17), as part of the intra-project cumulative effects assessment, this assessment would include a separate section on health and wellbeing.

## EMF

- 10.10.7 The International Commission on Non-Ionizing Radiation Protection (ICNIRP) developed health protection guidelines for both public and occupational exposure to EMF. The guidance sets out limits to ensure members of the public are protected. UK Government policy is that exposure of the public should comply with the ICNIRP guidelines (ICNIRP, 2020) and the electricity industry has agreed to follow this policy.
- 10.10.8 There are also three Department of Energy and Climate Change (DECC) Codes of Practice relating to demonstrating compliance with EMF public exposure:
- Power Lines: Demonstrating compliance with EMF public exposure guidelines. A Voluntary Code of Practice (DECC, 2012)

- Optimum Phasing of high voltage double-circuit Power Lines. A voluntary Code of Practice (DECC, 2012)
  - Power lines: Control of microshocks and other indirect effects of public exposure to electric fields. A voluntary Code of Practice (DECC, 2013)
- 10.10.9 At high exposure levels, EMFs can have both direct and indirect effects on human health and wellbeing. Direct effects are protected against by compliance with the ICNIRP guidelines. Indirect effects, which can result in microshocks, have no known long-term health effects and the effects are mitigated by the principles in the DECC Codes of Practice.
- 10.10.10 The approach taken by the Project with regards to the EMF is based on a statement of compliance with existing policy and process documents that National Grid must comply with when designing projects. National Grid processes for assessing and reporting on potential EMF effects are based on the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines for *limiting exposure to EMFs* and the Department of Energy and Climate Change (DECC), *voluntary Codes of Practice*. The designs would be developed to be compliant with the requirements of the guidance.
- 10.10.11 As described in Section 10.0 EMFs are only generated by the distribution and use of equipment during the operational stage, therefore no discernible EMF generation is anticipated during the construction stage. Only the Project's operational phase (when power is being distributed) has the potential to generate EMFs. Substations and CSE compounds do not produce significant EMFs outside their operational boundaries. Underground cables produce no external electric fields, and the magnetic field falls more rapidly, falling to the levels typically found in UK homes within around 20m. Therefore, these are proposed to be **scoped out** of the ES.
- 10.10.12 Given that EMFs resulting from electrical equipment must comply with the relevant ICNIRP exposure guidelines as specified by Government and with the additional precautionary policies set out within the DECC Codes of Practice, no potential for significant effects from EMFs have been identified and an assessment of EMFs is therefore **scoped out** of the ES.
- 10.10.13 National Grid, however, recognises public concern regarding EMFs and therefore comprehensive information on EMFs and compliance of the proposed Project with the ICNIRP guidelines and requirements of NPS EN-5 would be provided in a standalone EMF report which would be submitted as part of the DCO application.

## 10.11 Proposed assessment methodology

- 10.11.1 No specific assessment methodology is proposed as a health and wellbeing chapter is proposed to be **scoped out** of the ES.

## 10.12 Proposed scope of the ES

- 10.12.1 The matters that are proposed to be scoped into and out of the assessment are summarised in Table 10.2. It is not considered that general health and wellbeing requires additional separate reporting in the ES. A health and wellbeing chapter is therefore not proposed. Where there is an interaction of the effects during construction, this would be considered within Chapter 17: Cumulative Effects, as part of the intra-Project cumulative effects assessment, this assessment would include a separate section on health and wellbeing. The matters scoped in or out of further assessment for

health and wellbeing are outlined in Table 10.2.

Table 10.2 – Matters scoped in or out of the ES

<b>Matter</b>	<b>Phase</b>	<b>Scoped in / out</b>	<b>Justification</b>
Health related environmental change (for example, air quality, noise, geology and hydrogeology, traffic and transport health related impacts)	Construction and operation	Scoped out	The potential for likely significant effects on health and wellbeing resulting from related environmental change (in air quality, noise and vibration, contaminated land (geology and hydrogeology) and traffic and transport) would be assessed and reported elsewhere in related topic chapters of the ES. The cumulative effects assessment would identify any intra-project (and inter-project) cumulative effects on receptors, this assessment would include a separate section on health and wellbeing.
EMFs	Construction	Scoped out	EMFs are associated with power distribution. As no distribution would be taking place during construction, no EMF would be generated.
	Operation	Scoped out	The Project would be designed in accordance with Government guidance and precautionary policies, thereby ensuring the Project would not generate levels of EMF to affect health. A compliance report would be submitted with the application for development consent. As the measures are embedded within the Project design, no further assessment for EMFs is required within the EIA.

\*Operation referred to above also includes maintenance.

# 11 Historic Environment

## 11.1 Approach to scoping

11.1.1 The approach to scoping has drawn from previous experience of similar projects. Determining the scope of the Historic Environment assessment has included the following stages:

- Regulatory and planning policy context
- Defining the study area
- Engagement with stakeholders
- Stating sources of data collected
- Outlining baseline conditions
- Highlighting further data to be gathered
- Outlining environmental measures
- Predicting likely significant effects
- Drafting the proposed assessment methodology
- Stating the proposed scope of the ES

11.1.2 There are interrelationships related to the potential effects on the historic environment and other environmental topics. Therefore, please also refer to the following chapters:

- Chapter 9: Geology and Hydrogeology
- Chapter 12: Hydrology and Land Drainage
- Chapter 13: Landscape and Visual
- Chapter 14: Noise and Vibration

11.1.3 This chapter should also be read in parallel with Figure 11.1 at Appendix A.

## 11.2 Regulatory and planning policy context

### National policy

11.2.1 Chapter 2: Legislation and Planning Policy Context sets out the overarching policy relevant to the Project including overarching NPS for Energy (EN-1), NPS for Electricity Networks Infrastructure (adopted EN-5) and Regulation 3 of the Infrastructure Planning (Decisions) Regulations 2010.

11.2.2 The NPS EN-1 contains the following paragraphs relating to cultural heritage which have been considered within this chapter:

- Paragraph 5.8.9 – *“Where a development site includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological interest, the applicant should carry out appropriate desk-based assessment and, where such desk-based research is insufficient to properly assess the interest, a field evaluation. Where proposed development will affect the setting of a heritage asset, representative visualisations may be necessary to explain the impact”.*



- Paragraph 5.8.12 – *“In considering the impact of a proposed development on any heritage assets, the IPC should take into account the particular nature of the significance of the heritage assets and the value that they hold for this and future generations. This understanding should be used to avoid or minimise conflict between conservation of that significance and proposals for development.”*
- Paragraph 5.8.14 – *“There should be a presumption in favour of the conservation of designated heritage assets and the more significant the designated heritage asset, the greater the presumption in favour of its conservation should be... Substantial harm to or loss of designated assets of the highest significance, including Scheduled Monuments; registered battlefields; grade I and II\* listed buildings; grade I and II\* registered parks and gardens; and World Heritage Sites, should be wholly exceptional.”*

11.2.3 NPS EN-5 provides limited guidance in relation to heritage. The only reference is at paragraph 2.8.9 in relation to looking at underground options that: the environmental and archaeological consequences (undergrounding a 400kV line may mean disturbing a swathe of ground up to 40 metres across, which can disturb sensitive habitats, have an impact on soils and geology, and damage heritage assets, in many cases more than an overhead line would).

11.2.4 Draft NPS EN1 is consistent with the current NPS in relation to the historic environment. Draft NPS EN5 does not contain any advice relating to the historic environment.

11.2.5 The Infrastructure Planning (Decisions) Regulation (2010) Regulation 3 (listed buildings, conservation areas and scheduled monuments) requires that:

- *“(1) When deciding an application which affects a listed building or its setting, the decision-maker must have regard to the desirability of preserving the listed building or its setting or any features of special architectural or historic interest which it possesses.*
- *(2) When deciding an application relating to a conservation area, the decision-maker must have regard to the desirability of preserving or enhancing the character or appearance of that area.*
- *(3) When deciding an application for development consent which affects or is likely to affect a scheduled monument or its setting, the decision-maker must have regard to the desirability of preserving the scheduled monument or its setting.”*

## Regional and local policy

11.2.6 Chapter 2: Legislation and Planning Policy Context sets out relevant regional and local policy for the Scoping Report Corridor (Mid Suffolk, South Norfolk, Babergh, Thurrock, Brentwood, Chelmsford, Braintree, Basildon, Colchester and Tendring). There are a further five Local Authorities within the 2km study area (Breckland, Ipswich, Maldon, Medway and Gravesham). There are a further three Local Authorities within the 3km study area (Epping Forest, Uttlesford and Norwich). Local policy, specific to the historic environment would be reviewed and assessments undertaken with regard to this policy in the ES.

## Guidance

11.2.7 Relevant guidance, specific to the historic environment, that has informed this Scoping Report and would inform the assessment within the ES comprises:

- Chartered Institute for Archaeologists (CIfA) (2014, updated 2020) Standard and guidance for historic environment desk-based assessment

- Cifa, IEMA, IHBC (2021) Principles of Cultural Heritage Impact Assessment in the UK
- Historic England (2008) Conservation Principles Policies and Guidance for the Sustainable Management of the Historic Environment
- Historic England (2015) Managing Significance in Decision-Taking in the Historic Environment. Historic Environment Good Practice Advice in Planning: 2
- Historic England (2017) The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3 (Second Edition)
- ICOMOS (2011) Guidance on Heritage Impact Assessments for Cultural World Heritage Properties

## 11.3 Study area

- 11.3.1 The study areas for the historic environment comprise the Scoping Report Corridor plus a 250m buffer surrounding the Scoping Report Corridor for non-designated assets. In addition, two wider study areas have been defined: the first extends 2km around the Scoping Report Corridor and is used for all designated assets; the second, comprises up to 3km from the Scoping Report Corridor for designated assets of the highest significance (scheduled monuments, grade I and II\* listed buildings and grade I and II\* registered parks and gardens). In certain locations, and in accordance with the approach for the Landscape and Visual assessment including Zone of Theoretical Visibility (ZTV), the study area may be increased, for example where topography allows for more distant views. This is to ensure that heritage assets, where their setting could be affected, are included in assessment (refer to Figure 11.1 at Appendix A).
- 11.3.2 The three study areas are considered appropriate based on the potential effects of this Project on cultural heritage assets, including consideration of physical impact and impacts arising through change to setting from tall infrastructure, the study areas and approach to ZTV for landscape and visual, professional judgement and previous experience of similar projects.
- 11.3.3 The study area for the historic environment is shown on Figure 11.1 at Appendix A. Within the ES, the Scoping Report Corridor would be refined to the proposed Order Limits.

## 11.4 Data collection

- 11.4.1 The baseline has been informed by a desk study which has drawn on the following information sources:
- Historic Environment Record (HER) data for known archaeological sites, monuments, find spots and events
  - Local authority websites have been viewed for information on locally listed buildings
  - Data sets of designations from Historic England's National Heritage List for England
  - Conservation areas have recently become available as a data download from Historic England. Data for conservation areas were cross referenced with the local authority websites to ensure accurate data was used

## 11.5 Engagement with stakeholders

11.5.1 A summary of engagement undertaken to date is presented in Table 11.1.

Table 11.1 – Summary of engagement

Organisation and date	Summary of response	Consideration in the Scoping Report
Norfolk HER, May 2022	Provided HER data for the Scoping Report Corridor, plus a 500m buffer (a 500m buffer was created to allow for future design development)	To inform baseline
Suffolk HER, May 2022	Provided HER data for the Scoping Report Corridor, plus a 500m buffer (a 500m buffer was created to allow for future design development)	To inform baseline
Essex HER, May, 22 June 2022	Provided HER data and aerial imagery for the Scoping Report Corridor, plus a 500m buffer (a 500m buffer was created to allow for future design development)	To inform baseline
Colchester HER, June 2022	Provided HER data for the Scoping Report Corridor, plus a 500m buffer (a 500m buffer was created to allow for future design development)	To inform baseline
Babergh Mid Suffolk Council, Thurrock, Norfolk County, Suffolk, Essex, Braintree Council, Chelmsford Council, Basildon, Colchester, Historic England, July 2022	The Project presented the proposed approach to scoping and methodology for historic environment assessment and baseline. Most aspects of the approach were agreed but the outstanding areas are study area and specific aspects of the proposed approach to scoping walkover survey and historic building assessment.	Further consideration is being given to the specific aspects not agreed and further engagement is planned in September to present updated approach.
Norfolk County, Suffolk, Essex, Braintree Council, Chelmsford Council, Colchester, Historic England, September 2022	The Project presented the updated approach to study areas, scoping of walkover and scoping of historic buildings, in response to feedback received at and following the previous meeting on 13 July 2022. This was largely agreed with some caveats regarding the 250m study area in specific geographic locations of the Project and some concerns regarding designated	The Scoping Report reflects the updated information presented in the meeting.

Organisation and date	Summary of response	Consideration in the Scoping Report
	assets of the highest significance beyond the 3km study area, this will be dealt with on a case-by-case basis once ZTV is available. A brief update regarding archaeological fieldwork was provided. The landscape and visual impact assessment methodology, including viewpoints, was presented.	

## 11.6 Baseline conditions (inc. future baseline)

### Designated heritage assets

11.6.1 The following designated heritage assets are situated within the study areas. These are listed below in Table 11.2, according to their location in relation to the Project, and are presented in Figure 11.1 at Appendix A:

- 76 scheduled monuments (3km study area)
- 134 Grade I listed buildings (3km study area)
- 292 Grade II\* listed buildings (3km study area)
- 3,254 Grade II listed buildings (2km study area)
- Four Grade II\* registered parks and gardens (3km study area)
- Five Grade II registered parks and gardens (2km study area)
- 63 conservation areas (2km study area)

Table 11.2 – Summary of Designated heritage assets

Designated Heritage Assets	Within Scoping Report Corridor	Between Scoping Report Corridor and 2km study area	Between 2km and 3km study area (Only assets of highest significance)
Scheduled Monuments	6	48	22
Grade I Listed Buildings	6	93	35
Grade II* Listed Buildings	18	208	66
Grade II Listed Buildings	201	3,053	-
Registered Parks and Gardens Grade I	0	0	0
Registered Parks and Gardens Grade II*	0	2	2
Registered Parks and Gardens Grade II	2	3	-
Conservation Areas	7	56	-

- 11.6.2 There are no World Heritage Sites, registered battlefields, or protected wrecks within the 3km study area.
- 11.6.3 Of the designated assets listed above 21 are listed on Historic England’s ‘Heritage at Risk Register’. These heritage assets have been identified as being at risk of being lost as a result of decay or inappropriate development. These assets have the potential to be more effected by the Project than other designated heritage assets. These are presented in Table 11.3.

Table 11.3 – Heritage assets on the ‘Heritage at Risk Register’

<b>Asset Type</b>	<b>Grade</b>	<b>Within Scoping Report Corridor</b>	<b>Outside Scoping Report Corridor, within 2km Study Area</b>	<b>Between 2km Study Area and 3km Study Area</b>
Scheduled Monuments	-	0	5	3
Listed Buildings	I	0	5	1
	II*	0	5	0
	II	0	0	0
Registered Parks and Gardens	I	0	0	0
	II*	0	0	0
	II	0	0	0
Conservation Areas	-	1	1	0

### Non-designated heritage assets

- 11.6.4 An initial examination of the data obtained for non-designated heritage assets has revealed heritage assets dating from all time periods, including multi-period sites, and many presently undated heritage assets (this could be due to lack of information or opportunity to investigate the assets). The data contains archaeological remains (in the form of findspots including those from the Portable Antiquities Scheme, crop or parch marks, features encountered during archaeological assessment or mitigation and areas where no archaeological remains have been encountered during investigation) and historic buildings.
- 11.6.5 Non-designated heritage data has been obtained from Colchester, Essex, Norfolk and Suffolk Historic Environment Records (HERs), refer to Table 11.4. This data would be fully examined and assessed during the desk-based assessment and within the ES (refer to section 11.9).
- 11.6.6 Locally listed buildings data, supplied by the HERs and local authority websites would be fully assessed during the desk-based assessment and presented in the ES (refer to section 11.9). The Project would define a non-designated historic building as one that was included on a local list held by a relevant local authority or available from HER data.
- 11.6.7 Protected lanes are located within the Essex area only. Data has been obtained from Braintree, Brentwood, Chelmsford, Colchester and Tendring Local Planning Authority websites. The rest of the Local Planning Authority areas within Essex (Basildon and Thurrock) did not contain Protected Lanes.

Table 11.4 – Non-designated heritage assets within Local Planning Authority areas

<b>Asset Type</b>	<b>Within Scoping Report Corridor</b>	<b>Outside Scoping Report Corridor, within 250m Study Area</b>
<b>South Norfolk District</b>		
Archaeology	174	122
Buildings	12	26
<b>Mid Suffolk District</b>		
Archaeology	3070	3625
Buildings	71	130
<b>Babergh District</b>		
Archaeology	99	193
Buildings	37	66
<b>Colchester District</b>		
Archaeology	132	109
Buildings	9	4
Protected Lanes	6	0
<b>Tendring District</b>		
Archaeology	27	23
Buildings	1	1
Protected Lanes	0	0
<b>Braintree District</b>		
Archaeology	133	81
Buildings	2	2
Protected Lanes	4	1
<b>Chelmsford District</b>		
Archaeology	78	69
Buildings	1	2
Protected Lanes	0	0
<b>Brentwood District</b>		
Archaeology	24	11
Buildings	1	1

<b>Asset Type</b>	<b>Within Scoping Report Corridor</b>	<b>Outside Scoping Report Corridor, within 250m Study Area</b>
Protected Lanes	1	0
<b>Basildon District</b>		
Archaeology	4	5
Buildings	0	0
Protected Lanes	0	0
<b>Thurrock District</b>		
Archaeology	91	46
Buildings	0	1
Protected Lanes	0	0

### Historic landscape

11.6.8 An initial examination of the historic landscape characterisation data, provided by the HERs, shows there are large areas of agriculture that date to the Post Medieval to Modern periods. Also noted are: commons, built or industrial areas, areas of boundary loss, meadows, parklands, woodlands (including ancient woodlands), enclosed fields (both regular and irregular) and wetlands (both managed and unmanaged). Historic landscape characterisation would be used to inform the baseline in the ES.

### Future baseline

11.6.9 The future baseline relates to known or anticipated changes to the current baseline in the future which should be assessed as part of the Project in the ES.

11.6.10 No significant changes to the future cultural heritage baseline are anticipated.

11.6.11 Further heritage assets may be recorded and/or current records may be updated during field investigation works and would be added to the assessment in the ES where relevant.

## 11.7 Further data to be gathered / processed in the ES

1.1.1 The assessment within the ES would be informed by third party data and data obtained through survey, such as:

- Archaeological reports (grey literature) on archaeological interventions within the Scoping Report Corridor as the key consideration area for archaeological potential
- Published archaeological journals and monographs, local history books and pamphlets, including local history websites as appropriate
- Historic maps, including OS, estate maps, enclosure maps, tithe maps and military plans, all available scales of OS maps would be utilised
- 2022 aerial photography
- Historic aerial photography

- LiDAR data
- Site walkover survey
- Setting assessment
- Non-intrusive evaluation
- Intrusive archaeological evaluation

11.7.1 These are outlined further in section 11.9.

## 11.8 Measures adopted as part of the Project

11.8.1 The Scoping Report Corridor has been designed to avoid as far as practicable physical impact(s) on designated heritage assets as set out in the Corridor and Preliminary Routeing and Siting Study (National Grid, 2022). In addition, undergrounding is proposed to avoid impacts to the setting of heritage assets located within the Dedham Vale AONB. Further embedded measures would be developed as the Project design evolves.

11.8.2 A range of standard measures for the Project would be adopted throughout the duration of the construction phase. Appendix B: Initial Outline CoCP outlines measures relevant to historic environment. These include but are not limited to:

- The location of known archaeological remains or areas where archaeological investigations will be undertaken (i.e., excavations) will be signposted/ fenced off to avoid unintentional damage
- Where a previously unknown heritage asset has been discovered, or a known heritage asset has proven to be more significant than foreseen at the time of application, the Project will inform the Local Planning Authority and discuss a solution that protects the significance of the new discovery, so far as is practicable within the Project parameters
- Where practicable, maintain elements within the landscape such as vegetation and hedgerows (including re-instating hedgerows, fences and walls)

11.8.3 All of these standard measures would reduce impacts on heritage assets.

11.8.4 In addition, archaeological mitigation in the form of excavation and recording are likely to be required. This would be specified through a draft Heritage Mitigation Strategy and Outline Written Scheme of Investigation (WSI) to be submitted with the ES.

## 11.9 Likely significant effects

11.9.1 This section sets out the likely significant effects of the Project on the historic environment. It assumes that the relevant embedded (design measures), standard and additional measures outlined within the Initial Outline CoCP at Appendix B, and the expected mitigation for any other consents or permits are in place before assessing the effects. This is in accordance with guidance from IEMA as part of preparing a proportional assessment (IEMA, 2022).

11.9.2 The likely significant effects of the Project have been split into:



- Archaeological remains – the material remains of human activity from the earliest periods of human evolution to the present. These may be buried trace of human activities, sites visible above ground, or moveable artefacts
- Historic buildings – architectural, designed, or structures with a significant historical value. This includes conservation areas or structures not usually thought of as buildings such as milestones and bridges
- Historic landscapes – including historic landscape character and the present landscape. These were formed by the results of the actions and interactions of natural and/or human factors. These include elements such as protected lanes and hedgerows and designated sites such as registered parks and gardens

11.9.3 Impacts on the historic environment are divided into two categories:

- Physical – the loss of, or damage to, the fabric of a heritage asset that would occur during the construction or operation of the Project
- Setting – change to the setting of a heritage asset that would impact its value which would occur during the construction or operation of the Project

11.9.4 The potential impacts resulting from the Project would either be adverse or beneficial.

## Archaeological remains

### Construction – Physical effects to archaeological remains

11.9.5 The Project has been and would continue to be developed to avoid any designated archaeological remains, therefore there would be no physical impact to these heritage assets during the construction phase. However, the construction of the underground cable, pylon bases and any temporary working areas may physically impact non-designated archaeological remains, both known and unknown.

11.9.6 The potential for direct adverse physical impacts on known and previously unrecorded non-designated archaeological remains during construction of the Project, comprises:

- Damage or destruction through removal of archaeological deposits during construction
- Damage through compaction and/or removal of topsoil during construction
- Damage through changes in groundwater flow and quality during dewatering activities during construction or through changes to groundwater due to underground structures during operation, resulting in the desiccation of waterlogged archaeological deposits. These would likely to be focused in areas of proposed trenchless crossings or deep foundations such as at the substation and the CSECs (see Chapter 9: Geology and Hydrogeology and Chapter 12: Hydrology and Land Drainage)

11.9.7 All ground works including, but not limited to, the construction of pylon bases, the underground cables, the substation, CSECs and any temporary working areas, such as access tracks, crane bases and compounds, could affect buried archaeology. Embedded measures, such as avoiding known sensitive sites, would avoid significant effects on buried archaeology of identified high importance, however, as with projects of this type, direct physical effects on non-designated buried archaeological remains would likely occur during construction. Therefore, physical effects on archaeological remains during construction are **scoped into** the ES.

### **Operation (inc. maintenance) – Physical effects to archaeological remains during operation**

- 11.9.8 There would be no physical effects on archaeological remains (designated or non-designated) anticipated during operation. If routine inspections identify the need to undertake maintenance or repairs on sub-surface features (such as an underground cable), this would be restricted to areas of ground previously disturbed and mitigated during construction activities. Therefore, physical effects on archaeological remains during operation (inc. maintenance) are proposed to be **scoped out** of the ES.

### **Construction and operation (inc. maintenance) – Effects on the setting of archaeological remains**

- 11.9.9 There would be potential for adverse impacts to the value of designated and non-designated archaeological remains due to changes to their settings during construction as a result of factors such as noise, dust or visual intrusion caused by construction activities. There would also be the potential for effects resulting from change to setting of archaeological remains during operation due to the presence of the new infrastructure and therefore these are proposed to be **scoped into** the ES for construction and operation (inc. maintenance).

## **Historic buildings**

### **Construction – Physical effects to historic buildings**

- 11.9.10 No direct physical impact on designated or non-designated historic buildings are anticipated. It is also not anticipated that adverse physical impacts on historic buildings through vibration or subsidence caused by changes to groundwater would occur. Any such effects are likely to be very localised (associated with piling or trenchless crossings). The construction vibration study area is 100m from construction activity that may generate vibration impacts, specifically piling and compaction activities that could occur at pylon bases, substation and construction compounds. The Project would be routed to avoid any physical impacts on historic buildings and this is therefore proposed to be **scoped out** of the ES. This would be kept under review as the Project design and assessment progresses and should any potential for physical impact through vibration or subsidence occur this would be scoped into assessment.

### **Operation (inc. maintenance) – Physical effects to historic buildings**

- 11.9.11 No physical impacts on designated or non-designated historic buildings are anticipated during operation (inc. maintenance), this is proposed to be **scoped out** of the ES.

### **Construction and operation (inc. maintenance) – effects on the setting of historic buildings**

- 11.9.12 There is the potential for adverse impacts on the value of designated and non-designated historic buildings due to changes to their settings during construction (as a result of intrusion caused by construction activities) and operation of the Project (due to the presence of the new infrastructure), this comprises:
- Change caused by noise, dust, or visual intrusion during construction or operation (inc. maintenance)
  - Change caused by visual severance of associated heritage assets and/or their setting during construction and operation (inc. maintenance)

- 11.9.13 There is also the potential for beneficial impacts to the setting of designated and non-designated historic buildings in areas where an existing overhead line would be removed.

- 11.9.14 Overall, there is the potential for significant adverse effects during construction and significant adverse or beneficial effects during operation (inc. maintenance) to historic buildings. Therefore, effects on the setting of historic buildings are proposed to be **scoped into** the ES.

## Historic landscape

### Construction – Physical effects to historic landscapes

- 11.9.15 There is the potential for adverse physical impacts on designated (including registered parks and gardens) and non-designated historic landscapes through physical disturbance (including dust), removal of historic landscape elements (such as hedgerows) and change of land use during construction. Therefore, physical effects to historic landscapes are proposed to be **scoped into** the assessment.

### Operation (inc. maintenance) – Physical effects to historic landscapes

- 11.9.16 There are no anticipated physical effects on designated (including registered parks and gardens) and non-designated historic landscapes during typical operational activities. If routine inspections identify the need to undertake maintenance or repairs on sub-surface features (such as an underground cable), this would be restricted to areas of ground previously disturbed and mitigated during construction activities. For this reason, this is proposed to be **scoped out** of the ES.

### Construction and operation (inc. maintenance) – effects on the setting of historic landscapes

- 11.9.17 There is the potential for adverse effects on the setting of designated (including registered parks and gardens) and non-designated historic landscapes during the construction and operation phases of the Project through the change to the setting of the heritage asset (i.e., through noise, dust, construction traffic, visual intrusion, etc). The potential effect on the setting and use of protected lanes from construction-related traffic during operation is also included.
- 11.9.18 There is also the potential for beneficial effects on the setting and cultural associations of designated and non-designated landscapes in areas where the Project or existing infrastructure would be undergrounded.
- 11.9.19 Overall, there is the potential for adverse or beneficial effects on the setting of historic landscapes (both designated and non-designated) during construction and operation. Therefore, effects on the setting on historic landscapes are proposed to be **scoped into** the ES.

## 11.10 Proposed assessment methodology

### Introduction

- 11.10.1 This section sets out the proposed methodology for the historic environment assessment of the ES. The historic environment comprises designated and non-designated archaeology, built heritage and historic landscapes, including listed buildings, conservation areas, scheduled monuments and registered parks and gardens. The assessment methodology is based on guidance set out in Section 11.1 and professional judgement. The assessment would also be informed by the landscape and visual assessment in the ES.
- 11.10.2 The assessment comprises assessing the value of the heritage asset, the magnitude of impact (change in the baseline conditions) it would experience because of the Project

and the resulting significance of effect, which is determined by comparing the value and impact. Where there is any potential for an impact to a heritage asset resulting from the Project, these assets would be assessed in full in the ES. The assessment would utilise the assessment of value assigned to heritage assets in the desk-based assessment (DBA) and an assigned magnitude of impact in line with the most up to date design information for the Project.

- 11.10.3 The contribution of the setting to the value of heritage assets would be assessed in accordance with the guidance provided in the Historic Environment Good Practice Advice Planning Note 3: The Setting of Heritage Assets (Historic England, 2017). The baseline setting would be informed through a combination of desk-based assessment of online mapping and aerial imagery, the Landscape and Visual Impact Assessment (LVIA) (including wirelines and photomontages), and the walkover and setting survey. The value of the heritage asset, assigned in the DBA, would be carried into the ES for discussion of impact and proportionate mitigation measures.
- 11.10.4 The Dedham Vale AONB is recognised as a nationally significant landscape with cultural heritage associations. The Stour Valley Project Area, although not designated (see Chapter 13: Landscape and Visual), also has important cultural associations that exist with artists such as Constable, Gainsborough, Nash, and the East Anglian School of Painting and Drawing under the direction of Sir Cedric Morris. Cultural associations would be considered within the historic landscape assessment within the ES.

### Desk-based assessment (including walkover)

- 11.10.5 A DBA would be prepared in accordance with the specification directed in the Standard and guidance for historic environment desk-based assessment (ClfA 2014, updated 2020), with the exception of the assessment of the impact of the Project and any proposed mitigation, which would be included in the ES chapter. The DBA would focus on:
- Detailing the desk-based baseline for the historic environment
  - Providing a robust assessment of the value of all heritage assets within this baseline
  - Assessing the setting of heritage assets scoped in to the assessment as per the approach below (paragraphs 11.9.14 – 11.9.19) and to what degree the setting makes a contribution to the value of the heritage asset
  - Presenting the cultural heritage baseline in the form of an appended cultural heritage gazetteer supported by figures and photographs where appropriate
- 11.10.6 As described below a targeted walkover survey would be undertaken where a need for supporting information is identified, in accordance with paragraphs 11.9.10 relating to areas scoped in for survey. The walkover would be reported in the DBA.
- 11.10.7 During completion of the DBA, engagement would be conducted with the archaeological advisors to the local planning authorities to discuss the need and scope for additional surveys which may include geophysics and / or trial trenching which would further inform the baseline and ultimately proposed mitigation.

### Site walkover approach

- 11.10.8 A targeted approach would be used for the walkover survey, with areas scoped in or out for site visits to aid a proportionate approach to assessment. Scoping of the targeted walkover focuses on areas of perceived limited modern disturbance and areas not so densely vegetated as to obscure the ground surface and local topography. The scoping

of areas to visit is data led, as a result of a desk-based information, and where ground truthing of the conditions of heritage assets would be possible.

11.10.9 The site walkover would be informed by utilising aerial imagery data from the Project commissioned aerial survey. The aerial imagery is useful as it represents the most up to date (2022) ground conditions within the Scoping Report Corridor. This would be analysed and areas identified that provide value to the baseline understanding of the Project.

11.10.10 Scoping the walkover would use a holistic understanding of the current site conditions, informed by what is visible on the aerial imagery, and recorded heritage assets, along with professional judgement. The purpose of the walkover is to add to the understanding of the historic environment conditions for the baseline and not to catalogue current ground or farming conditions i.e., if the field contains crops or livestock etc.

11.10.11 The following bullet points outline the rationale that would be applied to the process of scoping areas in or out of the walkover survey:

- Areas scoped out of survey
  - Areas of existing infrastructure, industrial complexes, private gardens, or areas of hardstanding where only observations of modern disturbance would be available on site and the character of the area has been altered. It is unlikely that areas such as these would be physically affected by the Project but even if they were, a walkover would not provide suitable information to inform impact assessment due to the previous changes to the land
  - Areas of dense woodland or thick scrubland that would be avoided by the Project and therefore not physically affected and where identification of any potential earthworks would be difficult
  - Fields which have been subject to previous archaeological investigations, such as geophysics or excavation – a walkover survey would not be able to supplement information on heritage assets supplied by intrusive fieldwork
  - Fields in very close proximity to residential properties or surrounded by woodland for a similar proportionate approach that the Project would need to provide a suitable buffer for safety. The ES would set out the approach taken on a case-by-case basis
  - Areas removed from the Project, following consultation led changes and/or refinement of design, which are not yet surveyed
- Areas scoped in for survey
  - Fields with monument records to ground truth the condition of the asset.
  - Fields within the Scoping Report Corridor in close proximity to a designated heritage asset for the purpose of supporting setting assessment
  - Fields where potential assets or activity of interest have been identified through LiDAR or the aerial imagery
  - Grassland, identified through the aerial survey, where there is a greater potential to identify any earthworks through probable limited disturbance from agricultural activity

11.10.12 Where a field does not meet one or more of the survey scoping criteria above, the field

is proposed to be **scoped out** for walkover. The study area is principally made up of arable fields. It is acknowledged that there are limitations in identifying features of archaeological interest within ploughed fields due to modern agricultural practices, which are likely to have truncated or removed above ground earthworks or other evidence of heritage assets. While it is acknowledged that artefacts brought to the surface from ploughing have the potential to provide evidence for the location of archaeological sites, the purpose of the walkover survey is to ground truth site conditions and not to conduct a systematic fieldwalking exercise.

11.10.13 The final data set of assets identified and ground truthed through walkover would be incorporated in the main baseline and gazetteer submitted as part of the ES.

11.10.14 At the time of scoping, it is unknown exactly what area would be scoped in for walkover, the exact area would be determined through the analysis of the aerial imagery and further influenced by agreement of land access.

### Historic buildings approach

11.10.15 In order to provide a proportionate assessment and due to the large number of listed buildings and non-designated historic buildings within the 2km and 3km study areas, it is proposed to apply a scoping method to determine which listed buildings would be taken forward for assessment. At this stage of the Project, it is anticipated that there would be no direct physical impacts on any listed buildings and non-designated historic buildings as a result of the Project. Therefore, this scoping exercise is based on which buildings are likely to experience any change to their settings resulting from the Project, during either construction or operation.

11.10.16 The following principles would be applied to scope listed buildings and non-designated historic buildings into or out of assessment. Any listed building and non-designated historic buildings identified as having relevant historic interest within the draft proposed Order Limits would be automatically scoped into assessment.

11.10.17 It is proposed to scope out:

- Listed buildings and non-designated historic buildings beyond the 250m study area that are outside the ZTV, as at this distance from the Project the only change to setting is likely to be visual and therefore a lack of visibility of the Project would mean that no change to setting would occur
- Listed buildings and non-designated historic buildings that are of a type that have a restricted setting due to their inherent characteristics. This group includes, but may not be limited to: milestones, gravestones/markers/tombs within churchyards
- Listed buildings and non-designated historic buildings that are located within settlements and do not have settings that extend beyond the urban area and where the Project would not introduce new infrastructure into this setting. This requires a rapid assessment to check that any listed buildings in this category with settings that extend to the Project are included in assessment. This would be done based on the listed building name and listing description, to understand its broad type, and its location (supported by review of current mapping and aerial imagery). It would be assumed that domestic buildings, shops, public houses etc have settings that are informed by their settlement location and do not extend beyond this, except where demonstrated otherwise by location information. This would also include listed buildings located within conservation areas
- Listed buildings and non-designated historic buildings that are separated from the Project by other major infrastructure (e.g., motorways, major dual carriageways,

active mainline railways) where it can be reasonably concluded that the infrastructure is a pre-existing barrier that the setting of a building would not extend beyond

- Listed buildings and non-designated historic buildings within Tilbury Docks whose function and significance is derived from the activities of the docks and do not extend beyond the geographical limits of the dockyard as the Project would not introduce new infrastructure into this setting
- Listed buildings and non-designated historic buildings that are separated from the Project by the Bramford, Norwich Main and Tilbury substations as these structures represent a significant visual impact within the setting of assets that the addition of overhead lines beyond would not create appreciable change. Cumulative likely significant environmental effects would be assessed as part of the ES
- Any other listed buildings and non-designated buildings (not already scoped out for one of the above reasons) where it is identified that their settings do not extend to the Project and therefore there would be no potential for impact. This would be identified through the assessment of setting and value in the DBA, and where/if identified these buildings would not be taken forward for impact assessment in the ES

11.10.18 The above assumptions would be kept under review to establish whether there is a need to alter the scoping out thresholds and approach taken. A reasonable proportionate approach would be adopted.

11.10.19 The buildings within the 2km and 3km study areas that are scoped out would be listed in an appendix to the DBA. Any buildings that are not scoped out for the above reasons would have their settings and value assessed and described in the DBA and would be included in impact assessment within the ES.

11.10.20 There may also be situations in which buildings outside the study areas are scoped in, including where they have a historical and/or functional relationship with a scoped in building within the study areas or where landscape and visual assessment indicates the Project would be a prominent visual feature. Listed buildings located immediately adjacent to construction vehicle access routes would be included in assessment.

## Non-intrusive evaluation

11.10.21 As discussed above, a targeted cultural heritage walkover survey would be undertaken where a need for supporting information has been identified. This may comprise walkover survey and/or site inspections at the location of specific heritage assets.

11.10.22 A Geophysical Survey would be undertaken over the location of the underground cable sections and within the footprint of the CSECs, Tendring Substation and the temporary site main compounds. If, however, the area has already been geophysically surveyed, or have had other archaeological assessment or mitigation i.e., trial trenches, excavation or watching brief conducted, then there would be no need for such surveys to be conducted again.

11.10.23 A 2022 high quality aerial photography survey (APEM) has been conducted along the Scoping Report Corridor. This provides an up-to-date birds-eye view of the present condition of the Scoping Report Corridor. Assessment of this information would be undertaken to identify previously unrecorded archaeological remains, the condition of known remains (both designated and non-designated) and the current use of the land i.e., agricultural, woodland, industrial etc.

11.10.24 The combined results of the geophysical survey and aerial photographic assessment is

considered sufficient to inform both the scope of intrusive evaluation and the ES.

## Assessment of palaeoenvironmental and geoarchaeological potential

- 11.10.25 In areas where the extent of impact during construction is likely to be deep enough to affect palaeoenvironmental and geoarchaeological deposits, for example at pits associated with trenchless crossings or deeper foundations, the records of site investigation work undertaken for geotechnical purposes would be reviewed by an appropriately qualified specialist. The results of this work would inform the need for a programme of further evaluation or mitigation during construction.
- 11.10.26 Intrusive archaeological surveys, draft Heritage Mitigation Strategy and Outline WSI,
- 11.10.27 In some cases, desk-based assessment or non-intrusive surveys may be insufficient to properly assess the archaeological potential of specific locations physically affected by the Project. In these cases, a programme of intrusive survey would be implemented, as part of a staged assessment of the archaeological potential.
- 11.10.28 The overriding aim of all fieldwork would be to target insufficient information in the baseline, as outlined in EN-1, paragraph 5.8.9 in locations that would be physically affected by the Project.
- 11.10.29 Due to the scale of the Project initial discussion with heritage consultees would be sought to discuss parameters for prioritising archaeological fieldwork to further inform the assessment of archaeological potential. It is proposed that areas of the Project that would cause the greatest impact, such as the underground cables, new substation and CSECs, would be prioritised. A strategy for proportional fieldwork would be developed in consultation with heritage consultees to also inform the baseline and further assessment of archaeological potential. Intrusive fieldwork to further inform the archaeological potential would be undertaken at the earliest available time in consultation with the heritage consultees. All available information would be included within the ES at the time of submission. There will be ongoing engagement with County Archaeologist and LPAs to agree further archaeological works, such as trial trenching.
- 11.10.30 The historic environment baseline, developed through desk-based assessment, non-intrusive and intrusive investigations, and assessment of effects on the identified heritage assets would be used to inform the development of a mitigation strategy. Proposed mitigation measures would be proportionate to the level of impact and the value of the heritage asset. A draft Heritage Mitigation Strategy and Outline WSI would be prepared as a technical appendix to the ES, to include:
- The principles of the Mitigation Strategy
  - The scope and overarching methodology of mitigation undertaken post determination
  - Commitments for proportionate post-excavation analysis, assessment, reporting and dissemination of results
  - Commitments for preparation and deposition of the site archive
- 11.10.31 It is intended that the draft Heritage Mitigation Strategy and Outline WSI would remain a live document throughout the DCO examination, to capture any changes in baseline understanding, impact and therefore required mitigation following delivery of any fieldwork results post DCO submission. However, the assessment submitted would be robust without this further work.



## 11.11 Ascribing value

- 11.11.1 The term 'value' would be used to describe the importance of a heritage asset, in preference to the term 'significance', in order to avoid confusion with the similar terminology, in particular, 'significant effects' as commonly used in EIA.
- 11.11.2 The value of a heritage asset derives from the asset's ability to illustrate one or more of the Conservation Principles, described in Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (Historic England, 2008). The contribution of setting to the significance of a heritage asset would also be considered as part of the assessment of value, as per The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3 (Second Edition) (Historic England, 2017). The following criteria in Table 11.5 would be used for assigning value:

Table 11.5 - Heritage value assessment criteria

Value	Criteria for Value
Very High	<p>Very high importance and rarity, international scale and very limited potential for substitution</p> <p>World Heritage Sites (including nominated sites) inscribed for their cultural heritage importance</p> <p>Individual attributes that convey Outstanding Universal Value of the World Heritage property</p> <p>Assets that can contribute significantly to acknowledged international research objectives</p> <p>Assets of acknowledged international importance</p> <p>Historic landscapes of international value, whether designated or not</p> <p>Extremely well-preserved historic landscapes with exceptional coherence, time depth, or other critical factors</p>
High	<p>Scheduled Monuments (including proposed sites)</p> <p>Grade I and II* Listed Buildings</p> <p>Grade I and II* Registered Parks and Gardens</p> <p>Registered Battlefields</p> <p>Protected Wrecks</p> <p>Conservation Areas containing buildings of predominantly high value.</p> <p>Non-designated assets of the quality and importance to be designated.</p> <p>Assets that can contribute significantly to acknowledged national research objectives</p>

Value	Criteria for Value
	<p>Designated or non-designated historic landscape of outstanding interest</p> <p>Non-designated landscapes of high quality and importance, and of demonstrable national value</p> <p>Well preserved historic landscapes, exhibiting considerable coherence, time depth or other critical factors</p>
Medium	<p>Grade II Listed Buildings</p> <p>Grade II Registered Parks and Gardens</p> <p>Conservation Areas containing buildings of predominantly medium value.</p> <p>Assets that contribute to regional research objectives and/or have exceptional quality in their fabric or historical associations</p> <p>Landscapes of regional value</p> <p>Averagely well-preserved historic landscapes with reasonable coherence, time depth or other critical factors</p>
Low	<p>Locally listed buildings, or those of equivalent quality in their fabric or historical associations</p> <p>Assets of local importance</p> <p>Assets compromised by poor preservation and/or poor survival of contextual associations</p> <p>Assets of limited value, but with potential to contribute to local research objectives</p> <p>Robust non-designated historic landscapes</p> <p>Historic landscapes with importance to local interest groups</p> <p>Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations</p>
Negligible	<p>Assets with very little or no surviving archaeological/historical interest</p> <p>Buildings of no architectural or historical note; buildings of an intrusive character</p> <p>Landscapes with little or no significant historical interest</p>
Unknown	<p>The importance of the resource has not been ascertained/is inaccessible</p>

## Impact magnitude

11.11.3 Where there is any potential for an impact to a heritage asset resulting from the Project

these assets would be assessed and the results presented within the ES. The assessment would use the value assigned to heritage assets in the DBA and the assign a magnitude of impact.

11.11.4 Potential impacts to heritage assets could arise from construction activity, including creation and use of access routes and traffic management, site compounds and working/storage areas, and the operational presence of the overhead line/underground cable and associated infrastructure. In addition, the potential impact of other environmental mitigation, such as ecological habitat creation or landscape planting, would be assessed for any impact to heritage assets.

11.11.5 The terminology for describing the magnitude of impact, is presented in Table 11.6.

**Table 11.6 - Criteria for quantifying the magnitude of impact to heritage assets**

<b>Magnitude of Impact (term)</b>	<b>Criteria of impact</b>
High	Change to most or all key archaeological materials, such that the resource is totally altered  Change to key historic building elements, such that the resource is totally altered  Comprehensive changes to setting of archaeology, built heritage or designated or non-designated landscapes
Medium	Changes to many key archaeological materials, such that the resource is clearly modified  Change to many key historic building elements, such that the resource is significantly modified  Changes to the setting of an historic building, such that it is significantly modified  Considerable changes to setting that affect the character of the asset or designated or non-designated landscapes
Low	Changes to key archaeological materials, such that the asset is slightly altered  Slight changes to setting  Change to key historic building elements, such that the asset is slightly different  Change to setting of an historic building, or designated or non-designated landscapes, such that that are noticeably changed
Negligible	Very minor changes to archaeological materials, or setting  Slight changes to historic building elements or setting that hardly affect it

<b>Magnitude of Impact (term)</b>	<b>Criteria of impact</b>
	Slight changes to designated or non-designated landscapes setting
No change	No change

11.11.6 Following the implementation of mitigation measures, an assessment of the magnitude of impact would follow. Mitigation measures would be proportionate to the level of impact and the value of the heritage asset. The need for a proportionate approach is outlined in the 2021 CIFA/IEMA/IHBC document which states:

*“The [CHIA] process should be proportionate to the importance of the cultural heritage assets being assessed. It should recognise the scale of the proposal and the potential magnitude of the impact (CIFA, IEMA, IHBC, 2021).”*

11.11.7 A draft Heritage Mitigation Strategy and Outline WSI would accompany the ES chapter and include required bespoke mitigation measures. It is intended that this document would remain a live document throughout the examination phase. However, the assessment submitted would be robust without this further work.

11.11.8 Additional standard mitigation measures would also be included within the outline CoCP (submitted with the DCO application) to ensure appropriate working during construction. The construction phase assessment would not include an assessment of the completed Project. The completed Project would be assessed within the operational assessment only, to avoid assessing the same impact twice.

### Significance of effect

11.11.9 The significance of effect would be expressed as a result of the value of the heritage asset and the magnitude of impact it experienced as a result of the Project. The significance would be expressed as major, moderate, minor, negligible or neutral and either adverse or beneficial. The matrix for reporting of significance of effect is outlined in Table 11.7, adapted from Heritage Impact Assessments for Cultural World Heritage Properties (ICOMOS, 2011).

Table 11.7 - Significance of effects matrix

		Value of Heritage Asset				
		Very High	High	Medium	Low	Negligible
Magnitude of impact	High	Major	Major	Major to moderate	Moderate to Minor	Minor
	Medium	Major to Moderate	Major to Moderate	Moderate	Minor	Negligible
	Low	Major to Moderate	Moderate to Minor	Minor	Negligible	Negligible
	Negligible	Minor	Minor	Negligible	Negligible	Neutral
	No Change	Neutral	Neutral	Neutral	Neutral	Neutral

11.11.10 The matrix would be used as a check to ensure that judgements on value, magnitude of impact and significance of effect are balanced, but in all cases professional judgement would be used and the value and impact judgements revisited if the significance of effect is unreasonable.

11.11.11 For the purpose of this assessment, a significant effect in EIA terms is a moderate or major effect. These significances of effect would be the primary focus of the Historic Environment ES chapter.

## 11.12 Proposed scope of the ES

11.12.1 The matters that are proposed to be scoped in and out of the assessment are summarised in Table 11.8.

Table 11.8 – Matters scoped in or out of the ES

Matter	Phase	Scoped in / out	Justification
Terrestrial archaeology – physical effects	Construction	Scoped in	There is known archaeology present within the Scoping Report Corridor and the assessment would include consideration of archaeological potential, and to consider potential impacts to yet unknown archaeological remains of all archaeological periods.
	Operation	Scoped out	There would only be a limited need for sub-surface works during operation, which would only affect ground that has previously been disturbed during the construction phase of the Project.
Terrestrial archaeology – setting and indirect effects	Construction and operation	Scoped in	The Project would introduce tall permanent structures and associated infrastructure that would change the setting of archaeological assets and potentially affect

<b>Matter</b>	<b>Phase</b>	<b>Scoped in / out</b>	<b>Justification</b>
			<p>their value during construction works and into operation.</p> <p>The potential for indirect effects to archaeology, for example through changes to groundwater, would be included in the assessment. Such effects could affect the preservation of archaeology not directly physically impacted by the Project.</p>
Built heritage – physical effects	Construction and operation	Scoped out	<p>There are no anticipated likely impacts to the physical fabric of built heritage assets. The Project does not currently propose to remove or modify any built heritage assets and effects from vibration are highly unlikely to result from the Project for built heritage during construction and operation. This would be kept under review as the Project evolves.</p>
Built heritage – setting and indirect effects	Construction and operation	Scoped in	<p>The overhead line alignment would introduce tall permanent structures and associated infrastructure that have the potential to change the setting of a built heritage asset, and therefore effect its value.</p>
Historic landscape	Construction and operation	Scoped in	<p>The construction of the Project has potential to physically impact features of the historic landscape, as well as changing the land use of historic landscape character areas during construction, both of which could affect the value of the historic landscape.</p> <p>The operation of the Project would introduce tall permanent structures and associated infrastructure that has potential to change the historic landscape, therefore affecting its value. This impact would commence during construction and continue into operation.</p>
Inter-tidal and marine archaeology	Construction and operation	Scoped out	<p>The Project would not interact with inter-tidal or marine areas and therefore there is no potential for impacts to this matter.</p>

\*Operation referred to above also includes maintenance.

11.12.2 Overall, the key considerations for heritage assets in relation to the Project comprise: the potential for physical damage to non-designated archaeological remains within the areas of underground cable and pylon construction; and the potential for change to the settings of designated and non-designated historic buildings, archaeology and the historic landscape of the area that impact the value of these assets. A staged

programme of archaeological survey, assessment and recording is proposed and would be consulted with the relevant stakeholders including Historic England and Local Planning Authorities archaeological advisors (or equivalent).

- 11.12.3 Meetings would be held with Historic England and the archaeological advisors (or equivalent) to discuss the approach to survey work, such as geophysical survey and trial trenching.

# 12 Hydrology and Land Drainage

## 12.1 Approach to scoping

12.1.1 The approach to scoping has been drawn from previous experience of similar projects. Determining the scope of Hydrology and Land Drainage has included the following stages:

- Regulatory and planning policy context
- Defining the study area
- Engagement with stakeholders
- Stating sources of data collected
- Outlining baseline conditions
- Highlighting further data to be gathered
- Outlining environmental measures
- Predicting likely significant effects
- Drafting the proposed assessment methodology
- Stating the proposed scope of the ES

12.1.2 There are interrelationships related to the potential effects on hydrology and land drainage and other environmental topics. Therefore, please also refer to the following chapters:

- Chapter 8: Ecology and Biodiversity
- Chapter 9: Geology and Hydrogeology

12.1.3 This chapter should also be read in parallel with Figure 12.1 and Figure 12.2 at Appendix A.

## 12.2 Regulatory and planning policy context

### National policy

12.2.1 Chapter 2: Legislation and Planning Policy Context sets out the overarching policy relevant to the Project including the Overarching NPS for Energy EN-1 and EN-5, which is specific to electricity networks infrastructure. EN-1 contains the following paragraphs relating to hydrology and land drainage which have been considered within this chapter:

- Paragraph 5.7.4 – *“Applicants for energy projects of 1 hectare or greater in Flood Zone 1 in England and all proposals for energy projects located in Flood Zones 2 and 3 should be accompanied by a FRA”*
- Paragraph 5.15.2 – *“Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent.”*



- Paragraph 5.15.5 - *“The IPC will generally need to give impacts on the water environment more weight where a project would have an adverse effect on the achievement of the environmental objectives established under the Water Framework Directive.”*
- Paragraph 5.15.6 – *“The IPC should satisfy itself that a proposal has regard to the River Basin Management Plans and meets the requirements of the Water Framework Directive (including Article 4.7) and its daughter directives, including those on priority substances and groundwater. The specific objectives for particular river basins are set out in River Basin Management Plans. The IPC should also consider the interactions of the proposed project with other plans such as Water Resources Management Plans and Shoreline/Estuary Management Plans.”*

12.2.2 In relation to flood risk EN-1 sets out at paragraph 5.7.9 that “In determining an application for development consent, the IPC should be satisfied that where relevant:

- *The application is supported by an appropriate FRA*
- *The Sequential Test has been applied as part of site selection*
- *A sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk*
- *The proposal is in line with any relevant national and local flood risk management strategy*
- *Priority has been given to the use of Sustainable Drainage Systems (SuDS) (as required in the next paragraph on National Standards)*
- *In flood risk areas the project is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed over the lifetime of the development.”*

12.2.3 The policy set out in draft NPS EN-1 is substantially the same as the above and so is not expanded on further herein.

12.2.4 NPS EN-5 covers resilience to climate change and the need to look to design for flood resilience:

- *Paragraph 2.6.1 – “substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change”*
- *Paragraph 2.4.2 – “advises that the resilience of a project to climate change should be assessed in the ES accompanying an application”. Also stating that “future increased risk of flooding would be covered in any flood risk assessment”.*

12.2.5 There is nothing significantly different within Draft EN-5.

## Regional and local policy

12.2.6 Chapter 2: Legislation and Planning Policy Context sets out relevant regional and local policy.

## Guidance

12.2.7 Relevant guidance, specific to hydrology and land drainage, that has informed this Scoping Report and would inform the assessment within the ES, comprises:

- Advice Note 18: Water Framework Directive Assessments (Planning Inspectorate, 2017)
- Various Construction Industry Research and Information Association publications that provide construction good practice for preventing pollution of the water environment, for example, C532: Control of water pollution from construction sites
- Design Manual for Roads and Bridges (DMRB) LA 113: Road drainage and the water environment (National Highways, 2020)

## 12.3 Study area

- 12.3.1 The study area for hydrology and land drainage includes the area directly affected by the Project, extending to a 500m buffer around the Scoping Report Corridor (which would be reduced to 500m around the proposed Order Limits within the ES). This is considered an appropriate study area based on technical knowledge of similar projects and consideration of the distances over which potential significant effects can reasonably be expected to occur. The study area for hydrology and land drainage is presented on Figure 12.1 at Appendix A.
- 12.3.2 The FRA, that would be prepared to inform the ES and the design, may include for a larger study area where necessary, for example, to assess the potential for changes to baseline flood risk within a floodplain cell, which could cover several square kilometres.
- 12.3.3 The Water Framework Directive (WFD) Screening assessment would include a study area that is set at the water body scale and include all those WFD waterbodies with the potential to experience deterioration because of project activities.

## 12.4 Data collection

- 12.4.1 The baseline assessment has been informed by a desk study which has drawn on the following information sources:
- OSmapping, aerial mapping and Magic Maps (Defra, 2022)
  - Main River map for England (Environment Agency, 2019)
  - Catchment data explorer database of Cycle 2 and 3 WFD information (Environment Agency, 2020)
  - River Basin Management Plan (Environment Agency, 2018)
  - Long term flood risk map for England (Environment Agency, 2022)
  - The Flood Map for Planning (Environment Agency, 2022)
  - The Historic Flood Map (Environment Agency, 2022)

## 12.5 Engagement with stakeholders

- 12.5.1 A summary of engagement undertaken to date is presented in Table 12.1.

Table 12.1 – Summary of engagement

Organisation and date	Summary of response	Consideration in the Scoping Report
<p>Thematic meeting held with Environment Agency and host planning authorities, 7 July 2022</p>	<p>There is need to consider flood risk and for the Project to be subject to a site-specific flood risk assessment with particular focus on management of surface water drainage.</p> <p>There is a need to consider effects on ground water and aquifers and groundwater as a source of flood risk should be scoped into the FRA.</p> <p>More current policy guidance and good practice should be applied as the published EN-1 is out of date.</p> <p>The Project design and assessments should accommodate the most recent Environment Agency climate change guidelines.</p> <p>Approach to baseline data collection was discussed. Data requests should be submitted to the Environment Agency and the Local Planning Authorities and Internal Drainage Boards (IDB), to provide further information to support the future assessment.</p>	<p>A standalone FRA would be prepared.</p> <p>Chapter 9: Geology and Hydrogeology provides further details of the proposed scope of assessment on groundwater and aquifers. Groundwater flooding is included within the proposed scope of the FRA.</p> <p>The requirements of the consultation draft of EN-1 would be considered, alongside the National Planning Policy Framework (NPPF) and guidance from the Planning Inspectorate with regard to WFD assessments.</p> <p>Noted. These guidelines (most recently updated in May 2022) would be applied.</p> <p>Data requests would be submitted.</p>

## 12.6 Baseline conditions (inc. future baseline)

### Surface water features

- 12.6.1 The study area crosses through the catchments of numerous watercourses and spans two WFD (RBD), namely the Thames and Anglian RBDs. Water features within the study area range in scale. Examples of large Environment Agency main rivers that are regionally important include the River Tas in Norfolk, the River Waveney that drains parts of Norfolk and Suffolk, the River Gipping in Suffolk and the River Stour on the borders of Essex and Suffolk. These watercourses support several services, including

water supply, receipt and dilution of wastewater discharges, navigation and amenity.

12.6.2 Many small watercourses and drainage ditches, that function at the local scale, are located throughout the study area. In specific areas these features are managed to facilitate land drainage and control flood risk by the East Suffolk, Norfolk Rivers and Waveney, Lower Yare and Lothingland IDBs.

12.6.3 Other water features within the study area include numerous ponds and small reservoirs. Examples include Needham Lake in the River Gipping catchment, several waterbodies in the Belstead Brook catchment and alongside the River Stour, Ardleigh Reservoir and waterbodies at Mucking Marshes in East Tilbury. Sites designated for their nature conservation interest, where surface waters play a role in sustaining the designated interest features, are also important receptors. Assessment of effects on such sites would be undertaken in collaboration with ecology and groundwater specialists.

12.6.4 Water features are illustrated in Figure 12.1 at Appendix A and an overview of the baseline water quality, and flood risk is provided in the paragraphs that follow.

## Water quality and water interests

12.6.5 Within the Thames RBD the study area passes through the Mardyke operational catchment. WFD surface waterbodies in this catchment are designated as heavily modified waterbodies and achieve moderate overall status. Ecological quality is limited in some watercourses by biological quality elements and poor physico-chemical quality, notably phosphate exceedance, is common. The rivers share a chemical status of 'fail' due to exceedances for priority hazardous substances, in particular mercury and its compounds, as well as Polybrominated diphenyl ethers (PBDE).

12.6.6 The study area passes through several operational catchments in the Anglian RBD. The majority of watercourses are designated as heavily modified and share 'moderate' or 'poor' overall status. Most rivers are failing with regard to chemical status due to exceedances for priority hazardous substances. The exception is the Jordan (East Suffolk) waterbody which is at 'good' status. Reasons for not achieving 'good' status are shared by many of the watercourses, and include pollution from rural areas, and from wastewater discharges. Reasons for not achieving 'good' status are shared by many of the watercourses, and include pollution from rural areas, and from wastewater discharges.

12.6.7 Several of the watercourses in the study area support water interests, supplying licensed abstractions for water supply to agricultural, industrial, and potable uses. Numerous watercourses also receive, dilute and transport permitted wastewater discharges.

## Flood risk and land drainage

12.6.8 Based on the online Flood Maps (Environment Agency, 2021), the majority of the study area is at low risk of flooding from rivers (in Flood Zone 1) as shown on Figure 12.2 at Appendix A. Most watercourses that flow through the study area have narrow floodplains, represented by Flood Zones 2 and 3. Watercourses with more extensive floodplains include the River Colne, River Stour and River Blackwater, as well as the River Gipping, River Waveney, River Blackwater, River Chelmer and River Wid. There is also an area of floodplain in Tilbury, which is associated with the River Thames. However, this floodplain is prevented from regular inundation by flood defences along the Thames frontage, which provide a high standard of flood protection.

12.6.9 The land drainage regime is governed by the topography and the permeability of

underlying soils and geology. Formal (piped) drainage systems include those serving existing roads and areas of urban development. Agricultural land is also expected to be served by piped and open drainage systems.

## Hydromorphology

- 12.6.10 Many of the watercourses in the study area have been subject to modifications for the purposes of land drainage and flood defence and have a WFD designation of 'Heavily Modified Water Body' (HMWB). The ordinary watercourses in the study area, particularly those within IDB districts, also serve a land drainage function and have a relatively low hydromorphological diversity.

## Future baseline

- 12.6.11 The future baseline relates to known or anticipated changes to the current baseline in the future which should be assessed as part of the Project in the ES.
- 12.6.12 With regard to flood risk and land drainage, future baseline conditions would be forecast, drawing on current best practice guidelines (Environment Agency, 2021 and 2022) taking into account the likely impacts of climate change on rainfall intensities, and where applicable peak river flows and sea level risk. These future conditions would be considered to factor in climate change resilience into the Project design, with regards managing surface water runoff and at any substations and CSECs situated in the floodplain.
- 12.6.13 The implementation of future cycles of WFD management plans driving future improvements in the ecological and chemical quality of water bodies would also be considered when assigning value to hydrology and land drainage resources and receptors.
- 12.6.14 The effects of known future development that share the same hydrological catchments as the study area would also be considered, in terms of the potential for these developments to impact on the status of water receptors.

## 12.7 Further data to be gathered / processed in the ES

- 12.7.1 The assessment within the ES would be informed by third party data and surveys. This would include:
- Field notes and photographs collected during, for example ecology surveys, to characterise attributes such as the hydromorphology of watercourses to be crossed, in addition to the high-resolution aerial imagery
  - Flood data from Environment Agency flood models
  - Drainage and flood data from Local Authority Surface Water Management Plans and Strategic Flood Risk Assessments
  - Further water quality data from the Environment Agency archive (Environment Agency, 2018)
  - Data defining surface water catchment areas and hydrological properties (e.g. rainfall, slopes, and soil permeability) from the Flood Estimation Handbook webservice (CEH, 2008)
  - Environment Agency data to characterise using surface water interests (abstractions and discharges)

## 12.8 Measures adopted as part of the Project

12.8.1 The Scoping Report Corridor has been designed to avoid as far as practicable sensitive hydrology and land drainage features as set out in the Corridor and Preliminary Routeing and Siting Study (National Grid, 2022). This includes avoiding international sites designated for nature conservation, including those with a supporting water interest, avoiding as far as practicable reservoirs, large ponds, minimising disruption to small watercourses and ditches, and where necessary crossing rivers at the narrowest point to reduce changes to hydromorphology. Further embedded design measures would be developed as the Project design evolves.

12.8.2 A range of standard measures for the Project would be adopted throughout the duration of the construction phase. Appendix B: Initial Outline CoCP outlines measures relevant to hydrology and land drainage. These include but are not limited to:

- Fuels, oils and chemicals would be stored responsibly, away from sensitive water receptors. Where practicable, they would be stored >15m from watercourses, ponds and GWDTE. Where it is not practicable to maintain a >15m distance, additional measures would be identified
- All refuelling, oiling and greasing of construction plant and equipment would take place above drip trays and also away from drains as far as is reasonably practicable
- Vehicles and plant would not be left unattended during refuelling
- Appropriate spill kits would be made easily accessible
- Potentially hazardous materials used during construction would be safely and securely stored including use of secondary containment where appropriate
- Stored flammable liquids such as diesel would be protected either by double-walled tanks or stored in a bunded area with a capacity of 110% of the maximum stored volume
- Runoff across work sites would be controlled by the use of a variety of methods including header drains, buffer zones around watercourses, on-site ditches, silt traps and bunding. There would be no intentional discharge of site runoff to ditches, watercourses, drains or sewers without appropriate treatment and agreement of the appropriate authority (except in the case of an emergency)
- Wash down of vehicles and equipment would take place in designated areas within construction compounds. Wash water would be prevented from passing untreated into watercourses
- Wheel washing would be provided at each main compound access point on to the highway. An adequate supply of water would be made available at these locations at all times. Road sweepers would be deployed on public roads where necessary to prevent excessive dust or mud deposits
- An Emergency Action Plan would be developed for the construction phase which would outline procedures to be implemented in case of unplanned events, including but not limited to site flooding and pollution incidents
- For open cut watercourse crossings and installation of vehicle crossing points, good practice measures would include but not be limited to:

- Where practicable, reducing the working width for open cut crossings of a main or ordinary watercourse whilst still providing safe working; and reinstating the riparian vegetation and natural bed of the watercourse, using the material removed when appropriate on completion of the works and compacting as necessary
- Installation of a pollution boom downstream of open cut works
- The use and maintenance of temporary lagoons, tanks, bunds, silt fences or silt screens as required
- Have spill kits and straw bales readily available at all crossing points for downstream emergency use in the event of a pollution incident
- The use of all static plant such as pumps in appropriately sized spill trays
- Prevent refuelling of any plant or vehicle within 15m of a watercourse
- Prevent storing of soil stockpiles within 15m of a main river
- Inspect all plant prior to work adjacent to watercourses for leaks of fuel or hydraulic fluids
- Reinstating the riparian vegetation and natural bed of the watercourse, using the material removed when appropriate, on completion of the works and compacting as necessary. If additional material is required, appropriately sized material of similar composition will be used
- Riverbank and in-channel vegetation would be retained where not directly affected by installation works. Natural substrate would be provided through temporary watercourse crossings box culverts
- Active private water supplies will be identified with landowners through the landowner discussions. Appropriate measures will be considered during construction. In the event of a landowner or tenant reporting that installation activities have affected their private water supplies, an initial response will be provided within 24 hours. Where the installation works have affected a private water supply, an alternative water supply will be provided, as appropriate.
- In the event of a significant spill during construction, all relevant landowners/tenants will be contacted in proximity of the spill, to determine if there are any private water supplies that might be affected; an assessment of the likelihood of groundwater contamination reaching identified private water supplies will be undertaken, and where a private water supply is judged likely to be affected, an alternative water supply will be provided, as appropriate
- Where a main river is crossed by a trenchless crossing, the cables will be laid at least 1m below the hard bed level of the river and will remain at or below this level for a distance of not less than 3m from the brink of the riverbank before rising at a slope no greater than 1 vertical in 1.5 horizontal. Marker posts shall also be positioned on each bank of the river to indicate the location of the under-crossing and the nature of the works
- Where construction activities to place in Flood Zone 3, construction compounds would be laid out in accordance with the Sequential Test and incorporate flood resilience measures where necessary. Storage of construction equipment and materials would be done in such a way as to avoid forming barriers to floodplain flows

- Surface water runoff from operational above ground infrastructure would be managed in accordance with the requirements and standards of the relevant Lead Local Flood Authority (LLFA), and adopt suitable sustainable drainage techniques, designed to allow for climate change resilience

12.8.3 Other consents and licences required associated with hydrology and land drainage comprise:

- Flood Risk Activity Permits for works to main river watercourses
- Ordinary Watercourse or Land Drainage consents for works with the potential to impeded flow in ordinary watercourses

12.8.4 If abstraction of surface water is necessary to supply water for construction activities, depending on the volumes and durations involved, an abstraction licence from the Environment Agency may be required.

## 12.9 Likely significant effects

12.9.1 This section sets out the likely significant effects of the Project on hydrology and land drainage. It assumes that the relevant embedded (design measures), standard measures outlined within the Initial Outline CoCP at Appendix B, and the expected mitigation for any other consents or permits are in place before assessing the effects. This is in accordance with guidance from IEMA as part of preparing a proportional assessment (IEMA, 2022).

### Water quality

#### Construction

12.9.2 Good practice standard mitigation measures within the outline CoCP (submitted with the DCO application) would reduce the risk of pollution to hydrology and land drainage receptors during construction by removing the pathway between the source and the receptors for most of the working environment.

12.9.3 The most sensitive sites regarding pollution risk are where underground cables cross watercourses using open cut methods, with a reduced risk where crossings are facilitated by trenchless techniques. There are also locations where temporary crossings would be required for access across watercourses during construction, which could include the locations of OHL. Works would follow the good practice measures set out within the outline CoCP (submitted with DCO application). In addition, any works within watercourses and the construction of accesses over the top of watercourses, would need to be undertaken with the conditions set out within the consents and permits from the relevant authorities. With the implementation of standard mitigation measures, no likely significant effects are anticipated, however at this early stage it is proposed to **scope in** the ES.

#### Operation (inc. maintenance)

12.9.4 During operation of the Project, pollution impact pathways to surface watercourses would be very limited. This is because land would be reinstated following completion of construction works and there would be no operational discharges to surface watercourses, other than surface water drainage from sub-stations. Physico-chemical elements supporting WFD water body status would therefore be safeguarded. Maintenance activities would be undertaken in accordance with National Grid's operational management procedures. No likely significant effects on water quality are therefore anticipated, and it is proposed that this aspect is proposed to be **scoped out**



of the ES.

## Surface water interests

### Construction

- 12.9.5 Given the nature of the Project, during its construction there would be no new large scale consumptive water uses and no effects on the downstream continuity of flow in watercourses. The potential for likely significant effects on existing water interests (surface water abstractions and discharges) is negligible. No likely significant effects on water interests during construction are anticipated and this aspect is proposed to be **scoped out** of the ES.

### Operation (inc. maintenance)

- 12.9.6 Given the nature of the Project, during its operation there would be no new consumptive water uses and no effects on the downstream continuity of flow in watercourses. The potential for likely significant effects on existing water interests (surface water abstractions and discharges) is negligible. Likely significant effects on water interests during operation (inc. operation) are not anticipated and it is proposed to be **scoped out** this aspect from the ES.

## Hydromorphology

### Construction

- 12.9.7 During construction of the Project, there would be potential for temporary physical disturbance to the beds and banks of watercourses, as well as wider river bank corridors, for example at crossings for construction access, and where underground cable sections of the Project would cross watercourses. Impacts would only occur during construction of the crossing and would be relatively short-term in duration. However, depending on the crossing technique, temporary effects have the potential to be significant and this aspect is proposed to be **scoped into** the ES.

### Operation (inc. maintenance)

- 12.9.8 Crossing designs would be discussed with the Environment Agency and LLFAs in advance of construction, and pre-application advice would be sought to ensure designs meet with the likely conditions of the consents applicable to works on main river (Flood Risk Activity Permits) and ordinary watercourses. Such conditions may include, for example, the depth of cover between watercourse bed levels and the cable in underground sections, excavation set back distances from river banks and freeboard (a factor of safety) between water levels and crossing structure soffits. Watercourses would be reinstated following construction, including reinstatement of the river corridor vegetation and natural bed. Once the watercourses are reinstated, there would be no likely significant effects on hydromorphology during operation and therefore it is proposed to be **scoped out** of the ES.

## Flood risk and drainage

### Construction

- 12.9.9 As described in Section 12.6 whilst most of the study area is at low risk of flooding from rivers and the sea, the Project would cross watercourses with relatively extensive floodplains including the River Colne, River Stour and River Blackwater. There is also an area of floodplain in Tilbury, which is associated with the River Thames, albeit this is afforded protection from regular inundation by existing flood defences. During construction there is the potential for the Project to increase flood risk through the creation of soil stockpiles and temporary works e.g., haul routes and compounds could

result in the temporary loss of floodplain storage or impede flood flows. Flood risk from rivers and the sea is therefore proposed to be scoped in during construction.

### **Operation (inc. maintenance)**

- 12.9.10 During operation most land required for construction would be returned to its pre-construction land use and so impacts on rivers and their floodplains across the Project are likely to be limited. However, there is potential for permanent above ground infrastructure in Flood Zone 3, for example at Tilbury, so this aspect is proposed to be **scoped in** at this early stage, subject to further detailed assessment.
- 12.9.11 Given the size of the Project and the requirements set out within the NPS, a Flood Risk Assessment would be produced.
- 12.9.12 With regard to other sources of flood risk:
- Surface water: Environment Agency mapping shows high areas of surface water flood risk within the study area and the Project has potential to cause temporary and permanent changes to impermeable land cover and to temporarily disrupt existing land drainage routes during construction. It is proposed to **scope in** this form of flood risk for both construction and operation (inc. maintenance)
  - Tidal flooding: the Project at its southern limits is located within the defended floodplain of the River Thames, which is tidally dominated in the study area. It is therefore proposed to **scope in** this form of flooding into the FRA for both construction and operation (inc. maintenance)
  - Groundwater flooding: whilst excavations for buried cable sections of the Project would be shallow, piling for pylon foundations may be required and so this aspect is proposed to be **scoped in** for both construction and operation (inc. maintenance)
  - Other sources (sewers, reservoirs): given the nature of the Project it is of low vulnerability to flooding from other sources and has limited potential to impact on flood risk from these sources. It is therefore proposed to **scope out** these forms of flooding for both construction and operation (inc. maintenance)

## **12.10 Proposed assessment methodology**

- 12.10.1 This section sets out the proposed methodology for the hydrology and land drainage assessment of the ES. This is based on guidance set out in the DMRB LA 113: Road Drainage and the Water Environment (National Highways, 2020).
- 12.10.2 In addition, guidance included within various Construction Industry Research and Information Association (CIRIA) publications would be considered. These publications set out current good practice measures to avoid and reduce construction impacts on surface water resources. Local flood risk management guidelines published by the host County Councils would also be referenced including:
- Essex Local Flood Risk Management Strategy and SuDS Design Guide (Essex County Council, 2020)
  - Norfolk Local Flood Risk Management Strategy (Norfolk County Council, 2015)
  - Suffolk Local Flood Risk Management Strategy and its accompanying SuDS Design Guide (Suffolk County Council, 2016)
  - Thurrock Local Flood Risk Management Strategy (Thurrock Council, 2015)

- 12.10.3 The FRA would be produced in accordance with the National Planning Policy Framework Flood Risk and Coastal Change Planning Practice Guidance, as well as with reference to 'Flood resilience and resistance for critical infrastructure' (CIRIA, 2010). The FRA would review baseline flood risk to the Project from all relevant sources during its construction and recommend measures to manage risks and prevent temporary increases in flooding on third party lands. The assessment would also review the potential for any effects on the integrity of existing Environment Agency flood defence assets. Where permanent above ground infrastructure is proposed, the FRA would consider flood risk over the lifetime of these assets, incorporating allowance for climate change in accordance with published guidance<sup>11</sup>, and would document proposals for the management of rainfall runoff from areas of new impermeable land cover. The FRA would be informed by data from existing Environment Agency flood models. Given the nature of the Project, no flood risk modelling is anticipated to be necessary at this stage, however this would be reviewed at later stages.
- 12.10.4 A WFD Screening Assessment would also be produced for the Project guided by Planning Advice Note Eighteen: The Water Framework Directive (Planning Inspectorate, 2017). The effects of the Project on the Thames and Anglian River Basin Management Plan (RBMPs) and the water bodies within the study area would be described, and the assessment would set out how the Project design has been developed to align with the requirements of the Directive.
- 12.10.5 It is proposed that the WFD Screening Assessment is informed by published Environment Agency data sources and data collected for the ES, for example, from ecology surveys and field notes. The assessment would identify the embedded, standard and additional mitigation measures proposed by the project to avoid deterioration of WFD waterbodies.
- 12.10.6 Given the geographical scale of the Project it is intended that baseline data collection and subsequent assessments would be targeted, focusing on collecting data for receptors where source-pathway linkages are identified. It is considered that this approach would result in proportionate EIA, FRA and WFD assessments.

### Ascribing value / sensitivity

- 12.10.7 Hydrology and land drainage receptors have been identified within the study area and the attributes and the services that these water bodies provide have been characterised using the baseline datasets collected to date. This information, supplemented by further desk study and review, would be used to assign to receptors one of the value (sensitivity) categories defined in Table 12.2. These values are based on Table 3.70 of LA 113 (National Highways *et al.*, 2020).

**Table 12.1 – Criteria for determining value / sensitivity**

<b>Sensitivity/Value</b>	<b>Criteria</b>
Very high	Nationally significant attribute of high importance. Examples: Watercourse having a WFD classification shown in a River Basin Management Plan (RBMP) and Q95 ≥ 1.0m <sup>3</sup> /s. Site protected under European legislation whose designated interest is dependent on the hydrological/surface water regime e.g. (SACs, SPA, Ramsar site)

<sup>11</sup> [Flood risk assessments: climate change allowances - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/542222/flood_risk_assessments_climate_change_allowances.pdf)

<b>Sensitivity/Value</b>	<b>Criteria</b>
	Land uses defined as essential infrastructure or highly vulnerable development under the NPPF, for example transport routes, electricity generating power stations and grid and primary substations, emergency services stations and basement dwellings. River supporting a regionally important abstraction for potable water supply.
High	Regionally significant attribute of high importance. Examples: Watercourse having a WFD classification shown in a RBMP and Q95 <1.0m <sup>3</sup> /s. Site protected under UK legislation whose designated interest is dependent on the hydrological/surface water regime e.g. SSSIs, NNRs, Local Wildlife Site (LWS), salmonid waters*. Land uses defined as 'more vulnerable' under the NPPF, e.g. residential dwellings and educational establishments. River supporting a locally important abstraction for potable water supply.
Medium	Locally significant, of moderate quality and rarity. Examples: Watercourses not having a WFD classification shown in a RBMP and having a Q95 >0.001m <sup>3</sup> /s. Land uses defined as 'less vulnerable' under the NPPF e.g., buildings used for shops, offices and general industry. River supporting abstraction for non-potable water supply at the local scale.
Low	Lower quality. Examples: Watercourses not having a WFD classification shown in a RBMP and Q95 ≤0.001m <sup>3</sup> /s. Land uses defined as water compatible e.g., docks, marinas and water transmission infrastructure.

## Impact magnitude

12.10.8 The criteria for assigning impact magnitude, summarised in Table 12.3 (drawn from Table 3.71 of DMRB, LA 113 (National Highways, 2020)), consider the scale/ extent of the predicted change and the nature and duration of the impact. Whilst examples of each category of impact magnitude are provided in the guidance, professional judgement would be applied in assigning a magnitude of impact.

**Table 12.3 – Criteria for determining magnitude**

<b>Magnitude</b>	<b>Description</b>
Large	Loss or extensive change to a fishery. Loss of regionally important public water supply. Reduction in water body WFD classification. Increase in peak flood level (>100mm).
Moderate	Partial loss in productivity of a fishery. Degradation of regionally important public water supply or loss of major commercial/ industrial/agricultural supplies.

<b>Magnitude</b>	<b>Description</b>
	Contribution to reduction in water body WFD classification. Increase in peak flood level (>50mm).
Small	Potential for a low risk of pollution. Increase in peak flood level (>10mm).
Negligible	No measurable change to baseline surface water quality or WFD water body status. Negligible change to peak flood level ( $\leq \pm 10$ mm).

## Significance

- 1.1.2 Significance would be derived using the matrix set out in Table 5.1 of Chapter 5: EIA Approach and Method. This may be supplemented by professional judgement, which would be explained to give the rationale behind the predicted effect(s). Likely significant effects, in the context of the EIA Regulations 2017 would be effects of moderate or greater significance.
- 1.1.3 Overall significance would also be concluded for each aspect of hydrology and land drainage, taking into consideration the potential for the Project to affect more than one attribute of a particular water body.

## 12.11 Proposed scope of the ES

- 12.11.1 The matters scoped in or out of further assessment for hydrology and land drainage are outlined in Table 12.4.

Table 12.4 – Proposed scope of the ES

<b>Matter</b>	<b>Phase</b>	<b>Scoped in / out</b>	<b>Justification</b>
Effects on surface water quality	Construction	Scoped in	Project wide but particularly at temporary watercourse crossings by haul routes or in cable sections, and local to areas of topsoil stripping and excavations.
	Operation	Scoped out	No likely significant effects as no operational discharges would be generated and surface water drainage from operational infrastructure would be managed using suitable SuDS.
Hydromorphology of watercourses	Construction	Scoped in	Project wide but particularly at temporary watercourse crossings by haul routes or in sections of cable.
	Operation	Scoped out	No likely significant effects as once the Project is installed and land temporarily affected is re-instated, there would be no disturbance to the beds, banks, flow regimes or riparian corridors of watercourses.
	Construction	Scoped in	There are working areas in fluvial Flood Zone 3, particularly in proximity to the River

<b>Matter</b>	<b>Phase</b>	<b>Scoped in / out</b>	<b>Justification</b>
Flood risk from rivers and the sea			Stour, the River Colne. Areas of the Project at Tilbury are in the defended tidal floodplain. Works have the potential to temporarily disrupt river flow and floodplain flow regimes.
	Operation	Scoped in	Most land required for construction would be returned to its pre-construction land use and so impacts on rivers and their floodplains across the Project are likely to be limited. However, there is potential for permanent above ground infrastructure in Flood Zone 3, for example at Tilbury, so this aspect is proposed to be scoped in at this early stage, subject to further detailed assessment.
Flood risk from surface water and effects on the land drainage regime	Construction and Operation	Scoped in	The Project has potential to cause temporary and permanent changes to impermeable land cover and potential for temporary disruption to existing land drainage routes during construction.
Flood risk from groundwater	Construction and Operation	Scoped in	Whilst excavations for cable sections of the Project would be shallow, piling for pylons may be required and so this aspect is proposed to be scoped in at this early stage.
Flood risk from other sources (sewers, artificial waterbodies)	Construction and Operation	Scoped out	Given the nature of the Project (OHL and buried cable), it is of low vulnerability to flooding from other sources and has limited potential to impact on flood risk from these sources.
Existing water interests (abstractions and discharges)	Construction and Operation	Scoped out	No likely significant effects on flow availability in watercourses supporting existing water interests.

\*Operation referred to above also includes maintenance.

# 13 Landscape and Visual

## 13.1 Approach to scoping

13.1.1 The approach to scoping has drawn on previous experience of similar projects. Determining the scope of the LVIA has included the following stages:

- Regulatory and planning policy context
- Defining the study area
- Engagement with stakeholders
- Stating sources of data collected
- Outlining baseline conditions
- Highlighting further data to be gathered
- Outlining environmental measures
- Predicting likely significant effects
- Drafting the proposed assessment methodology
- Stating the proposed scope of the ES

13.1.2 There are interrelationships between the landscape and visual chapter and other environmental topics. Therefore, please also refer to the following chapters:

- Chapter 8: Ecology and Biodiversity
- Chapter 11: Historic Environment
- Chapter 15: Socio-economics, Recreation and Tourism
- Chapter 16: Traffic and Transport

13.1.3 This chapter should be read in parallel with Figures 13.1 and 13.2 at Appendix A, together with the following appendices:

- Appendix G: Key Characteristics of Landscape Character Areas and Types
- Appendix H: Preliminary Viewpoints
- Appendix I: Landscape and Visual Impact Assessment Methodology
- Appendix J: Arboricultural Strategy

## 13.2 Regulatory and planning policy context

### National policy

13.2.1 Chapter 2: Legislation and Planning Policy Context sets out the overarching policy relevant to the Project including overarching NPS for Energy (EN-1) and NPS for Electricity Networks Infrastructure (EN-5). EN-1 together with the draft EN-1 set out broad guidance in relation to landscape and visual effects at section 5.9 and detail what a landscape and visual assessment should cover. EN-5 contains more specific guidance. The following paragraphs from EN-5 relates to landscape and visual impact

assessment and have been considered within this chapter:

- Paragraph 2.8.2 - *“Government does not believe that development of overhead lines is generally incompatible in principle with developers’ statutory duty under section 9 of the Electricity Act to have regard to amenity and to mitigate impacts (see paragraph 2.2.6 above). In practice new above ground electricity lines, whether supported by lattice steel towers/pylons or wooden poles, can give rise to adverse landscape and visual impacts, dependent upon their scale, siting, degree of screening and the nature of the landscape and local environment through which they are routed. For the most part these impacts can be mitigated, however at particularly sensitive locations the potential adverse landscape and visual impacts of an overhead line proposal may make it unacceptable in planning terms, taking account of the specific local environment and context. New substations, sealing end compounds and other above ground installations that form connection, switching and voltage transformation points on the electricity networks can also give rise to landscape and visual impacts. Cumulative landscape and visual impacts can arise where new overhead lines are required along with other related developments such as substations, wind farms and/or other new sources of power generation.”*
- Paragraph 2.8.3 - *“Sometimes positive landscape and visual benefits can arise through the reconfiguration or rationalisation of existing electricity network infrastructure.”*

13.2.2 Draft EN-5 contains the following relevant policy relating to landscape and visual effects:

- Paragraph 2.11.20 – *“The Secretary of State should also have special regard to nationally designated landscapes, where the general presumption in favour of overhead lines should be inverted to favour undergrounding. Away from these protected landscapes, and where there is a high potential for widespread and significant landscape and/or visual impacts, the Secretary of State should also consider whether undergrounding may be appropriate, now on a case-by-case basis, weighing the considerations outlined above.”*

## Regional and local policy

13.2.3 Chapter 2: Legislation and Planning Policy Context sets out regional and local policy. There are 10 Local Planning Authorities within the Scoping Report Corridor (South Norfolk, Mid Suffolk, Babergh, Tendring, Colchester, Braintree, Chelmsford, Basildon, Brentwood and Thurrock) and a further seven (Norwich, Breckland, Ipswich, Maldon, Epping, Medway and Gravesham) within the 3km study area (refer to section 13.3).

## Guidance

13.2.4 Relevant guidance, specific to landscape and visual effects, that has informed this Scoping Report and would inform the assessment within the ES comprises:

- Landscape Institute and Institute for Environmental Management and Assessment (IEMA) (2013) Guidelines for Landscape and Visual Impact Assessment – 3rd Edition (GLVIA3)
- Planning Inspectorate Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects
- Landscape Institute (2021) Technical Guidance Note 02/21 Assessing landscape value outside national designations



- Landscape Institute (2019) Technical Guidance Note 06/19 Visual Representation of Development Proposals
- Scottish Natural Heritage (2017) Visual Representation of Wind Farms – Version 2.2
- The Holford Rules: Guidelines for the Routeing of New High Voltage Overhead Transmission Lines (NGC plc) 1992 and Scottish Hydro-Electric Transmission plc (SHETL) 2003 Notes)<sup>12</sup>
- The Horlock Rules: NGC Substations and the Environment: Guidelines on Siting and Design (2006)

### 13.3 Study area

- 13.3.1 The study area is determined by the nature and scale of the Project and the nature of the surrounding area and considers the landscape and/ or views that the Project may influence in a significant manner.
- 13.3.2 The study area comprises the Scoping Report Corridor with a 1km buffer (for the underground element) to 3km buffer (for the above ground element) on either side of the Scoping Report Corridor (as presented on Figure 13.1 at Appendix A). The 3km buffer has been informed by the type and scale of the Project including the overhead line proposed (steel lattice tower at a standard height of typically 50m) and the nature of the receiving landscape. A 3km buffer would also be applied to CSEC and the new substation.
- 13.3.3 Based on professional judgement and experience of assessing transmission infrastructure, significant effects on landscape character and visual amenity are unlikely to occur beyond the 3km study area. However, more distant viewpoints up to 5km from the Project are considered where there is the potential for significant visual effects to arise beyond the 3km study area, for example where the topography allows more far-reaching views. The location of these viewpoints would be informed by ZTV mapping, which indicates the areas from which the Project would be theoretically visible, and supplemented by field work.
- 13.3.4 The study area for the underground element of the Project would comprise a 1km buffer around the Scoping Report Corridor, based on professional judgement and good practice. More distant viewpoints from the underground element are considered where there is the potential for significant visual effects to arise.
- 13.3.5 The study areas would be refined within the ES to comprise 3km and 1km around the proposed Order Limits for the overhead lines and CSEC/ new substation and underground cable route(s), respectively.

### 13.4 Data collection

- 13.4.1 The baseline has been informed by a desk study which has drawn on the following information sources:
- Mapping and data,
  - 125,000 and 1:50,000 OS maps

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<sup>12</sup> Paragraph 2.8.5 of EN-5 states that the Holford Rules should be followed by developers when designing their proposals

- Aerial photography, Google Earth and Google Maps Street View
- Open source GIS data
- Landscape Character Assessment (LCA)
- Natural England’s National Character Area profiles (2014)
- Natural England’s National Historic Landscape Characterisation (NHLC) Project
- South Norfolk District LCA(LUC, 2001)
- Suffolk LCA (Suffolk County Council, 2010)
- Tendring District LCA (LUC, 2001)
- Colchester Borough LCA (CBA, 2005)
- Braintree, Brentwood, Chelmsford, Maldon and Uttlesford LCAs (CBA, 2006)
- Essex LCA(CBA, 2003)
- LCA of Basildon Borough (The Landscape Partnership, 2014)
- Thurrock Landscape Capacity Study (CBA, 2005)
- Designated Landscape Publications
- The Dedham Vale Landscape (LDA for the Countryside Commission, 1997)
- Dedham Vale AONB Natural Beauty and Special Qualities and Perceived and Anticipated Risks (Alison Farmer Associates, 2016)
- Dedham Vale AONB and Stour Valley Project Area Management Plan 2021-26
- Suffolk Coast and Heaths AONB Natural Beauty and Special Qualities Indicators (LDA, 2016)
- Suffolk Coast and Heaths AONB Management Plan 2018-2023

## Site visit

13.4.2 This Scoping Report has been informed by targeted field work undertaken in August 2022. Weather conditions were fine and visibility was excellent. The visit was focused on the landscape around Dedham Vale AONB and Suffolk Coast and Heaths AONB. The purpose of the visit was to obtain a better understanding of the baseline landscape, potential effects and consider possible options for mitigation.

## 13.5 Engagement with stakeholders

13.5.1 A summary of engagement undertaken to date is presented in Table 13.1.

Table 12.1 – Summary of engagement and responses

Organisation and date	Summary of response	Consideration in the Scoping Report
Natural England, August 2022	‘The Site’ – changes to topography should be mentioned in the ‘potential significant effect’ column.	The assessment approach proposes that direct effects within the proposed Order Limits would be reported

Organisation and date	Summary of response	Consideration in the Scoping Report
		within the assessment of effects on landscape character areas. This is due to the extensive length of the Project, to simplify the assessment to keep it streamlined and easy to access. Changes in topography would be considered within the assessment of effects on landscape character.
Natural England, August 2022	‘Designated landscapes – Dedham Vale AONB’ ... the LVIA report should specifically consider the impact of proposals on each of the defining characteristics and ‘special qualities’ of the AONBs. At this stage it is not possible to rule out potential significant adverse landscape and visual effects to the Dedham Vale AONB at operational stage and therefore assessment of these effects should not be scoped out of the LVIA.	Section 13.9 recognises there may be the potential for the Project to affect the defining characteristics and ‘special qualities’ of nationally designated landscapes and therefore these are scoped in as outlined in Table 13.4.
Natural England, August 2022	Study Area Natural England note site visits will be required to ‘ground truth’ ZTVs and to make judgements as to the likely significance of landscape and visual effects arising in areas where sensitive landscape and visual receptors have been identified.	Section 13.3 explains the approach to the study area at this point in time. This would continue to be reviewed.  Sections 13.7 and 13.10 refer to site visit proposals that would be undertaken to inform the assessment.  Appendix I presents the proposed method for judging levels of effects and significance.  Indicative preliminary viewpoints can be found at Appendix H.
Natural England, August 2022	... there may be a need for some viewpoints that are beyond the study areas proposed for the	Viewpoint locations would be discussed and agreed with relevant stakeholders

<b>Organisation and date</b>	<b>Summary of response</b>	<b>Consideration in the Scoping Report</b>
	Project. This will be particularly important in relation to views from the AONB; to confirm that the effects from any key, publicly accessible viewpoints within the AONB are not significant.	including Natural England, AONB Partnership and Local Planning Authorities. Indicative preliminary viewpoints can be found at Appendix H.
Natural England, August 2022	... to aid our understanding of viewpoint selection in relation to sensitive receptors that the AONB boundary and Stour Valley Special Landscape Area (SLA) should be shown on all relevant future maps and ZTV modelling presented in consultation and evidence documents. The setting of the Dedham Vale and Suffolk Coasts and Heaths AONBs should also be shown on maps as soon as the work to define the setting has been completed and agreed.	Figure 13.1 illustrates the AONB boundaries and the Stour Valley Project Area.  Figures produced to support the ES (including ZTV mapping) would illustrate AONB boundaries and the Stour Valley Project Area.  Areas considered to form the setting of the AONBs would be discussed with Natural England and the Dedham Vale AONB Partnership and illustrated on figures to accompany the ES.
Natural England, August 2022	Natural England strongly advocate undergrounding of cables within areas found to be in 'the setting' of the AONB and sealing end compounds should be located outside of these areas ...we agree with Arcadis's confirmation at the 15th July meeting that the 3km study area will be applied to sealing end compounds as this represents a more precautionary approach.	A precautionary approach is being taken in relation to the study area around the CSECs and substation. The 3km study area would continue to be reviewed as the Project progresses and any proposed changes would be discussed with stakeholders.
Natural England, August 2022	Cumulative Assessment ... the assessment should also include the cumulative effect of the development with other relevant existing or proposed developments in the area. In this context Natural England advises that the cumulative impact assessment should include other proposals currently at Scoping stage. We welcome the statement at 3.1.8 that 'National Grid will seek to	Chapter 17 Cumulative Effects provides an overview of the proposed approach and method for cumulative impact assessment.

Organisation and date	Summary of response	Consideration in the Scoping Report
	<p>agree a list of developments to be considered in the Cumulative Landscape and Visual Impact Assessment (CLVIA) with consultees through the EIA process' since National Grid intend to limit the assessment of cumulative impacts to those developments which 'are likely to result in similar type, scale and extent of landscape and visual effects.'</p>	
<p>Natural England, August 2022</p>	<p>Mitigation measures  Natural England strongly support the statement at 4.1.2. that any mitigation measures identified within the LVIA to reduce potential residual landscape and visual effects will be detailed within the LEMP.</p>	<p>Appendix B: Initial Outline CoCP, confirms that a LEMP would be produced prior to construction. The LEMP would incorporate any mitigation measures identified within the assessment to reduce potential residual landscape and visual effects. An outline LEMP would be submitted with the DCO application.</p>
<p>Suffolk County Council and Essex Place Services, July 2022</p>	<p>Landscape Character  It is suggested that the East of England landscape typology, which covers the entire area of the Project in Norfolk, Suffolk, and Essex should be used as the principal baseline characterization. However, it is recognized that this is a typology and the landscape types will need to be grouped into, identified and described, landscape areas.  This overarching framework can then be informed by the various local landscape studies.</p>	<p>Appendix I describes the approach to the method for assessing landscape effects.</p>
<p>Suffolk County Council and Essex Place Services, July 2022</p>	<p>The proposed approach to mitigation should set out the possible suite of mitigation options, both embedded and secondary. Including:  undergrounding of cables,</p>	<p>Section 13.8 Measures to be adopted as part of the Project discusses the approach that has and continues to be taken in respect of mitigation measures (embedded and standard).</p>

Organisation and date	Summary of response	Consideration in the Scoping Report
	<p>the use of alternate tower designs such as T pylons, or low level lattice pylons,</p> <p>the use of gantries, rather than terminal towers at cable sealing end compounds.</p> <p>Landscape planting to reduce visual impact in views</p> <p>Landscape planting to deliver wider landscape restoration to offset the residual harm by the introduction of new transmission towers and other associated infrastructure.</p>	<p>Section 13.10 discusses examples of additional mitigation which may be considered if required and appropriate.</p>
<p>Suffolk County Council and Essex Place Services, July 2022</p>	<p>It is not clear, despite the operation of the Holford and Horlock rules, to what extent the existing baseline wire-scape, consisting of both 400kV and 132kV overhead lines, will be considered in any landscape assessment. It is likely that in some sections of the route this Project. In combination with the baseline (other proposed projects in particular Bramford to Twinstead), may create an unacceptable wires-cape. Therefore, this will need to be part of any assessment and inform the approach to mitigation.</p>	<p>Existing developments, such as other vertical infrastructure (e.g. overhead lines, telecommunications masts and wind farms) form part of the existing baseline environment and would be considered as such in the assessment. Consented and proposed developments (including the Bramford to Twinstead Reinforcement Project) would be considered in the cumulative landscape and visual assessment.</p>
<p>Suffolk County Council and Essex Place Services, July 2022</p>	<p>Visual - Viewpoints from key settlements and significant locations should be included, even when significance of effect is not anticipated.</p>	<p>Section 13.10 Viewpoints and visualisations and Appendix I sets out the approach to selection of viewpoints. Indicative preliminary viewpoints can be found at Appendix H.</p>
<p>Suffolk County Council and Essex Place Services, July 2022</p>	<p>Visual - It will also be necessary for sequential visual effects to be considered. Given the scale and repetitive nature of this Project, combined with varying visibility of pylons, these will need to be identified by NG and assessed accordingly.</p>	<p>Section 13.10 Viewpoints and visualisations and Appendix I sets out the approach to selection of viewpoints. Indicative preliminary viewpoints can be found at Appendix H.</p>

Organisation and date	Summary of response	Consideration in the Scoping Report
Suffolk County Council and Essex Place Services, July 2022	Visual - It would be expected that as well as representative views and receptor groups, that specific viewpoints (vistas/vantage points) are included in the assessment to ensure any concerns regarding these impacts can be identified and assessed in isolation to receptor groups.	Section 13.10 Viewpoints and visualisations and Appendix I sets out the approach to selection of viewpoints. Indicative preliminary viewpoints can be found at Appendix H.
Suffolk County Council and Essex Place Services, July 2022	Visual - Illustrative viewpoints will be necessary to help provide a narrative for the characteristics and qualities of the landscape.	Section 13.10 Viewpoints and visualisations and Appendix I sets out the approach to selection of viewpoints. Indicative preliminary viewpoints can be found at Appendix H.
Suffolk County Council and Essex Place Services, July 2022	The EIA should consider whether parts of the road network are also identified as promoted routes, quiet lanes and/or restricted byways and therefore sensitivity may be greater.	Section 13.9 and Table 13.4 confirm that receptors travelling on roads are scoped in.

## 13.6 Baseline conditions (inc. future baseline)

- 13.6.1 This section provides a high-level overview of landscape designations, landscape character and visual amenity within the study area.
- 13.6.2 The study area comprises a largely rural landscape with low-lying topography of typically flat to gently undulating landform incised by numerous river valleys. Major watercourses within the study area include (but are not limited to) the River Tas, River Waveney, River Gipping, River Stour, River Colne, River Blackwater, River Brain, River Ter, River Chelmer, River Can, River Wid and associated tributaries including those of the River Thames.
- 13.6.3 The River Stour is the most notable of the valleys, bisecting the study area around the midway point on an east/ west alignment.
- 13.6.4 Landcover patterns and scale vary along the study area. Land use is typically a mix of arable and pasture interspersed with woodland and corridors of riparian vegetation associated with the many watercourses. Larger scale arable fields are usually associated with the plateaux landscapes whereas a smaller scale patchwork of pastoral field patterns, hedgerows, woodland, small clusters and individual trees are often found to be associated with river valleys and in closer proximity to historic settlement.

### Landscape designations

- 13.6.5 The following nationally and locally designated landscapes fall within the study area and are presented on Figure 13.1 at Appendix A:
- Suffolk Coast and Heaths AONB (National designation)

- Dedham Vale AONB (National designation)
- The Waveney and Dove Valleys SLA (locally designated landscape)
- Botesdale/Redgrave Parks SLA (locally designated landscape)
- Thornham Park/Mellis Common SLA (locally designated landscape)
- Blackbourne Valley SLA (locally designated landscape)
- Flowton SLA (locally designated landscape)
- Gipping Valley SLA (locally designated landscape)
- Brett Valley SLA (locally designated landscape)
- Dodnash SLA (locally designated landscape)
- Two SLAs to the west of Stowmarket (locally designated landscape)

13.6.6 Although the Stour Valley Project Area (shown on Figure 13.1 at Appendix A) is not a formally designated landscape it is recognised that this is a valued and important part of the landscape and has a relationship with Dedham Vale AONB. As such this area would be taken into consideration in terms of contributing to landscape character and value.

## Landscape character

13.6.7 Table 13.2 sets out the hierarchy of landscape character types and areas which fall within the study area.

Table 13.2 – Landscape character

Scale/ Source	Landscape Character Types/ Areas
National Character Areas/ Natural England	NCA 84 Mid Norfolk NCA 83 South Norfolk and High Suffolk Claylands NCA 86 South Suffolk and North Essex Clayland NCA 111 Northern Thames Basin NCA 81 Greater Thames Estuary
East of England Landscape Typology	Urban Valley Settled Farmlands Wooded Plateau Claylands Settled Plateau Claylands Valley Meadowlands Plateau Estate Farmlands Wooded Plateau Farmlands Wooded Hills and Ridges Lowland Settled Claylands Lowland Settled Farmlands Coastal Levels Saltmarsh/Intertidal Flats
District and County Scale Landscape Character	See Appendix G.



Scale/ Source	Landscape Character Types/ Areas
Assessment/ Local Planning Authorities	

## Existing environment and views

- 1.1.4 Visibility within the study area is assumed to vary in accordance with topographic changes. Longer distance views are anticipated to be afforded along and across the numerous river valleys and from elevated locations. In contrast, views within and around the low lying, less undulating parts of the landscape are anticipated to be foreshortened by the layers of vegetation found in the landscape. These assumptions have been backed up by the field work undertaken in August 2022.
- 13.6.8 There a large number of potentially highly sensitive visual receptors in the study area including people living and moving around settlements and scattered communities; people engaged in outdoor recreation such as those using national and regional cycle routes, long distance walking routes/ regional trails, local PRoW and open access land; people visiting Registered Parks and Gardens, promoted tourist destinations such as viewpoints, publicly accessible cultural heritage features of interest, public parks, golf courses and recreation grounds; and people travelling along the road and rail network.
- 13.6.9 An overview of the existing environment has been broken down by local planning authority areas for ease of reference. The existing environment and views would be considered in more detail as the assessment work is progressed and visual receptors would be identified based on desk top ZTV analysis and site-based findings.

### South Norfolk District

- 13.6.10 Within South Norfolk District the Project would run between the existing substation at Norwich and down to Diss which lies on the boundary with Mid Suffolk. The Project would pass through the following landscape character types: Tributary Farmland; Settled Plateau Farmland; Plateau Farmland; and Rural River Valley. These landscape character types are typically flat to gently undulating and large in scale. The Waveney Rural River Valley LCA in the south marks the boundary between Norfolk and Suffolk and is characterised by its flat, wide floodplain and gently sloping valley sides.
- 13.6.11 In the north (east of Mulbarton) there is an existing 400kV overhead line on the edge of the Scoping Report Corridor which runs to the south from the existing substation, then down towards the eastern side of Diss. The Scoping Report Corridor moves west away from this existing overhead line to the west of Newton Flotman and deviates around Diss to the west.

### Mid Suffolk District

- 13.6.12 Within Mid Suffolk District the Project would run between the Waveney Valley and the existing substation at Bramford. The Project would pass through the following landscape character types: Rolling Valley Farmlands and Furze; Ancient Plateau Claylands; Plateau Claylands; Rolling Valley Claylands; Valley Meadowlands; and Rolling Valley Farmlands. The plateau character types are typically flat or gently undulating, and the valleys typically have flat bottoms with gently sloping valley sides.
- 13.6.13 The Scoping Report Corridor crosses existing 132kV overhead lines near Mellis in the north and Barking in the south. From Mellis to Needham Market the Scoping Report Corridor runs between an existing 400kV overhead line in the east and an existing 132kV overhead line in the west. Multiple overhead lines converge at Bramford substation.

## **Babergh District**

- 13.6.14 Within Babergh District the Project would run between Bramford Substation (in Mid Suffolk) and Stratford St Mary which lies within the Dedham Vale AONB. The Project would pass through the following landscape character types: Ancient Plateau Claylands; Rolling Valley Farmland; Ancient Estate Claylands; and Plateau Farmland. These character types are often large in scale and with regular field patterns.
- 13.6.15 The Scoping Report Corridor continues south from Bramford substation where a number of existing overhead lines converge. Just south of the A1071 the Scoping Report Corridor crosses one existing 132kV overhead line which is proposed to be removed as part of the Bramford to Twinstead Reinforcement Project. There is an existing 132kV overhead line to the east within the AONB and there are also sections which run to the north of the AONB, parts of which cross into the northern extent of the AONB.

## **Tendring District/ Colchester District**

- 13.6.16 Within Tendring District and Colchester District the Project would run from Stratford St Mary (within Dedham Vale AONB) to the Colchester District boundary near Surrex. Between the proposed EACN in the east and vicinity of Fordham in the west, the Project would run in an east west direction to the south of the Dedham Vale AONB, within parts of the landscape that are likely to form the wider setting to the AONB. The Project would pass through the following LCAs: Bromley Heath (an exposed and windswept plateau landscape with large scale arable fields); Great Horkesley Farmland Plateau (farmland plateau with small to medium-scale fields) and Rochfords Farmland Plateau (medium to large-scale fields, more open and exposed than the Great Horkesley Farmland Plateau). These LCAs are large in scale and with regular field patterns.
- 13.6.17 There is potential intervisibility with the Dedham Vale AONB (from its elevated southern enclosing ridgeline). The Project would pass through several pinch points (north of Ardleigh and north of Great Horkesley).
- 13.6.18 Between Fordham and the Colchester District boundary near Surrex, the Project would cross the Colne Valley (Colne River Valley Floor and Colne River Valley Slopes LCAs), where there is a relatively steep, V-shaped valley and small linear settlements. South of the Colne Valley the landscape transitions Great Tey Farmland Plateau LCA (gently sloping farmland plateau with medium to large scale fields) and Easthorpe Farmland Plateau LCA (raised farmland plateau with mixed scale irregular fields). There is an existing 132kV overhead line to the east of the Scoping Report Corridor within the AONB. Within the Colchester District there are no existing high voltage overhead lines near the Scoping Report Corridor which runs to the north of Colchester, between Colchester and the Dedham Vale AONB. There is just one existing 132kV overhead line which runs to the south of Colchester.

## **Braintree District**

- 13.6.19 Within Braintree District the Project would pass through the Gosfield Wooded Farmland LCA (a wooded and enclosed, flat to gently undulating landscape), Black Water and Brain Valley LCA (shallow farmed valleys, with gently undulating valley sides) and Central Essex Farmland LCA (an extensive LCA with gently undulating topography). These character types have subtle topography and are sometimes wooded nature.
- 13.6.20 The Scoping Report Corridor crosses existing 400kV and 132kV overhead lines in the east of Braintree District.

## **Chelmsford District**

- 13.6.21 Within Chelmsford District the Project would pass through the extensive Central Essex

Farmland LCA, which is dissected by the narrow Chelmer Valley LCA between Little and Great Waltham. The topography is gently undulating, crossing several small valleys which dissect the farmland. The topography becomes more pronounced in the south at Coptfold near the boundary with Brentford.

- 13.6.22 Within the Chelmsford District there are no existing high voltage overhead lines near the Scoping Report Corridor which runs to the west of Chelmsford. There is one existing 132kV and one existing 400kV overhead line which runs to the east of Chelmsford.

### **Brentwood District/ Basildon District**

- 13.6.23 Between the Brentwood local authority boundary near Ingatestone and Havering's Grove on the boundary with Basildon, the Project would pass through the Brentwood Hills LCA. The Brentwood Hills LCA is characterised by gently to strongly undulating hills and ridges, with dense vegetation creating a sense of enclosure. In this northern part of Brentwood the landscape is gently undulating.
- 13.6.24 At Havering's Grove the Project would pass through a narrow pinch point before crossing higher ground along the boundary between Brentwood and Basildon. It would pass through the Wooded Farmland, Sloping Farmland and Lowland Settled Claylands character types.
- 13.6.25 The Scoping Report Corridor runs largely to the east of an existing 132kV overhead line from Brentwood to Basildon. South of the A127 two existing 132kV lines intersect within the Scoping Report Corridor.

### **Thurrock District**

- 13.6.26 Between the local authority boundary and Southfields the Project would pass through the Sticking Hill Rolling Farmland LCA, an area of gently undulating terrain. Between the local authority boundary and the historic settlements of Orsett and Horndon on the Hill, the proposed Project would follow a straight route, and run parallel to an existing 132kV line.
- 13.6.27 Between Horndon on the Hill and the substation at Tilbury Marshes the Project would pass to the east of Southfields, as well as the settlements of Linford, East Tilbury, West Tilbury, Chadwell St Mary and Tilbury. In this section it would cross several urban fringe character areas before entering Tilbury Marshes at the substation. These character areas combine farmland with urban and industrial land uses; there are also multiple overhead lines in the landscape which converge at Tilbury substation.

### **Future baseline**

- 13.6.28 The future baseline is related to landscape changes which are considered certain or likely to happen, including consented proposals which are not yet present in the landscape but are expected to be constructed.
- 13.6.29 There are applications for development within the study area, which may affect the landscape character or result in changes to visual amenity and people's views. These would be considered within the cumulative effects assessment in the ES.
- 13.6.30 Ash (*Fraxinus excelsior*) trees within the study area may be affected by ash dieback. This is a disease of ash trees caused by a fungus of Asian origin called *Hymenoscyphus fraxineus* (H. fraxineus; formerly called *Chalara fraxinea*). The disease causes leaf loss and crown dieback in affected trees and is usually fatal. Mapping by the Department for Environment, Food and Rural Affairs (DEFRA) and the Forestry Commission confirms the presence of ash dieback in the study area. The future baseline therefore assumes that there would be loss of ash trees in the long term across the study area, but that other tree species would occupy gaps created in the

short term, and overall levels of vegetation would remain similar to existing. The arboricultural tree schedule data may record incidents of ash dieback observed during the site surveys (refer to Appendix J), however does not constitute a tree health condition survey.

13.6.31 In contrast, some positive landscape changes are also anticipated. These relate to agri-environment and woodland planting schemes which would continue to enhance the landscape. For example, over the last decade there have been new areas of woodland and hedgerows planted in parts of the study area. Furthermore, it is anticipated the landscape being managed in accordance with the Dedham Vale AONB and Stour Valley Management Plan (Dedham Vale AONB, 2021) would continue to be enhanced by management practices and conservation and enhancement projects undertaken by the AONB and partners.

13.6.32 As previously stated, it is recognised that no landscape is static and that the landscape across the study area is under different pressures and continually changing; albeit over relatively long timeframes. Further to a review of the above, in terms of landscape character, it is considered that the character of the baseline landscape would not significantly change in the future in the absence of the Project.

## 13.7 Further data to be gathered / processed in the ES

13.7.1 The assessment within the ES would be informed by additional research and analysis, third party data and data obtained through survey, such as:

- East of England Landscape Typology (Landscape East, 2010)
- Land of the Fanns, LCA (Alison Farmer Associates, 2016)
- Babergh and Mid Suffolk Special Landscape Areas
- Dedham Vale AONB and Stour Valley Project Area State of the AONB Report 2018 (LUC, 2019)
- Landscape Character Guidelines for the Suffolk Coast and Heaths AONB (undated)

13.7.2 More detailed desk-based research and analysis utilising sources listed in section 13.4 and any emerging guidance or information which may not yet be adopted or in the public domain:

- Ground truthing seasonal field work to verify the desk-based review of baseline landscape character and record baseline photography
- Field work to assess the landscape and visual impacts
- Viewpoint surveys to record baseline visual amenity and take baseline photography, including photography for the purposes of photomontage production
- Processing of APEM aerial survey data
- Obtaining and processing OS terrain data and Laser Imaging Detection and Ranging (LIDAR)
- Production and analysis of ZTV maps
- Obtaining and processing OS Address Base data

## 13.8 Measures to be adopted as part of the Project

- 13.8.1 The Scoping Report Corridor has been designed to avoid sensitive features as far as practicable. This has included minimising potential impacts with designated landscapes through the Corridor and Preliminary Routeing and Siting Study, together with proposed undergrounding to avoid long-term effects on Dedham Vale AONB. Further embedded measures would be developed as the Project design evolves.
- 13.8.2 During the ongoing design process, it is envisaged there would be further opportunities for embedded design measures through sensitive siting of:
- Temporary and permanent access routes
  - Construction areas and compounds
  - New above ground infrastructure such as pylons
  - Proposed CSEC and substation
- 13.8.3 Other embedded measures that would continue to be explored include rationalisation of existing overhead lines, use of alternative tower designs, use of full tension gantries instead of terminal towers at CSEC and potential need for additional sections of underground cables.
- 13.8.4 In addition, the assessment would continue to identify embedded design measures through the location of any screening of equipment and, where practicable, influencing the proposed materials and colour finishes of equipment, security fencing and surfacing.
- 13.8.5 A range of standard measures for the Project would be adopted throughout the duration of the construction phase. Appendix B: Initial Outline CoCP outlines measures relevant to landscape and visual receptors. These include but are not limited to:
- An outline LEMP and a draft CTMP will be submitted with the DCO application
  - Environmental Manager(s)/ Environmental Clerk of Works will be appointed for the duration of the construction phase
  - A pre-condition survey will be undertaken to ensure appropriate reinstatement is undertaken
  - Land used temporarily will be reinstatement following construction
  - Sensitive areas will be protected during construction
  - Construction lighting will be directional and minimised where possible
  - Retention of vegetation where practicable and where vegetation cannot be retained, replacement will be used as appropriate
  - Tree protection measures in accordance with British Standards will be implemented
- 13.8.6 The outline LEMP would include mitigation measures (where required) such as:
- Landscape planting to reduce visual impact in views
  - Landscape planting to deliver wider landscape restoration to offset the residual harm by the introduction of new transmission pylons and other associated infrastructure

## 13.9 Likely significant effects

13.9.1 This section sets out the likely significant effects of the Project on landscape and visual receptors. It assumes that the relevant embedded (design measures), good practice measures outlined within the Initial Outline CoCP at Appendix B, and the expected mitigation for any other consents or permits are in place before assessing the effects. This is in accordance with guidance from IEMA as part of preparing a proportional assessment (IEMA, 2022).

13.9.2 Potential construction and operational effects of the Project on landscape and visual receptors comprise:

- Physical and perceptible effects on designated landscapes and their setting through removal and addition of landscape features and infrastructure elements

Physical and perceptible effects on landscape character through removal and addition of landscape features and infrastructure elements

- Effects on the visual amenity of people living in and moving around the landscape through removal and addition of landscape features and infrastructure elements

### Landscape designations – construction and operation (inc. maintenance)

#### Nationally designated landscapes

13.9.3 The Project has the potential to affect the defining characteristics and ‘special qualities’ and setting of nationally designated Dedham Vale AONB during construction and operation. There is potential for significant adverse effects during construction due to the intrusive nature of the construction works associated with undergrounding. During operation this likelihood is reduced as the new 400kV network reinforcement would be underground. The consideration of effects on this nationally designated landscape and its setting are therefore proposed to be **scoped into** the ES during both construction and operation (inc. maintenance).

13.9.4 There is also the potential for the Project to affect the defining characteristics and ‘special qualities’ of the Suffolk Coasts and Heaths AONB, including its setting. The consideration of effects on this nationally designated landscape and its setting are therefore proposed to be **scoped into** the ES during both construction and operation (inc. maintenance).

#### Locally designated landscapes

13.9.5 There is potential for the Project to affect locally designated Special Landscape Areas. Therefore, the assessment of SLAs are proposed to be **scoped into** the ES during both construction and operation (inc. maintenance).

#### Designated landscapes – at night

13.9.6 Significant effects on designated landscapes are not anticipated at night. Appendix B: Initial Outline CoCP includes standard measures for lighting during construction. Operational (inc. maintenance) lighting would be located at the proposed substation and CSEC and would be designed to minimise intensity and light spill as far as practicable, using measures such as, lighting would only be switched on when needed. Lighting is therefore proposed to be **scoped out** of the ES in relation to designated landscapes.

## Landscape character – construction and operation (inc. maintenance)

- 13.9.7 The construction and operation of the Project, including the proposed 400kV overhead line, underground cables, CSEC and substation works have the potential to affect landscape character.
- 13.9.8 During construction, effects on landscape character would likely arise from the introduction of construction activities, presence of construction equipment and the direct loss or fragmentation of distinctive landscape elements, for example:
- Highway works on protected lanes
  - Vegetation clearance to allow for temporary work areas
  - Access and construction of the Project – particularly in relation to the underground cable
- 13.9.9 During operation (inc. maintenance), effects would include the introduction of above ground infrastructure elements in the landscape such as the overhead lines, CSEC, substations and permanent access roads. Long term effects may also arise from the requirement for permanent tree clearance beneath the overhead line and above underground cables.
- 13.9.10 There is potential for these effects to result in likely significant adverse effects on the landscape character areas. The assessment of effects on landscape character during construction and operation (inc. maintenance) is therefore proposed to be **scoped into** the ES.
- 13.9.11 Significant effects on the landscape at night are not anticipated. Appendix B: Initial Outline CoCP includes standard measures for lighting during construction. Operational (inc. maintenance) lighting would be located at the proposed substation and CSEC and would be designed to minimise intensity and light spill as far as practicable, using measures such as, lighting would only be switched on when needed. Night-time effects in relation to landscape character is therefore proposed to be **scoped out** of the ES during both construction and operation.

## Existing environment and views – construction and operation (inc. maintenance)

- 13.9.12 The identification of visual receptors would be informed by ZTV mapping, which would indicate the areas from which the Project is theoretically visible. Field work would be undertaken to ground truth the ZTVs. The assessment would not consider effects on visual receptors that are located wholly outside the ZTV, as they are highly unlikely to have views of the Project. Effects on visual receptors located outside of the ZTV are therefore proposed to be **scoped out** of the ES, during construction and operation.
- 13.9.13 Assessment of visual effects on individual private views (with regard to the ‘right to a view’) is not within the remit of EIA. However, through consultation and the iterative design process, the Project, where practicable would reduce visual effects on residential properties. Effects on the visual amenity of local residents would be considered as part of an assessment of visual effects on settlements and communities, undertaken by agreed representative assessment viewpoints from publicly accessible places (indicative preliminary viewpoints can be found at Appendix H). Construction and operation (inc. maintenance) impacts on private views for individual properties are therefore proposed to be **scoped out** of the ES.

- 13.9.14 The routeing process has sought to reduce potential effects on the views and visual amenity of residential communities, reducing routeing close to residential areas as far as practicable (Supplementary note 1 of the Holford Rules). There would be potential effects on views from residential communities located within proximity to the Project which would continue to be considered as the design of the Project evolves.
- 13.9.15 Visual effects upon settlements and communities would be considered through the use of representative assessment viewpoints (indicative preliminary viewpoints can be found at Appendix H). There is potential for these to be significant adverse effects during both construction and operation (inc. maintenance). Effects on views from settlements and communities are therefore proposed to be **scoped into** the ES during both construction and operation.
- 13.9.16 The Project has potential to affect the visual amenity of people visiting and/ or taking part in recreational activities within the study area such as people walking on regional trails, PRoWs, people cycling on national and promoted cycle routes and people visiting visitor attractions (recreational receptors). There is potential for significant adverse effects during both construction and operation (inc. maintenance). Effects on views from the recreational receptors are therefore proposed to be **scoped into** the ES during both construction and operation (inc. maintenance).
- 13.9.17 The Project has potential to affect the visual amenity of people travelling along parts of the road network where sensitivity may be greater such as promoted routes, quiet lanes, protected lanes and/ or restricted byways. There is potential for significant effects and as such the assessment of visual effects on people travelling by car through the area (road receptors) is proposed to be **scoped into** the ES.
- 13.9.18 Significant visual effects on people travelling by train on the Greater Anglia railway network are not anticipated due to the speed of travel, therefore this is proposed to be **scoped out** of the ES during construction and operation (inc. maintenance).
- 13.9.19 Significant effects on visual amenity at night are not anticipated. Appendix B: Initial Outline CoCP includes standard measures for lighting during construction. Operational (inc. maintenance) lighting would be located at the proposed substation and CSEC and would be designed to minimise intensity and light spill as far as practicable, using measures such as, lighting would only be switched on when needed and for safety reasons. Night-time effects in relation to visual amenity is therefore proposed to be **scoped out** of the ES during both construction and operation.

## Proposed assessment methodology

- 13.9.20 This section sets out a summary of the proposed methodology for the landscape and visual assessment of the ES. Full details are outlined within Appendix I. The methodology is based on guidance set out in GLVIA3 and also drawing on the Technical Guidance Note: Landscape Character Assessment (Technical Information Note 08/15) and Landscape Institute, TGN 02-21 Assessing landscape value outside national designations (Landscape Institute, May 2021). The assessment would also be informed by the historic environment assessment in the ES.

## Scope of the assessment

- 13.9.21 Landscape and visual assessments are distinct, but interconnected, processes and the assessment would describe potential landscape and visual effects separately. The assessment would consider potential effects on:



- Landscape as a resource in its own right (caused by changes to the constituent elements of the landscape, its specific aesthetic or perceptual qualities and the character of the landscape)
- Views and visual amenity as experienced by people and communities (caused by changes in the appearance of the landscape)

## Field surveys

- 13.9.22 Surveys would be undertaken during summer and winter months to fully understand the maximum level of visibility as part of the landscape and visual baseline.
- 13.9.23 Visual site surveys would be undertaken for a selection of agreed representative viewpoints for a variety of receptor types and at a range of distances from the Project. Surveys would include viewpoint photography to assist in the creation of wireframes and photomontages. Where possible all viewpoint photography would be captured when trees are not in leaf (i.e., a worst case) (a list of indicative preliminary viewpoints can be found at Appendix H).

## Viewpoints and visualisations

- 13.9.24 Viewpoints selected to represent the different groups of people likely to be affected by the Project would be agreed with Natural England and AONB Partnership (where required) and local planning authorities.
- 13.9.25 Appendix H and Figure 13.2 identifies the preliminary viewpoint locations for the Scoping Report Corridor. It is reasonable to assume that as the Project design evolves and a route alignment proposed, additional viewpoints may be required to inform the landscape and visual assessment. In the event that additional viewpoints are considered necessary these would be discussed and agreed with the applicable consultees.
- 13.9.26 The selection of the final viewpoints would be informed by the ZTV analysis, ground truthing field work, desk-based research on access and recreation (including PRoW – i.e. long distance paths, footpaths, bridleways – and public land), tourism including popular vantage points, and by the distribution of the different groups of visual receptors.
- 13.9.27 Viewpoints would be selected to represent several different receptor groups, for example on the edge of a settlement, on a promoted PRoW, at a high point or near to a cluster of properties.
- 13.9.28 Wireframes and photomontages would be used to consider and illustrate changes to views. Visualisations would be prepared in accordance with the Landscape Institute's TGN 06/19 Visual Representation of Development Proposals.
- 13.9.29 A number of the viewpoint locations would be illustrated with photomontages. Photomontages show more detail than wireframes, including buildings, vegetation, colour, texture and lighting conditions.

## Judging levels of effect and significance

- 13.9.30 Judging the significance of landscape and visual effects requires consideration of the nature of the receptor and the nature of the effect on the receptor. GLVIA3 states that the nature of receptors, commonly referred to as their sensitivity, should be assessed in terms of the susceptibility of the receptor to the type of change proposed, and the value attached to the receptor. Sensitivity judgements would be recorded as high, medium or low. The nature of the impact on each receptor, commonly referred to as its magnitude,

should be assessed in terms of size and scale; geographical extent; duration and reversibility. Magnitude of change would be recorded as high, medium, low or negligible. Intermediate judgements (e.g. medium-high, low-medium) would be used where necessary.

13.9.31 Judgements of sensitivity and magnitude are then combined to form a judgement regarding the overall significance of effect. Levels of landscape or visual effect would be categorised as major, moderate, minor or negligible / no effect. ‘Moderate’ and ‘major’ effects are considered significant in the context of the EIA Regulations. The nature of effects would be described as positive (beneficial), neutral or negative (adverse).

13.9.32 This determination requires the application of professional judgement and experience to balance the many different variables which need to be considered, and which are given different weight according to site-specific and location-specific considerations. Judgements of the potential landscape and visual effects which may arise from the Project, either individually or cumulatively when considered in combination with other existing, consented or proposed developments, are made on a case by case basis, guided by the typical descriptions/ definitions as detailed in Table 13.3.

**Table 13.3 – Levels of effect and significance**

<b>Significance of Effect</b>	<b>Receptor</b>	<b>Description/ Definition</b>
Major	Landscape	The Project would result in an obvious change in landscape features and character, and is likely to affect a landscape with a moderate or high susceptibility to that type of change.  This level of effect may also occur when a medium scale of effect acts on a nationally valued landscape.  The effect is likely to be long-term and affect a relatively large area.
	Visual	The Project would result in an obvious change in view and is likely to affect a visual receptor with a moderate or high susceptibility to that type of change.  This level of effect may also occur when a medium scale of effect acts on a nationally valued view and/ or a high susceptibility receptor.  The effect is likely to be long-term and affect a relatively large area or relatively large number of people.
Moderate	Landscape	The Project would result in a noticeable change in landscape characteristics and character and is likely to affect a landscape with a moderate susceptibility to that type of change.  This level of effect may also occur when a smaller scale of effect acts on a more widely valued landscape, or a larger scale of effect acting on a landscape valued at a more local level.  This level of effect may also occur when a large scale of effect occurs over a relatively short period or over a small area.

<b>Significance of Effect</b>	<b>Receptor</b>	<b>Description/ Definition</b>
	Visual	<p>The Project would result in a noticeable change in a view and is likely to affect a viewer with a moderate susceptibility to that type of change and/ or locally valued view.</p> <p>This level of effect may also occur when a smaller scale of change acts on a higher susceptibility receptor or affects a large number of people, or a larger scale of effect acting on a lower susceptibility receptor or affecting fewer people.</p> <p>This level of effect may also occur when a large scale of effect occurs over a relatively short period or over a small area/ affects few people.</p>
Minor	Landscape	<p>The Project would result in a small change in landscape characteristics and character over a long-term duration.</p> <p>This level of effect may also occur when a larger scale of effect is of short-term duration or confined to the site.</p>
	Visual	<p>The Project would result in a small change in view over a long-term duration and is likely to affect a smaller geographic extent and/ or fewer people.</p> <p>This level of effect may also occur when a larger scale of effect is of short-term duration or is confined in its geographical extent.</p>
Negligible / No effect	Landscape	The Project would result in a barely perceptible or no change in landscape characteristics/character.
	Visual	The Project would result in a barely perceptible or no change in views or visual amenity.

## 13.10 Proposed scope of the ES

13.10.1 The matters that are proposed to be scoped in and out of the assessment are summarised in Table 13.4.

Table 13.4 – Proposed scope of the ES

<b>Matter</b>	<b>Phase</b>	<b>Scoped in / out</b>	<b>Justification</b>
Designated landscapes – Dedham Vale AONB	Construction and Operation	Scoped in	Consideration of effects on the landscape character and defining characteristic and 'special qualities' of Dedham Vale AONB, including its setting.
Designated landscapes –	Construction and Operation	Scoped in	Consideration of effects on the landscape character and defining characteristic and 'special

<b>Matter</b>	<b>Phase</b>	<b>Scoped in / out</b>	<b>Justification</b>
Suffolk Coasts and Heaths AONB			qualities' of Suffolk Coasts and Heaths AONB, including its setting.
Designated landscapes – SLAs	Construction and Operation	Scoped in	Effects on the key characteristics and special qualities of locally designated SLAs. Theoretical inter-visibility with the Project would be described in the assessment and used as a means of identifying which require assessment if significant effects are deemed likely.
Designated landscapes, landscape character and views – at night	Construction and Operation	Scoped out	No likely significant effects on designated landscapes, landscape character or views at night.
Landscape character	Construction and Operation	Scoped in	Direct effects on local landscape character types / areas within the site boundary and indirect effects upon Landscape Character Types (LCTs) /LCAs in the study area from which potential visibility is indicated by Zone of Theoretical Visibility (ZTV) maps.
Visual receptors outside of the ZTV	Construction and Operation	Scoped out	It would be highly unlikely for receptors located in places outside the ZTV to have views of the Project – the digital ZTV maps would be ground-truthed to ensure that likely visibility from sensitive receptors is fully considered.
Representative viewpoints	Construction and Operation	Scoped in	Effects upon visual receptors within the study area, i.e. the people who may be affected by changes in views resulting from the Project. Visual receptors to be considered would include: <ul style="list-style-type: none"> <li>• People within settlements;</li> <li>• People travelling on major roads and railways;</li> <li>• People using walking routes (PRoW and long distance routes) and cycle routes; and</li> <li>• People visiting areas of interest such as visitor attractions, and scenic viewpoints.</li> </ul> A list of indicative preliminary viewpoints can be found at Appendix H. Further consultation would be sought to agree viewpoint locations and visualisation types.
Visual receptors at settlements / communities /	Construction and Operation	Scoped in	ZTV analysis and field work would determine which settlements and property groups within the study area are to be included in the assessment.

<b>Matter</b>	<b>Phase</b>	<b>Scoped in / out</b>	<b>Justification</b>
groups of properties			Potential effects on views from residential properties located within proximity to the Project would continue to be considered in the detailed design of the Project. A detailed residential visual amenity assessment from private properties is not anticipated to be required.
Receptors travelling on roads	Construction and Operation	Scoped in	Desk top study and ZTV analysis and field work would determine which roads within the study area are to be included in the assessment. These are likely to include parts of the road network where sensitivity may be greater such as promoted routes, quiet lanes, protected lanes and/ or restricted byways.
Receptors travelling on railways	Construction and Operation	Scoped out	No likely significant effects on people using rail travel.
Recreational receptors, including PRow and long distance routes and visitor attractions	Construction and Operation	Scoped in	ZTV analysis and field work would determine which recreational routes within the study area are to be included in the assessment.
Private views	Construction and Operation	Scoped out	Assessment of visual effects on individual private views (with regard to the 'right to a view') is not within the remit of EIA. However, through consultation and the iterative design process, the Project would where practicable reduce visual effects on residential properties. Effects on the visual amenity of local residents would be considered as part of an assessment of visual effects on settlements and communities, as represented by agreed representative assessment viewpoints.

\*Operation referred to above also includes maintenance.

# 14 Noise and Vibration

## 14.1 Approach to scoping

14.1.1 The approach to scoping has drawn from previous experience of similar projects. Determining the scope of the Noise and Vibration assessment has included the following stages:

- Regulatory and planning policy context
- Defining the study area
- Engagement with stakeholders
- Stating sources of data collected
- Outlining baseline conditions
- Highlighting further data to be gathered
- Outlining environmental measures
- Predicting likely significant effects
- Drafting the proposed assessment methodology
- Stating the proposed scoping of the ES

14.1.2 There are interrelationships related to the potential effects on noise and vibration and other environmental topics. Therefore, please also refer to the following chapters:

- Chapter 8: Ecology and Biodiversity
- Chapter 11: Historic Environment
- Chapter 16: Traffic and Transport

14.1.3 This chapter should be read in parallel with Figure 14.1 at Appendix A.

## 14.2 Regulatory and planning policy context

### National policy

14.2.1 Chapter 2: Legislation and Planning Policy Context sets out the overarching policy relevant to the Project including Overarching NPS for Energy EN-1 and NPS for Electricity Networks Infrastructure EN-5. EN-1 contains the following paragraphs relating to noise and vibration which have been considered within this chapter:

- Paragraphs 5.11.1 to 5.11.5 – *“Excessive noise can have wide-ranging impacts on the quality of human life, health (for example owing to annoyance or sleep disturbance) and use and enjoyment of areas of value such as quiet places and areas with high landscape quality. The Government’s policy on noise is set out in the Noise Policy Statement for England (NPSE). It promotes good health and good quality of life through effective noise management. Similar considerations apply to vibration, which can also cause damage to buildings. In this section, in line with current legislation, references to “noise” below apply equally to assessment of impacts of vibration.*

Noise resulting from a proposed development can also have adverse impacts on wildlife and biodiversity. Noise effects of the proposed development on ecological receptors should be assessed by the IPC in accordance with the Biodiversity and Geological Conservation section of this NPS.

Factors that will determine the likely noise impact include:

- *the inherent operational noise from the proposed development, and its characteristics;*
- *the proximity of the proposed development to noise sensitive premises (including residential properties, schools and hospitals) and noise sensitive areas (including certain parks and open spaces);*
- *the proximity of the proposed development to quiet places and other areas that are particularly valued for their acoustic environment or landscape quality; and*
- *the proximity of the proposed development to designated sites where noise may have an adverse impact on protected species or other wildlife.”*
- *“...where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment:*
  - *a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise;*
  - *identification of noise sensitive premises and noise sensitive areas that may be affected;*
  - *the characteristics of the existing noise environment;*
  - *a prediction of how the noise environment will change with the proposed development;*
  - *in the shorter term such as during the construction period;*
  - *in the longer term during the operating life of the infrastructure.*
  - *at particular times of the day, evening and night as appropriate.*
  - *an assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; and*
  - *measures to be employed in mitigating noise.*
- *The nature and extent of the noise assessment should be proportionate to the likely noise impact.*
- *The noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered.”*

14.2.2 NPS EN-5, includes the following relating to noise, specifically from OHLs, which has been considered within this chapter:

- Paragraphs 2.9.2 to 2.9.7 – *“All high voltage transmission lines have the potential to generate noise under certain conditions.*

*Line noise is generated when the conductor surface electric stress exceeds the inception level for corona discharge<sup>17</sup> activity which is released as acoustic energy and radiates into the air as sound. Transmission line conductors are designed to operate below this threshold. However, surface contamination on a conductor or accidental damage during transport or installation can cause local enhancement of electric stress and initiate discharge activity leading to the generation of noise.*

*The highest noise levels generated by a line generally occur during rain. Water droplets may collect on the surface of the conductor and initiate corona discharges with noise levels being dependent on the level of rainfall. Fog may also give rise to increased noise levels, although these levels are lower than those during rain.*

*After a prolonged spell of dry weather without rain to wash the conductors, contamination may accumulate at sufficient levels to result in increased noise. After heavy rain, these discharge sources are washed away and the line will be quiet again. Surface grease on conductors can also give rise to audible noise effects as grease is able to move slowly under the influence of an electric field, tending to form points which then initiate discharge activity. Surface grease is likely to occur along the entire length of a conductor. Hence there may be many potential discharge sources and, consequently, a high noise level. This will only occur if substandard grease has been used during manufacture or if the conductor has been overheated by carrying excessive electrical load. This can be mitigated by conductor cleaning or replacement.*

*Transmission line audible noise is generally categorised as “crackle” or “hum”, according to its tonal content. Crackle may occur alone, but hum will usually occur only in conjunction with crackle. Hum is only likely to occur during rain when rates of rainfall exceed 1mm/hr. Crackle is a sound containing a random mixture of frequencies over a wide range, typically 1kHz to 10kHz. No individual pure tone can be identified for any significant duration. Crackle has a generally similar spectral content to the sound of rainfall. Hum is a sound consisting of a single pure tone or tones.*

*Audible noise effects can also arise from substation equipment such as transformers, quadrature boosters and mechanically switched capacitors. Transformers are installed at many substations, and generate low frequency hum. Whether the noise can be heard outside a substation depends on a number of factors, including transformer type and the level of noise attenuation present (either engineered intentionally or provided by other structures). Noise may also arise from discharges on overhead line fittings such as spacers, insulators and clamps.”*

- Paragraph 2.9.10 to 2.9.11 – *“The IPC should ensure that relevant assessment methodologies have been used in the evidence presented to them, and that the appropriate mitigation options have been considered and adopted. Where the applicant can demonstrate that appropriate mitigation measures will be put in place, the residual noise impacts are unlikely to be significant.*

*Consequently, noise from overhead lines is unlikely to lead to the IPC refusing an application, but it may need to consider the use of appropriate requirements to ensure noise is minimised as far as possible.”*

14.2.3 Draft NPS EN-1 broadly aligns with the existing NPS EN-1 with regards to noise and includes the following policy relating to noise and vibration:



- Paragraph 5.12.9 – “Development must be undertaken in accordance with statutory requirements for noise. Due regard must be given to the relevant sections of the Noise Policy Statement for England, the NPPF, and the government’s associated planning guidance on noise”

14.2.4 Draft NPS EN-5 broadly aligned with the existing NPS EN-5 with regards to noise and vibration but contains the following policy in relation to noise:

- Paragraph 2.12.10 – “Selection of the quietest cost-effective plant available must be considered.”

## Regional and local policy

14.2.5 Chapter 2: Legislation and Planning Policy Context sets out relevant regional and local policy.

## Guidance

14.2.6 Relevant guidance, specific to noise and vibration, that has informed this Scoping Report and would inform the assessment within the ES, comprises:

- BS 5228-1:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites – Part 1: Noise
- BS 5228-1:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration
- Calculation of Road Traffic Noise 1988
- DMRB LA 111: Noise and Vibration (National Highways, 2020)

## 14.3 Study area

14.3.1 At the time of writing this Scoping Report, traffic data and construction traffic routes were not available. For the purpose of defining the baseline for scoping, the Scoping Report Corridor has been used. This is based on professional judgement and knowledge of similar projects.

14.3.2 For the ES the study area for noise impacts would comprise Noise Sensitive Receptors (NSRs) within 300m from the proposed Order Limits / construction works associated with the Project, excluding traffic on the public highway which is considered separately below. This is based on guidance in British Standard 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (BS 5228-1) DMRB LA 111: Noise and Vibration (National Highways, 2020).

14.3.3 Noise from construction traffic on the existing road network would be assessed for each applicable road affected and defined within the ES. The assessment would consider the change in Basic Noise Level (BNL), calculated in line with the methodology described in technical memorandum Calculation of Road Traffic Noise (CRTN) (Department of Transport and Welsh Office, 1988), with a subsequent assessment of the impacts on NSRs on routes where potential significant effects are identified.

14.3.4 The proposed study area for vibration impacts, based on guidance from BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration (BS 5228-2) and DMRB LA 111: Noise and Vibration (National Highways, 2020), comprises 100m from the closest construction activity with the potential to generate vibration impacts at NSRs.

## 14.4 Data collection

- 14.4.1 The baseline assessment has been informed by a desk study which has drawn on the following information sources:
- Defra strategic noise mapping, presented as noise contours within Figure 14.1 at Appendix A, represents the daytime ambient noise levels from road and rail sources (Defra, 2017) Noise Important Areas (NIAs) (Defra, 2022)
  - Current OS mapping

## 14.5 Engagement with stakeholders

- 14.5.1 A summary of engagement undertaken to date is presented in Table 14.1.

Table 14.1 – Summary of engagement

Organisation and date	Summary of response	Consideration in the Scoping Report
Babergh Mid Suffolk Council, Thurrock, Norfolk County, Suffolk, Essex, Braintree Council, Chelmsford Council, Basildon, Colchester, Historic England, September 2022	A letter was issued to Local Planning Authorities setting out the proposed methodology and scope. Feedback queried by assessment of NSR within the study area are yet to be complete. Generally Local Authorities agreed with the measures being scoped out, assuming that relevant controls are enforced to ensure that the correct embedded mitigation is installed.	Assessments are to be undertaken as the Project progresses, with potential impacts of construction noise and vibration and construction traffic being scoped into the assessment.

## 14.6 Baseline conditions (inc. future baseline)

- 14.6.1 The Scoping Report Corridor has been designed as far as practicable to avoid sensitive noise and vibration features as set out in the Corridor and Preliminary Routeing and Siting Study (National Grid, 2022). This included avoiding settlements and residential areas, passing predominantly through rural areas, with the majority of NSR being isolated dwellings and small settlements.
- 14.6.2 The Scoping Report Corridor does, however, pass in proximity to larger built-up areas at (north to south) for example, Mulbarton, Diss, Gislegham, Stowmarket, Needham Market, Capel St Mary, Ardleigh, Aldham, Silver End, White Notley, Little Waltham, Broomfield, Chelmsford, Billericay, Horndon on the Hill, Stanford-le-Hope, Orsett, Linford, East Tilbury, and West Tilbury.
- 14.6.3 The Scoping Report Corridor crosses over or close to a number of main transport routes, including the following roads (north to south): A140; A1066; A143; A14; A1071; A12; A136; A1124; A120; A131; A1060; A414; A129; A127; A128; and A13, and the following railway lines (north to south): the Great Eastern Main Line, the Shenfield-Southend line, and the London, Tilbury and Southend line. These features are presented on Figure 14.1 at Appendix A.
- 14.6.4 NIAs are determined via strategic noise maps and highlight the residential areas

experiencing the highest 1% of noise levels from road and rail sources in England. There are 29 NIAs located on the existing public highway within the 300m study area (refer to Table 14.2 and Figure 14.1 at Appendix A).

Table 14.2 – NIAs within the study area

<b>NIA identification number</b>	<b>Associated Road/Railway</b>	<b>Responsible Authority</b>
5020	A140 (Road)	Norfolk
11345	A1071 (Road)	Suffolk
4790	A12 (Road)	National Highways
4791	A12 (Road)	National Highways
12056	A12 (Road)	National Highways
4788	A12 (Road)	National Highways
4787	A12 (Road)	National Highways
4786	A12 (Road)	National Highways
6097	A12 (Road)	National Highways
12065	A12 (Road)	National Highways
4783	A12 (Road)	National Highways
12054	A1124 (Road)	Essex
12053	A1124 (Road)	Essex
12052	A1124 (Road)	Essex
12051	A1124 (Road)	Essex
4760	A12 (Road)	National Highways
4756	A120 (Road)	National Highways
14333	A120 (Road)	National Highways
4755	A120 (Road)	National Highways
4754	A120 (Road)	National Highways
12047	A120 (Road)	National Highways
4752	A120 (Road)	National Highways
13893	A131 (Road)	Essex
5357	A12 (Road)	National Highways
5356	A12 (Road)	National Highways
6170	A12 (Road)	National Highways
5664	A127 (Road)	Essex
5665	A127 (Road)	Essex
13464	A127 (Road)	Essex
13478	A13 (Road)	Thurrock
5562	A1013/A13 (Road)	Thurrock

- 14.6.5 The noise climate is expected to vary along the Scoping Report Corridor depending on the nature of the area. For example, close to noise sources, such as roads and railways and in built up areas, ambient noise levels are expected to be higher. Further away from road and rail sources and in rural areas, ambient and background noise levels would be expected to be lower. Daytime noise level contours from existing road and railway sources are presented in Figure 14.1 at Appendix A, showing how existing noise levels vary along the Scoping Report Corridor. Areas outside of the contours are generally considered to have low ambient and background noise levels. Areas where the road and rail contours overlap are considered to experience noise effects from both sources.
- 14.6.6 Ecological and heritage sites that maybe affected by noise and vibration would be considered within Chapter 8: Ecology and Biodiversity and Chapter 11: Historic Environment of the ES.
- 14.6.7 It is assumed that existing vibration levels are negligible within the Scoping Report Corridor compared to construction vibration threshold values, which is likely to be the case even close to railways or busy main roads. The assessment will therefore consider potential construction vibration impacts against threshold values assuming no significant existing vibration sources.

### Future baseline

- 14.6.8 The future baseline relates to known or anticipated changes to the current baseline in the future which should be assessed as part of the Project in the ES.
- 14.6.9 No significant changes to the future noise and vibration baseline are anticipated owing to the largely rural and agricultural nature of the Scoping Report Corridor. Should there be any changes, these would be assessed within the ES.

## 14.7 Further data to be gathered / processed in the ES

- 14.7.1 The assessment within the ES would be informed by third party data and data obtained through survey, such as:
- Environmental baseline noise surveys if deemed necessary at specific locations following the initial assessment.
  - Construction programmes, locations, and methodologies
  - Construction plant noise and vibration data
  - Operational OHL and plant specifications, layouts, and noise data
  - Ordinance Survey AddressBase Plus data

## 14.8 Measures adopted as part of the Project

- 14.8.1 The Scoping Report Corridor has been designed to avoid as far as practicable impacts on sensitive noise and vibration features, including settlements as set out in the Corridor and Preliminary Routeing and Siting Study (National Grid, 2022). Further embedded measures would be developed as the Project design evolves, for example through detailed routeing within the Scoping Report Corridor.

### Construction

- 14.8.2 A range of standard measures for the Project would be adopted throughout the duration of the construction phase. Appendix B: Initial Outline CoCP outlines measures relevant

to noise and vibration. These include but are not limited to:

- A CoCP, a LEMP and a CTMP will be produced prior to construction (an Outline CoCP, outline LEMP and draft CTMP would be submitted with the DCO application). The outline CoCP will include measures to manage dust, waste, water, noise, vibration and soil during construction. The Main Works Contractor shall undertake daily site inspections to check conformance with the Management Plans
- Suitably experienced Environmental Manager(s) will be appointed for the duration of the construction phase. In addition, qualified and experienced Environmental Clerk of Works will be available during the construction phase to advise, supervise and report on the delivery of the mitigation methods and controls outlined in the CoCP. The Environmental Clerk of Work(s) will monitor that the works proceed in accordance with relevant environmental DCO requirements and adhere to the required good practice and mitigation measures. The Environmental Clerk of Works will be supported as necessary by appropriate specialists, including ecologists and arboriculturists
- Construction workers will undergo training to increase their awareness of environmental issues as applicable to their role on the Project. Topics will include but not be limited to:
  - Pollution prevention and pollution incident response
  - Dust management and control measures
  - Location and protection of sensitive environmental sites and features
  - Adherence to protected environmental areas around sensitive features
  - Working hours and noise and vibration reduction measures
  - Working with potentially contaminated materials
  - Waste management and storage
  - Flood risk response actions
  - Agreed traffic routes, access points, etc
- Any activity carried out or equipment located within a construction compound that may produce a noticeable nuisance, including but not limited to dust, noise, vibration and lighting, will be located as far as practicable away from sensitive receptors such as residential properties or ecological sites
- Plant and vehicles will conform to relevant applicable standards for the vehicle type. Vehicles will be correctly maintained and operated in accordance with manufacturer's recommendations and in a responsible manner. All plant and vehicles will be required to switch off their engines when not in use and when it is safe to do so
- Materials and equipment will not be moved or handled unnecessarily. When loading and unloading materials from vehicles, including cable drums and excavated materials, drop heights will be limited
- Working areas will be appropriately fenced. The type of fencing to be installed will be dependent on the area to be fenced and will take into consideration the level of security required in relation to the surrounding land and public access, rural or

urban environment and arable or stock farming. For some locations the fence used may also serve to provide acoustic and visual screening of the work sites and reduce the potential for disturbance of users in the surrounding areas. Fencing will be regularly inspected and maintained and removed as part of the demobilisation unless otherwise specified

- Contractors will be required to follow good construction practices (referred to as best practicable means (BPM)) as outlined in *BS 5228-1* and *BS 5228-2* to control noise and vibration respectively. *BS 5228-1* and *BS 5228-2* have Approved Code of Practice status (in England) under the powers conferred by Sections 71(1)(b), (2) and (3) of the Control of Pollution Act 1974, as enacted under *The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015*. Compliance with the good practice noise and vibration requirements stated therein became a statutory obligation under the Act
- BPM measures will be identified within the outline CoCP (submitted with the DCO application) and may include housing continuous noisy plant in acoustic enclosures, siting semi-static equipment as far as reasonably practicable away from occupied buildings, and fitting equipment with suitable enclosures or screening

14.8.3 In certain instances where construction noise and/ or vibration may cause a significant adverse effect at nearby NSRs, applications for prior consent under Section 61 of the Control of Pollution Act 1974 may be submitted to the relevant local authority to ensure that BPM are applied to control noise and vibration. This would be considered within the mitigation outlined in the outline CoCP to support the DCO application.

## Operation

### **OHL - noise control measures**

14.8.4 The OHL system is a 'triple araucaria' conductor bundle, which is regarded as practically quiet during all weather conditions. In addition, pylon fittings, such as insulators, dampers, spacers and clamps, are designed and procured in accordance with a series of National Grid Technical Specifications and must be type registered (rigorously tested) to ensure the fitting conforms to the specification. These processes reduce the potential for audible noise and tones to occur from all types of fittings, including insulators.

### **Substations - noise control measures**

14.8.5 The proposed new substation would include any required noise mitigation measures by design. This may include, plant selection, siting, screening, and enclosures, as appropriate.

### **Substations - vibration control measures**

14.8.6 Plant with moving parts, such as cooling equipment and transformers, would be expected to be mounted on suitable anti-vibration mounts to protect the plant from potential vibration impacts and also to attenuate vibration generated by the plant.

## 14.9 Likely significant effects

14.9.1 This section sets out the likely significant effects of the Project on noise and vibration. It assumes that the relevant embedded (design measures), standard and additional measures outlined within the Initial Outline CoCP at Appendix B, and the expected mitigation for any other consents or permits are in place before assessing the effects.

This is in accordance with guidance from the IEMA as part of preparing a proportional assessment (IEMA, 2022).

14.9.2 The likely effects of the Project have been split into:

- Construction
  - Noise effects from construction activities and traffic
  - Vibration effects from construction activities and traffic
- Operation
  - Noise effects from the operational substations, OHLs, CSEC and underground cables
  - Operational vibration
  - Maintenance activities

## Construction

### Noise effects from construction activities

14.9.3 There is the potential for significant effects due to construction noise at NSRs within the study area. However, this depends on the nature and the duration of activities, the distance between the noise source and the NSR, the sensitivity of the NSR, and the standard measures employed to reduce noise.

14.9.4 Construction activities associated with pylons, conductors, trenchless crossings and underground cables are generally transient and of a relatively short duration at any one location, and together with the implementation of standard measures, significant effects from such works are not anticipated. There is a greater likelihood of significant adverse effects from construction noise at static sites, such as construction compounds and substations where the duration of works may be medium to long term, although these can generally be avoided with the implementation of standard measures set out within the outline CoCP (submitted with the DCO application).

14.9.5 Although significant adverse effects from construction noise are not expected, an assessment of construction noise impacts is proposed to be **scoped into the ES** to highlight any potential construction noise 'hotspots' that require further consideration during the construction phase. Construction noise hotspots are likely to include areas where piling may be required and at the trenchless crossing locations where night-time working may be required where certain operations, such as cable jointing, cannot be stopped once started.

### Noise effects from construction traffic

14.9.6 There is the potential for significant effects at NSRs close to construction traffic routes. Noise from construction traffic on the public highway is therefore proposed to be **scoped into** the ES.

### Vibration effects from construction activities – structures

14.9.7 Sources of construction vibration include piling and vibratory compaction. Construction vibration would not be expected to cause damage to buildings or structures unless very high levels of vibration are generated. Such levels would only be expected to occur where vibration generating activities occur very close to structures, within approximately 10m. Such distances between vibration generating activities and structures are not expected during the Project, therefore, construction vibration effects on structures are proposed to be **scoped out** of the ES, although this would be reviewed during the

iterative design process.

### **Vibration effects from construction activities – human**

- 14.9.8 There is the potential for effects on human receptors (i.e., nuisance) due to construction vibration at NSRs within the study area. The level of significance would depend on the nature and the duration of activities, the distance between the source of vibration and the NSR, the sensitivity of the NSR, and the standard measures employed to reduce vibration. However, the duration of such activities would be expected to be relatively short at any one location, and, together with the implementation of standard measures, significant effects from such works are not anticipated.
- 14.9.9 Although significant adverse effects from construction vibration are not expected, an assessment of construction vibration impacts on human receptors is proposed to be **scoped into the ES** to highlight any potential construction vibration 'hotspots', in terms of human receptors, for further consideration during the construction phase.

### **Vibration effects from construction traffic**

- 14.9.10 Vibration from traffic on the public highway is caused by irregularities in the road surface. Where the road surface is free from irregularities, such as potholes, significant vibration effects would not be expected, even at relatively short distances. This is based on guidance in DMRB LA 111: Noise and vibration (National Highways, 2020). For this reason, vibration from construction on the public highway is proposed to be **scoped out** of the ES.

## **Operation (inc. maintenance)**

### **Noise effects from substations**

- 14.9.11 The proposed new East Anglia Connection (EAC) Node substation located in the Tendring District, and extensions / works required at the existing Norwich Main, Bramford, and Tilbury Substations would include noise mitigation measures by design and would be subject to separate local planning applications. Therefore, significant adverse effects from noise are not expected and proposed to be **scoped out** of the ES.

### **Noise effects from OHLs**

- 14.9.12 Operational noise from the OHL is not likely to be significant at nearby NSRs under any weather conditions owing to the proposed 'triple araucaria' design and is therefore proposed to be **scoped out** of the ES. Should the iterative design process result in alternative conductor types being used, consideration for this would be assessed within the ES.
- 14.9.13 Pylon fittings, such as insulators, dampers, spacers and clamps, are designed and procured in accordance with a series of National Grid Technical Specifications and must be type registered. These processes reduce the potential for audible noise and tones to occur from all types of fittings, including insulators. Where noise does occur, it is likely to be localised and of short duration. If this is due to a fault, action can be taken to rectify it. Where noise from fittings does occur which results in a complaint, appropriate action can be taken to seek to remedy the cause of the noise, usually through cleaning or replacing the relevant fitting. Noise from fittings is therefore not expected to be at levels considered significant under normal operation and is proposed to be **scoped out** of the ES.
- 14.9.14 A technical note would be submitted as part of the application for development consent to support scoping out noise associated with OHLs from the ES.



### Noise effects from CSEC

- 14.9.15 The source of operational noise is the same as that from an OHL (i.e., the conductors) which would be ‘practically quiet’ during operation. Operational noise from CSEC is therefore proposed to be **scoped out** of the ES.

### Noise effects from underground cables

- 14.9.16 Underground cables are practically quiet and therefore not considered likely to cause significant effects. Operational noise from underground cables are proposed to be **scoped out** of the ES.

### Vibration

- 14.9.17 There are no sources of operational vibration proposed as part of the Project as plant with moving parts, including cooling equipment and transformers, would be mounted on suitable anti-vibration mounts. Vibration would therefore not be expected to be perceptible even in very close proximity to plant. Operational vibration is therefore proposed to be **scoped out** of the ES.

### Maintenance activities

- 14.9.18 Maintenance of the OHL, underground cables, and substations would be infrequent and localised and short term in duration. Maintenance activities would follow standard measures to reduce noise and vibration where required. Noise and vibration associated with operational maintenance is therefore proposed to be **scoped out** of the ES.

## 14.10 Proposed assessment methodology

- 14.10.1 This section sets out the proposed methodology for the Noise and Vibration assessment of the ES. This is based on guidance set out in BS 5228-1, BS 5228-2 and DMRB LA 111: Noise and vibration.

### Assessment methodology - Construction noise

- 14.10.2 Construction noise impacts would be assessed in accordance with BS 5228-1 and with the guidance of DMRB LA 111: Noise and vibration (National Highways, 2020).
- 14.10.3 Construction noise levels would be calculated at the facades of NSRs within the study area in accordance with the methodology described in Annex F of BS 5228-1. The predicted construction noise levels at NSRs would be compared against the lower noise thresholds (Category A) as detailed in Section E.3.2 of BS 5228-1 (the ‘ABC’ method). The Category A construction noise thresholds represent the lowest assessment criteria (typically used to assess impacts in rural areas) and are proposed to be used throughout the Project as a worst-case unless there is a justification for a higher threshold to be set (e.g., via noise survey or Defra noise mapping data) at specific locations.
- 14.10.4 The Lowest Observed Adverse Effect Level (LOAEL) and the Significant Observed Adverse Effect Level (SOAEL) would be established in accordance with Table 14.3.

Table 14.3 – Construction noise LOAELs and SOAELs at residential receptors

Time Period	LOAEL	SOAEL
Weekdays 7:00am to 7:00pm, and Saturdays 7:00am to 1:00pm	50dB LAeq,T	65dB LAeq,T
Weekdays 7:00pm to 11:00pm, Saturdays 1:00pm to 11:00pm, and Sundays 7:00am to 11:00pm	50dB LAeq,T	55dB LAeq,T

Time Period	LOAEL	SOAEL
Night-time 11:00pm to 7:00am	50dB L <sub>Aeq,T</sub>	45dB L <sub>Aeq,T</sub>

#### Assessment methodology - Construction traffic noise

14.10.5 Noise from construction traffic on the public highway would be calculated in accordance with CRTN and assessed against the criteria detailed in DMRB LA 111: Noise and vibration (National Highways, 2020). The BNL from roads within the construction traffic study area would be calculated in accordance with CRTN for the ‘do-nothing’ and ‘do-something’ scenarios in the construction year. The calculated BNL values would be compared to determine the magnitude of the impact.

#### Assessment methodology - Construction vibration

14.10.6 Construction vibration levels would be calculated and assessed in accordance with the methodologies described in BS 5228-2. No vibration baseline study is proposed within the ES and construction vibration levels would be compared against fixed assessment criteria appropriate detailed in BS 5228-2.

14.10.7 Vibration levels from construction activities would be calculated in accordance with the methodology described in Annex E of BS 5228-2. Construction vibration effect threshold levels, including applicable LOAEL and SOAEL. These are presented in Table 14.4.

Table 14.4 – Construction vibration effect magnitudes at residential receptors

Vibration Level mm/s PPV*	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3	Vibration might be just perceptible in residential environments (LOAEL).
1.0	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents (SOAEL).
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments

\* Peak Particle Velocity

#### Assessment methodology – Baseline noise surveys

14.10.8 Baseline noise surveys are not proposed as part of the assessment unless there is a justifiable reason for a particular NSR. In lieu of baseline noise data, worst-case lower thresholds would be used for the assessment of construction noise unless Defra strategic noise mapping data could be utilised to justify a higher threshold, where appropriate. Where surveys are carried out, they would be conducted in general accordance with the methodology described in BS 7445-1:2003 Description and measurement of environmental noise. Guide to quantities and procedures (BS 7445).

14.10.9 The sound level meter would measure a range of parameters including the following:

- L<sub>Aeq,T</sub> – The A-weighted equivalent continuous sound pressure level over the measurement period T, representative of the ‘average’ sound pressure level over a given period, in this case 15 minutes
- L<sub>A10,T</sub> – The L<sub>A10</sub> is defined as the noise level that is exceeded for 10% of the measurement period, and is usually regarded as a descriptor of road traffic noise

- $L_{A90,T}$  – The  $L_{A90}$  is defined as the noise level that is exceeded for 90% of the measurement period, and is usually regarded as a descriptor of the background noise level
- $L_{AFmax,T}$  – The  $L_{AFmax}$  is the maximum A-weighted noise level during the sample period, measured using a fast time weighting

14.10.10 Broadband and 1/3 octave band values would also be measured for the above parameters.

14.10.11 The measurement periods and durations would be appropriate to the measurement required. Microphones would be fitted with windshield and tripod mounted between 1.3m – 1.5m from ground level. The measurement locations would be free-field, at least 3.5m from any reflective surfaces, other than the ground, where possible. Otherwise a suitable correction would be applied.

14.10.12 Weather conditions would be monitored during the survey.

### Ascribing value

14.10.13 NSRs are determined partly on property type, for example residential properties are of a higher sensitivity than factories and offices. The sensitivity of residential NSRs is factored into the assessment criteria for noise and vibration impacts.

14.10.14 Although all residential NSRs are sensitive to noise and vibration, there are also cases where the sensitivity of an NSR may depend on the pre-existing noise climate. For example, NSRs falling within existing high noise areas (such as NIAs) may be more sensitive to increases in noise than those outside NIAs. Consideration would be given to such instances as part of the assessment of construction impacts.

14.10.15 Although the sensitivity of residential NSR is factored into the assessment methodologies, additional consideration of sensitivity may be required in certain cases for non-residential NSRs. The criteria used to determine the value and sensitivity of non-residential NSRs specific to noise and vibration are set out in Table 14.5. These values are based on standard practice.

Table 14.5 – Criteria for determining value / sensitivity – Non-residential NSR

Sensitivity / Value	Criteria
High	Schools and education premises, hospitals, clinics, care homes, places of worship, community centres, libraries
Medium	Areas primarily used for leisure activities including Public Rights of Way (PRoW), sports facilities and sites of historic or cultural importance, camp sites, hotels, gardens, parks
Low	Offices, cafes / bars with external areas
Negligible	Industrial or retail premises

### Impact magnitude

#### Impact magnitude - construction noise

14.10.16 The magnitude of impact of construction noise would be determined against the criteria specified by DMRB LA 111: Noise and vibration (National Highways, 2020), as detailed in Table 14.6.

Table 14.6 – Magnitude of impact from construction noise at residential receptors

<b>Magnitude</b>	<b>Construction Noise Level</b>
Major	Above or equal to SOAEL +5dB
Moderate	Above or equal to SOAEL and below SOAEL +5dB
Minor	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

**Impact magnitude - Construction traffic noise**

14.10.17 The calculated BNL values for the ‘do-minimum’ and ‘do-something’ scenarios in the construction year would be compared to determine the magnitude of the impact in accordance with criteria specified by DMRB LA 111: Noise and vibration (National Highways, 2020) as detailed in Table 14.7.

Table 14.7 – Magnitude of impact from construction traffic at residential receptors

<b>Magnitude</b>	<b>Increase in BNL of Closest Public Road Used for Construction Traffic (dB)</b>
Major	Greater than or equal to 5.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Minor	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0

**Impact magnitude – Construction vibration**

14.10.18 The magnitude of impact of construction vibration would be determined against the criteria specified by DMRB LA 111: Noise and vibration (National Highways, 2020), as detailed in Table 14.8.

Table 14.8 – Magnitude of impact of construction vibration at residential receptors

<b>Magnitude</b>	<b>Construction Vibration Level</b>
Major	Above or equal to 10mm/s PPV
Moderate	Above or equal to SOAEL and below 10mm/s PPV
Minor	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

**Significance of effects**

14.10.19 The significance of effect would be expressed as a result of the value and magnitude of impact on receptors, experienced as a result of the Project. The significance would be expressed as major, moderate, minor, negligible or neutral and either adverse or beneficial.

**Residential NSR**

14.10.20 Noise from construction activities, construction traffic noise, and construction vibration would constitute a significant adverse effect at residential NSR where it is determined that a major or moderate magnitude of impact would occur for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights, and/or
- A total number of days exceeding 40 in any six consecutive months

## Non-Residential NSR

- 14.10.21 With regards to non-residential receptors, the significance of effect would be determined via the matrix shown in Table 14.9, taking account of the sensitivity of the NSR and the impact magnitude. For construction impacts, the duration of impact would also be taken into account, as above.

Table 14.9 – Significance matrix at non-residential NSRs

		NSR Sensitivity:			
		High	Medium	Low	Negligible
Impact Magnitude	Major	Major	Major	Moderate	Minor
	Moderate	Moderate	Moderate	Minor	Negligible
	Minor	Moderate	Minor	Negligible	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

- 14.10.22 Major and moderate effects are typically considered to be significant, whilst minor and negligible effects are considered to be not significant. However, professional judgement would also be applied in reaching conclusions as to the significance of effects at specific non-residential NSRs.

## 14.11 Proposed scope of the ES

- 14.11.1 The matters that are scoped in and out of further assessment for noise and vibration are outlined in Table 14.10.

Table 14.10 – Matters scoped in or out of the ES

Matter	Phase	Scoped in / out	Justification
Construction noise	Construction	Scoped in	Potential significant effects from construction noise from static sites such as the substation and construction compounds at nearby NSR.
Construction traffic noise	Construction	Scoped in	Potential significant effects at NSRs close to construction traffic routes.
Construction vibration	Construction	Scoped in	Potential significant effects at NSR from construction vibration due to piling and compaction activities associated with the construction of the substations, pylons and construction compounds.
Construction traffic vibration	Construction	Scoped out	No likely significant effects.
Operational noise from substations, OHLs, CSE compounds and underground cables	Operation	Scoped out	No likely significant effects.

<b>Matter</b>	<b>Phase</b>	<b>Scoped in / out</b>	<b>Justification</b>
Operational vibration	Operation	Scoped out	No likely significant effects.
Noise and vibration associated with maintenance activities	Operation	Scoped out	Effects likely to be similar or less than those during construction at nearby NSR

# 15 Socio-Economic, Recreation and Tourism

## 15.1 Approach to scoping

15.1.1 The approach to scoping has drawn from previous experience of similar projects. Determining the scope of the Socio-Economics, Recreation and Tourism assessment has included the following stages:

- Regulatory and planning policy context
- Defining the study area
- Engagement with stakeholders
- Stating sources of data collected
- Outlining baseline conditions
- Highlighting further data to be gathered
- Outlining environmental measures
- Predicting likely significant effects
- Drafting the proposed assessment methodology
- Stating the proposed scope of the ES

15.1.2 There are interrelationships related to the potential effects on Socio-Economics, Recreation and Tourism and other environmental topics. Therefore, please also refer to the following chapters:

- Chapter 7: Air Quality
- Chapter 10: Health and Wellbeing
- Chapter 13: Landscape and Visual
- Chapter 14: Noise and Vibration
- Chapter 16: Traffic and Transport

15.1.3 This chapter should also be read in parallel with Figure 15.1 and Figure 15.2 at Appendix A.

## 15.2 Regulatory and planning policy context

### National policy

15.2.1 Chapter 2: Legislation and Planning Policy Context sets out the overarching policy relevant to the Project including Overarching NPS for Energy EN-1 and NPS for Electricity Networks Infrastructure EN-5. EN-1 contains the following paragraphs at 5.12 relating to socio-economics which have been considered within this chapter:

- Paragraph 5.12.4 – *“Applicants should describe the existing socio-economic conditions in the areas surrounding the proposed development and should also*

*refer to how the development's socio-economic impacts correlate with local planning policies”*

- Paragraph 5.12.6 – *“The IPC should have regard to the potential socio-economic impacts of new energy infrastructure identified by the applicant and from any other sources that the IPC considers to be both relevant and important to its decision”*
- Paragraph 5.12.7 – *“The IPC may conclude that limited weight is to be given to assertions of socio-economic impacts that are not supported by evidence (particularly in view of the need for energy infrastructure as set out in this NPS)”*
- Paragraph 5.12.8 – *“The IPC should consider any relevant positive provisions the developer has made or is proposing to make to mitigate impacts (for example through planning obligations) and any legacy benefits that may arise as well as any options for phasing development in relation to the socio-economic impacts”*

15.2.2 NPS EN-5 does not contain any specific policy in relation to socio-economics, recreation or tourism.

15.2.3 Draft versions of NPS EN-1 and EN-5 are also available, however they are consistent with the current NPSs in relation to socio-economics, recreation and tourism.

## Regional and local policy

15.2.4 Chapter 2: Legislation and Planning Policy Context sets out relevant regional and local policy.

## Guidance

15.2.5 There is no published guidelines or specific guidance for assessing socio-economic, recreation or tourism related impacts as part of an EIA. However, the economic and employment impact assessment would be informed by the principles set out in the HM Treasury Green Book (HM Treasury (2022)).

## 15.3 Study area

15.3.1 The study area comprises the following two spatial scales:

- **Local** - study area comprising the Scoping Report Corridor (which would be refined to comprise the proposed Order Limits within the ES)
- **Wider** - study area comprising all local authority spatial areas that the Scoping Report Corridor (which would be refined to the proposed Order Limits within the ES) passes through (South Norfolk District Council, Mid Suffolk District Council, Babergh District Council, Tendring District Council, Colchester District Council, Braintree District Council, Chelmsford District Council, Basildon District Council, Brentwood District Council and Thurrock Council)

15.3.2 The two study areas are based on professional judgement and previous knowledge of similar projects. The purpose of the two study areas is because data is available at different spatial scales and also to capture socio-economic, recreation and tourism effects that may occur at different spatial scales.

15.3.3 The **local** and **wider** study areas are presented on Figure 15.1 at Appendix A.



## 15.4 Data collection

15.4.1 The baseline assessment has been informed by a desk study which has drawn on the following information sources:

- Local economy and employment:
  - Age profile (Census 2011; Office for National Statistics (ONS))
  - Population growth (Census 2011; ONS)
  - Deprivation (Census 2011; ONS; Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government)
  - Employment levels (NOMIS (ONS Official Labour Market Statistics service)
  - Skills and qualifications (NOMIS (ONS Official Labour Market Statistics service)
  - Employment sectors (NOMIS (ONS Official Labour Market Statistics service)
  - Annual business survey (ONS)
  - Local planning evidence base economic and employment studies and strategies where relevant e.g., local authority economic assessments, employment land reviews
- Planning and development (data source: aerial mapping and local planning authority information)
- Community facilities:
  - Education (aerial mapping; local planning authority delivery plans and studies)
  - Healthcare facilities (aerial mapping; local planning authority delivery plans and studies)
  - Libraries (aerial mapping; local planning authority delivery plans and studies)
  - Post offices (aerial mapping; local planning authority delivery plans and studies)
  - Community centres (aerial mapping; local planning authority delivery plans and studies)
  - Youth centres and places of worship (aerial mapping; local planning authority delivery plans and studies)
- Tourism and recreation:
  - Assets and statistics (aerial mapping; Babergh and Mid Suffolk Open Space Assessment May 2019, Visit East of England Destination Development Plan Sept 2021 and Tourism Strategy for Tendering (2021-2026))

## 15.5 Engagement with stakeholders

15.5.1 A summary of engagement undertaken to date is presented in Table 15.1.

Table 15.1 – Summary of engagement

Organisation and date	Summary of response	Consideration in the Scoping Report
<p>Leisure Projects Officer Chelmsford City Council July 2022</p>	<p>Request for sports pitches and courts to be included under Tourism and Recreation. Seeking clarity on who will engage with those directly affected. Highlighting Hylands Estate as an important business and tourism location.</p>	<p>This information would be addressed within the ES.</p>
<p>Multiple local authority officers in attendance at Thematic Group Meeting for Socio-economics, Recreation and Tourism Attendees: Basildon Council Babergh and Mid Suffolk District Councils Essex County Council Colchester Borough Council Thurrock Council South Norfolk Council and Broadland District Council Norfolk County Council Braintree District Council Suffolk County Council AONB Manager for Suffolk Coast and Heaths and Dedham Vale AONB Thurrock Council Chelmsford City Council July 2022</p>	<p>Presentation of proposed approach to assessment. The purpose of the meeting was to obtain early feedback on the proposed scope of the EIA and to enable feedback to be considered ahead of formal submission of the Scoping Report to the Planning Inspectorate.</p>	<p>Areas discussed included: 1.Impacts on businesses as a result of construction traffic and activities 2.Potential impacts to perception of tourism in the area 3.Access to education and employment destinations 4.Consideration of the AONB as a tourism asset 5.Extent and impacts of construction workforce, including local employment and training.</p>

## 15.6 Baseline conditions (inc. future baseline)

- 15.6.1 This section summarises the current baseline regarding the socio-economic, recreation and tourism characteristics of the wider study area and describes tourism and recreation features, within the local study area.
- 15.6.2 The baseline conditions do not list all socio-economic and land uses (including tourist and recreation features) within the study area exhaustively. However, are representative of the socio-economic, tourism and recreation conditions in the study area.

## Economy and employment

### Population

- 15.6.3 Information on age profile, population growth and deprivation has been gathered from the ONS Annual Population Survey (2021) and the Index of Multiple Deprivation (2019) and presented in Tables 15.2 and 15.3.
- 15.6.4 The Project is located across 10 local planning authority areas, the resident populations, as of 2021, are presented in Table 15.2. Brentwood and Babergh are the least populous areas, whereas Colchester and Basildon are the most populous. The total estimated population for the wider study area in 2021 is 1.5 million.
- 15.6.5 The population profile for these local authorities (Table 15.3) shows that Tendring has the highest percentage of population 65 years and over, whilst Thurrock has the lowest. Tendring and Mid Suffolk have the lowest percentage of population 15 years and under, whilst Thurrock has the highest. Thurrock also has the highest percentage of population aged 15 to 64 years, whilst Tendring has the lowest.
- 15.6.6 Across England, population growth was highest in the East of England region increasing by 8.3% (approximately 488,000 people) since 2011, compared to 6.6% across England as a whole. South Norfolk and Thurrock districts experienced the highest population growth at 14.4% and 11.6% respectively. It should be noted that population change in certain areas may reflect how the COVID-19 pandemic affected people's choice of usual residence at the time of the census (for example, university students studying virtually from 'home' rather than living in university accommodation). These changes might have been temporary for some and more long-lasting for others.
- 15.6.7 The English Indices of Deprivation 2019 provides statistics on relative deprivation in Lower Super Output Areas (LSOAs) (areas smaller than ward level) in England. The average rank of local authority areas within the study area is provided in Table 15.2. This measure is calculated by averaging all of the LSOA ranks in each local authority area after they have been population weighted. The 'average rank' is then ranked, where the rank of 1 (most deprived) is given to the area with the highest score. On average, the areas of Tendring, Basildon and Thurrock are among the most deprived areas, whereas Chelmsford and Brentwood are among the least deprived.

**Table 15.2 – Population size, population increase and deprivation (Census 2021 ONS and English Indices of Deprivation 2019 UK Government)**

<b>Local authority</b>	<b>Population (2021)</b>	<b>Increase</b>	<b>Deprivation (IMD 2019 Rank of average rank)</b>
Thurrock	176,000	11.6%	116
Brentwood	77,000	4.6%	287
Basildon	187,600	7.5%	111
Chelmsford	181,500	7.8%	260
Braintree	155,200	5.5%	203
Colchester	192,700	11.3%	181
Tendring	148,100	7.3%	32

Local authority	Population (2021)	Increase	Deprivation (IMD 2019 Rank of average rank)
Babergh	92,300	5.2%	212
Mid Suffolk	102,700	6.2%	229
South Norfolk	141,900	14.4%	225
Wider Study Area	1.5 million	n/a	n/a
East of England	6.3 million	8.3%	n/a
England	56.5 million	6.6%	n/a

Table 15.3 – Percentage of population in age groups (Census 2021 ONS)

Local authority	Aged under 15 years (%)	Aged 15 to 64 years (%)	Aged 65 years and over (%)
Thurrock	21.3	65.3	13.6
Brentwood	17.4	62.5	20.1
Basildon	19.6	63.5	17.0
Chelmsford	17.5	63.2	19.4
Braintree	17.3	62.4	20.4
Colchester	17.7	64.5	17.8
Tendring	14.9	55.6	29.6
Babergh	15.1	58.4	26.4
Mid Suffolk	14.9	59.7	25.3
South Norfolk	16.3	59.3	24.3

### Economy and employment

- 15.6.8 Information on economic activity rate, occupational sector and skills and qualification levels is taken from the ONS Annual Population Survey (2021) and presented in Table 15.4. Total employment by sector for the wider study area is provided by the Business Register and Employment Survey (BRES) published by the ONS. This is presented in Table 15.5. Both tables show that the wider study area has a relatively healthy economy and employment status compared to the England average. It demonstrates that the wider study area has a more highly skilled workforce than the England average. Given the wider study areas rural character there is a higher proportion of people working in the primary sector (including agriculture) compared to the England average.

Table 15.4 – Economic activity rate, occupational group and skills and qualifications  
(Annual Population Survey 2021 ONS)

<b>Socio-economic indicator</b>	<b>Wider Study Area No.</b>	<b>%</b>	<b>East of England No.</b>	<b>%</b>	<b>England No.</b>	<b>%</b>
Economic activity rate – aged 16-64	702,300	80%	3,062,000	81%	27,394,600	79%
% all in employment who are:						
1: managers, directors and senior officials	65,200	9%	120,900	4%	1,282,100	5%
2: professional occupations	142,500	20%	329,100	11%	2,931,900	11%
3: associate prof and tech occupations	105,500	15%	684,100	22%	6,499,100	24%
4: administrative and secretarial occupations	89,500	13%	466,400	15%	4,172,600	15%
5: skilled trades occupations	68,600	10%	354,700	12%	2,779,900	10%
6: caring, leisure and other service occupations	58,300	8%	291,900	9%	2,361,900	9%
7: sales and customer service occupations	52,700	7%	275,900	9%	2,472,500	9%
8: process, plant and machine operatives	49,400	7%	210,700	7%	1,844,200	7%
9: elementary occupations	67,700	10%	168,500	5%	1,475,700	5%
% with NVQ4+ - aged 16-64	299,100	34%	286,700	9%	2,586,300	10%
% with NVQ3+ - aged 16-64	471,100	54%	1,489,500	40%	14,975,100	43%
% with NVQ2+ - aged 16-64	651,000	75%	2,189,100	58%	21,294,000	61%
% with NVQ1+ - aged 16-64	771,100	88%	2,891,200	77%	27,136,000	78%
% with other qualifications (NVQ) – aged 16-64	54,200	6%	3,335,500	89%	30,470,700	88%

Table 15.5 – Employment by sector (Business Register and Employment Survey, ONS 2020)

<b>Sector</b>	<b>Wider Study Area No.</b>	<b>%</b>	<b>East of England No.</b>	<b>%</b>	<b>England No.</b>	<b>%</b>
Primary (agriculture, mining etc.)	14,950	2.6%	64,000	2.3%	475,000	1.8%
Manufacturing	37,500	6.5%	193,000	6.9%	1,998,000	7.7%
Construction	45,500	7.9%	178,000	6.4%	1,218,000	4.7%
Retail, wholesale and motor	100,350	17.4%	446,000	16.0%	3,861,000	15.0%

<b>Sector</b>	<b>Wider Study Area No.</b>	<b>%</b>	<b>East of England No.</b>	<b>%</b>	<b>England No.</b>	<b>%</b>
Transport and storage (inc postal)	38,750	6.7%	155,000	5.6%	1,340,000	5.2%
Accommodation & food services	38,500	6.7%	194,000	7.0%	1,844,000	7.1%
IT, financial, professional, admin	127,100	22.0%	757,000	27.1%	7,202,000	27.9%
Public administration and defence	19,350	3.3%	93,000	3.3%	1,082,000	4.2%
Education	46,500	8.0%	248,000	8.9%	2,313,000	9.0%
Health	89,000	15.4%	353,000	12.7%	3,394,000	13.2%
Arts, entertainment, recreation and other services	20,250	3.5%	108,000	3.9%	1,080,000	4.2%
<b>Total</b>	<b>577,750</b>		<b>2,789,000</b>		<b>25,807,000</b>	

## Community facilities

- 15.6.9 Community facilities include health facilities such as health centres and hospitals, educational facilities such as schools, colleges and universities, and community facilities such as village halls and places of worship amongst others. Community facilities are a means of stimulating social inclusion and provide an important resource to the existing and future community.
- 15.6.10 The Scoping Report Corridor has been designed to avoid direct effects, as practicable, on sensitive community facilities and largely passes through agricultural land. However, given the extent of the local study area there are community facilities located within its boundaries. Table 15.6 presents the community facilities initially identified as being within the local study area. They are presented on Figure 15.2 at Appendix A.

Table 15.6 – Community facilities

<b>Community Facilities Category</b>	<b>Name/Description</b>	<b>Local Planning Authority Area</b>
Community	Condoverters Scout Activity Centre	Thurrock
Community	St. Giles' Church, Mountnessing	Brentwood
Community	St. Mary the Virgin Church (St Mary and St Peter)	Chelmsford
Community	Aldham Village Hall	Colchester
Education	Holmwood House Nursery	Colchester
Community	St. Johns Church Great Wenham	Colchester

<b>Community Facilities Category</b>	<b>Name/Description</b>	<b>Local Planning Authority Area</b>
Community	All Saints Church, Little Wenham	Colchester
Community	St. Peters Church, Creeting	Mid Suffolk
Community	Church of St. Mary the Virgin, Wortham	Mid Suffolk

## Tourism and recreation

### Tourism accommodation

15.6.11 Table 15.7 summarises the number of bedspaces available at the wider study area, East of England and England. It shows that there are 48,542 beds in the wider study area. Visit England data suggests that the room occupancy in the peak period (August 2021) was 77% in the East of England. Applying 23% spare capacity to the total number of beds suggests that there could be around 11,000 spare tourist beds in the wider study area. If more localised data is available this would be reviewed in later stages of the EIA process.

Table 15.7 – Number of bedspaces (Visit Britain survey of accommodation stock, 2016)

<b>Type of Accommodation</b>	<b>Wider Study Area</b>	<b>East of England</b>	<b>England</b>
Hotels and similar establishments	17,551	111,884	1,761,770
<b>Total serviced accommodation</b>	<b>17,551</b>	<b>111,884</b>	<b>1,761,770</b>
Holiday dwellings	1,538	17,684	324,318
Tourist campsites	29,396	52,680	909,029
Other collective accommodation	57	3,232	156,077
<b>Total Non-serviced</b>	<b>30,991</b>	<b>73,596</b>	<b>1,389,424</b>
<b>Total Accommodation</b>	<b>48,542</b>	<b>185,480</b>	<b>6,302,389</b>

### Tourism and recreation assets

15.6.12 Tourism and recreation assets include natural (National Parks, AONBs, coastline, paths and trails), cultural and heritage assets, settlements, and a number of related and other attractions and recreation assets such as golf courses, horse riding centres, paintballing etc (these assets would be presented on a figure in the ES). The Scoping Report Corridor has been designed as far as practicable to avoid direct effects to sensitive tourism assets. However, as with community facilities described above, given the significant size of the local study area it is inevitable that some tourism and recreation assets are located within the local study area. An initial review of tourism and recreation assets within the local study was undertaken and details are provided within Table 15.8, they are also presented on Figure 15.2 at Appendix A (cultural heritage assets are presented on Figure 10.1 at Appendix A).

Table 15.8 – Tourism and recreation assets

<b>Tourism and Recreation Asset Type</b>	<b>Name/Description</b>	<b>Local Planning Authority Area</b>
Recreation	Orsett Golf Club	Thurrock
Recreation	St. Cleres Hall Golf Club	Thurrock
Recreation	Langdon Hills Golf Country Club and Hotel	Thurrock
Recreation	Dunton Hills Family Golf Centre	Brentwood
Tourism	The Rectory Wedding Venue	Brentwood
Recreation	St Margaret's Riding School	Basildon
Tourism	Ingatestone Hall, Historic House	Chelmsford
Recreation	Willowmere and Chasewater Angling Club	Chelmsford
Recreation	King Edward VI Grammar School, Bedford Sports Fields	Chelmsford
Tourism	The Hare, Public House, Roxwell Road	Chelmsford
Tourism	Manna's Ark, Witham, Chelmsford	Chelmsford
Tourism	The George at Kelvedon, Public House, Coggeshall Road	Chelmsford
Tourism	Hylands Estate	Chelmsford
Tourism	Feeringbury Manor and Gardens, Feering	Colchester
Tourism	The Kings Arm Broad Green, Public House, Coggeshall Road	Colchester
Tourism	Little Tey Barn, Holidays homes	Colchester
Tourism	The Barn Brasserie, Restaurant and Wedding Venue, Brook Road, Great Tey	Colchester
Recreation	Hillhouse Wood Nature Reserve	Colchester
Recreation	Nationwide Paintball Colchester Bergholt, Sprawls Farm, Bures Road, Bergholt	Colchester



<b>Tourism and Recreation Asset Type</b>	<b>Name/Description</b>	<b>Local Planning Authority Area</b>
Tourism	Ardleigh Caravan and Camping Park, Dead Lane, Ardleigh	Tendring
Tourism	The Glass Room (holiday let), Ardleigh	Tendring
Tourism	Island Lodge, Dedham Road, Ardleigh	Tendring
Tourism	Weavers House, The St, Stratford St Mary	Babergh
Tourism	Pear Tree House (holiday accommodation), Upper Street, Higham	Babergh
Tourism	The Wood Shed (holiday accommodation), Higham Lodge, Upper Street, Higham	Babergh
Recreation	Stratford Hills Equestrian Centre, Hills Farm, Ipswich Road, Stratford St Mary	Babergh
Recreation	Brett Vale Golf Club	Babergh
Tourism	Queens Head Public House, The Row, Great Wenham	Babergh
Recreation	Hintlesham Fisheries, Fenn Far, Hadleigh Road, Burstall	Babergh
Tourism	Finjaro Guest House, Valley Farm Drive	Babergh
Tourism	Flowton Hall Cottage, Flowton (holiday accommodation)	Mid Suffolk
Tourism	Mousehall Barn, Flowton (holiday accommodation)	Mid Suffolk
Tourism	Doves Barn (holiday accommodation)	Mid Suffolk
Recreation	Creeting Lakes	Mid Suffolk
Tourism	The Old Dairy (holiday accommodation)	Mid Suffolk
Recreation	Mellis Common Nature Reserve	Mid Suffolk
Tourism	Bressingham Steam Museum and Gardens	South Norfolk
Recreation	Darrow Farm Fishery	South Norfolk

<b>Tourism and Recreation Asset Type</b>	<b>Name/Description</b>	<b>Local Planning Authority Area</b>
Tourism	Low Barn Farm Wedding Venue	South Norfolk
Tourism	Meadow Farm Cottage Bed and Breakfast	South Norfolk

## Future baseline

- 15.6.13 The future baseline relates to known or anticipated changes to the current baseline in the future which would be assessed as part of the Project in the ES.
- 15.6.14 Tourist numbers and revenue are likely to fluctuate year-on-year, primarily due to external factors such as the economy, foreign exchange rates and the weather. Current numbers and forecasts may be affected by COVID-19 restrictions, which have both restricted the opening of visitor attractions and would have restricted movements of visitors to the area. These may lead to a change in patterns of tourist numbers and tourism revenue going forward.
- 15.6.15 Major developments that have received planning permission may alter the socio-economic, recreation and tourism baseline. In addition, new proposed developments may be submitted for planning. Further data to be gathered / processed in the ES.
- 15.6.16 The assessment within the ES would also be informed by third party data and data obtained through survey, such as:
- Site visit to observe usage of affected PRoW and tourism assets, to be undertaken as part of the wider traffic and transport assessment
  - The desk-based study would be supported by specific site visit to ‘ground truth’ data gathered. This would include visiting tourist assets to establish the nature and level of usage
  - Engagement with relevant stakeholders to establish sensitive tourism and recreation assets
  - Further baseline information regarding community facilities, recreation and tourism assets
  - Baseline information on allocations and planning applications, and sports pitches and courts

## 15.7 Measures adopted as part of the Project

- 15.7.1 The Scoping Report Corridor has been designed as far as practicable to avoid direct effects to sensitive socio-economic, recreational and tourism features as set out in the CPRSS (National Grid, 2022). This includes proposed undergrounding through the Dedham Vale AONB. Further embedded measures would be developed as the Project design evolves.
- 15.7.2 A range of standard measures for the Project would be adopted throughout the duration of the construction phase. Appendix B: Initial Outline CoCP outlines measures relevant to socio-economics, recreation and tourism. These include but are not limited to:
- Provision of training to construction workers, particularly in relation to working hours and the management of emissions (dust, noise, vibration, etc)

- PRowS crossing the working areas will be managed in discussion with the relevant local authorities. Access disruption would be minimised while construction activities occur. Any required temporary diversions will be clearly marked at both ends with signage explaining the diversion, the duration of the diversion and a contact number for any concerns

15.7.3 A CTMP would also be prepared which would include commitments (where applicable) to reduce route and journey mileage to and from and around the construction sites, and manage access for neighbouring business and the wider community. A draft CTMP would be submitted with the DCO application.

## 15.8 Likely significant effects

15.8.1 This section sets out the likely significant effects of the Project on socio-economics, recreation and tourism. It assumes that the relevant embedded (design measures), standard and additional measures outlined within the Initial Outline CoCP at Appendix B, and the expected mitigation for any other consents or permits are in place before assessing the effects. This is in accordance with guidance from IEMA as part of preparing a proportional assessment (IEMA, 2022).

### Economy and employment

#### Construction

There are likely to be significant beneficial direct and indirect (supply chains) employment generation and economic activity from the Project during construction, arising from a requirement to source construction workers from the local labour market, including apprentices, security workers and delivery drivers. Therefore, the employment effects during construction are proposed to be **scoped into** the ES.

15.8.2 As with any construction project, there is potential for some temporary disruption of some businesses (including some tourism businesses) during construction, such as severance to access and noise affecting businesses that rely on a sense of tranquillity, such as wellbeing centres. Construction traffic and access impacts would be mitigated through measures set out within the draft CTMP submitted with the DCO application. In addition, given the rolling nature of the linear works, the construction activities in any particular area are likely to be short-term. However, as there is potential for some disruption to some businesses from the construction process this potential effect is proposed to be **scoped in** to the ES. Businesses reasonably likely to be affected by a Project of this type are proposed to be **scoped in** to the ES.

15.8.3 This chapter does not consider the financial effects on individual businesses, as this may be the subject of the landowner negotiations and may result in compensation payments to offset effects on landowners and businesses. In addition, this chapter does not consider the effects of the Project on property values as this is not a matter for assessment under the EIA Regulations 2017. As a result, this is **scoped out** of the ES. Also, it should be noted that potential impacts on farm business would be included in the agriculture and soils assessment.

#### Operation (inc. maintenance)

15.8.4 Given the nature of the Project there are not likely to be substantial amounts of direct and indirect (supply chains) employment generated during operation from the Project. This is because the infrastructure can be operated remotely and would not generate a significant number of additional jobs in relation to routine inspection and maintenance. Operation phase employment effects are therefore proposed to be **scoped out** of the

ES.

- 15.8.5 During operation (inc. maintenance), the Project would not affect business's ability to function and so effects are not likely to be significant and are proposed to be **scoped out** of the ES, as routine inspections and maintenance would not lead to significant disruption.

## Planning and development

### Construction

- 15.8.6 The proposed Order Limits would cross areas with planning permission and site allocations and this has the potential to affect development land. The draft CTMP and outline CoCP (both submitted with the DCO application) would set out measures to ensure access to land where construction is proposed for 'other development'. National Grid and their appointed Main Works Contractor would engage with developers to understand the timing of their works in relation to the Project. The potential effect of the Project on planning and development is therefore proposed to be **scoped into** the ES.

### Operation (inc. maintenance)

- 15.8.7 The proposed Order Limits would cross areas with planning permission and site allocations and this has the potential to sterilise development land. The Project could therefore affect potential areas of planned future growth that would need to be investigated in greater detail through the EIA process. The potential effect of the Project on planning and development is therefore proposed to be **scoped into** the ES.

## Community facilities

### Construction

- 15.8.8 The Project would continue to make efforts to avoid direct impacts on community facilities. However, there is some potential disruption of access to, and severance of, existing community facilities, particularly in relation to visual impacts. Cross reference would be made with the findings of the landscape and visual impact assessment, noise and vibration and traffic and transport assessments. Based on the potential for some disruption to community facilities this topic is therefore proposed to be **scoped into** the ES during construction. Effects on amenity would be assessed within the landscape and visual assessment.

### Operation (inc. maintenance)

- 15.8.9 There is some potential for amenity effects on existing community facilities, particularly in relation to visual impacts. However, this would be covered within the landscape and visual impact assessment. Any other impacts would also be covered in the respective chapters, for example Traffic and Transport.
- 15.8.10 During operation (inc. maintenance) the Project would not affect community facilities ability to function, therefore, effects are not likely to be significant and are proposed to be **scoped out** of the ES, as routine inspections and maintenance would not lead to significant disruption.

## Tourism and recreation

### Construction – Tourism and recreation assets

- 15.8.11 Although the Project avoids tourism and recreation assets where possible there is potential for disruption to tourism and recreation facilities during construction in certain locations. Also, there is the potential for temporary disruption to particularly sensitive i.e., heavily used PRow during construction. Therefore, potential effects on tourism and

recreation assets during construction are proposed to be **scoped into** the ES.

#### **Operation (inc. maintenance) – Tourism and recreation assets**

- 15.8.12 There is also potential that the Project could impact tourism assets and recreation facilities in certain locations during operation (inc. maintenance), for example in relation to visual impacts. Therefore, potential effects on tourism and recreation assets during operation are proposed to be **scoped into** the ES.

#### **Construction – Tourism accommodation**

- 15.8.13 Owing to the 23% spare capacity of tourist beds in the local area, the rolling nature of the linear works and that construction activities in any particular area are likely to be short-term, the requirements for worker accommodation during construction are not likely to be significant. However, this matter would be kept under review as more information becomes available and the assessment progresses, and is therefore proposed to be **scoped into** the ES.

#### **Operation (inc. maintenance) – Tourism accommodation**

- 15.8.14 Requirements for accommodation for routine inspection and maintenance workers during operation would not be of a magnitude to lead to impacts on tourism accommodation. Therefore, this matter is proposed to be **scoped out** of the ES.

## **15.9 Proposed assessment methodology**

- 15.9.1 This section sets out the proposed methodology for the socio-economic, tourism and recreation assessment of the ES. In the absence of standard guidance the proposed methodology draws on professional judgement and experience on previous projects.
- 15.9.2 The economic and employment impact assessment would be informed by the principles set out in the HM Treasury Green Book which describes a methodology for defining the additional economic benefits arising from a project, programme or policy.
- 15.9.3 DMRB, whilst not specific to electricity infrastructure, would also provide some useful context for assessing land use and community impacts of linear infrastructure, such as DMRB LA 112: Population and Human Health (National Highways, 2020).

### **Ascribing value / sensitivity, impact magnitude and significance**

- 15.9.4 A value has not been ascribed to the local economy or, tourism and recreation features. Instead, a qualitative approach has been used. Impacts would be defined as:
- Positive – indicates an advantageous or beneficial impact to an environmental resource or receptor, which may be minor, moderate or major in significance
  - Negligible – indicates an imperceptible impact to an environmental resource or receptor
  - Negative – indicates disadvantageous or adverse impact to an environmental resource or receptor, which may be minor, moderate or major in significance
- 15.9.5 Where a positive or negative has been identified, these would be assessed against the following scale of magnitude of significance:
- Minor – The extent of impacts on economic activities, local businesses, tourism and recreation is small in scale or magnitude and would only affect a small number of people or activities

- Moderate – The extent of impacts on economic activities, local businesses, tourism and recreation is small in scale or magnitude but a large number of people or activities would be affected
- Major – The extent of impacts on economic activities, local businesses, tourism and recreation is large in scale or magnitude and a large number of people or activities would be affected

## 15.10 Proposed scope of the ES

15.10.1 The matters that are proposed to be scoped in and out of the ES for socio-economics, recreation and tourism are summarised in Table 15.9.

Table 15.9 – Matters scoped in or out of the ES

Matter	Phase	Scope in / out	Justification
Local economy and employment: Construction and operation	Construction	Scoped in	There are likely to be significant beneficial direct and indirect (supply chains) employment generation and economic activity from the Project during construction.
	Operation	Scoped out	Given the nature of the Project there are not likely to be significant amounts of direct and indirect (supply chains) employment generated during operation from the Project.
Local economy and employment: Potential disruption to future and existing businesses	Construction	Scoped in	Potential temporary disruption of some businesses (including some tourism businesses) during construction. Businesses reasonably likely to be affected by a Project of this type would be scoped in to the ES. Reference to the Traffic and Transport assessment would be made in assessing potential impacts. However, because the Scoping Route Corridor avoids direct impact on buildings and businesses the impact of construction on businesses is not expected to be significant and construction impacts would be mitigated through the draft CTMP (submitted with the DCO application).
Local economy and	Operation	Scoped out	During operation, the Project would not affect business's ability to

<b>Matter</b>	<b>Phase</b>	<b>Scope in / out</b>	<b>Justification</b>
employment: Potential disruption to future and existing businesses			function. Routine inspections and maintenance would not lead to significant disruption
Local economy and employment: Financial effect on individual businesses or property prices	Construction and operation	Scoped out	This matter would be the subject of individual landowner negotiations and is not a matter for an EIA as it may result in compensation payments to offset effects on landowners and businesses. However, potential impacts on farm business would be included in the Soils and Agriculture assessment (included in a separate Thematic Group).
Planning and Development: Potential sterilisation of new areas for future development	Construction and operation	Scoped in	While the outline CoCP (submitted with the DCO application) would set out measures to help ensure continued access to land parcels that help to avoid severance effects during construction there is the potential for access to be affected (baseline data is yet to be collated in full). In addition, the Project could restrict potential areas of planned future growth that would need to be investigated in greater detail through the EIA process.
Community facilities; within Scoping Report Corridor including: schools, community centres, libraries, health (General Practitioners (GPs), dentists, hospitals), sports halls and swimming pools	Construction	Scoped in	The Scoping Route Corridor has made efforts to avoid community facilities. However, there is some potential disruption of access to, and severance of, existing community infrastructure.

Matter	Phase	Scope in / out	Justification
Community facilities; within Scoping Report Corridor including: schools, community centres, libraries, health (GPs, dentists, hospitals), sports halls and swimming pools	Operation	Scoped Out	During operation the Project would not affect community facilities ability to function. Also, routine inspections and maintenance would not lead to significant disruption.
Tourism, Recreation and Open Space: e.g., museums, visitor attractions, stately homes (within the route corridor): Open space and recreation facilities including parks, playing fields, play areas, PRow; cycle paths, bridleways (within the route corridor)	Construction and operation	Scoped in	<p>Although the Scoping Route Corridor avoids tourism and recreation assets where possible there is potential for disruption to tourism and recreation facilities during construction in certain locations. Also, potential temporary disruption to particularly sensitive i.e. PRow during construction.</p> <p>There is also potential that the Project could impact tourism assets and recreation facilities in certain locations during operation. Given the scale of the Project and the Scoping Route Corridor's general avoidance of sensitive tourism and recreation facilities, the EIA Scoping is proposed to follow a proportionate approach and focus the assessment on those areas where there is potential for significant effects, rather than assessing all PRow and tourism and recreation assets within the study area.</p>
Tourism and Recreation: Pressures on local visitor accommodation from influx of	Construction	Scoped in	This matter would be kept under review as more information becomes available and the assessment progresses.



<b>Matter</b>	<b>Phase</b>	<b>Scope in / out</b>	<b>Justification</b>
construction workers			
Tourism and Recreation: Pressures on local visitor accommodation from influx of construction workers	Operation	Scoped out	Not applicable. During operation there would not be construction workers so no pressure on tourist accommodation.

\*Operation referred to above also includes maintenance.

# 16 Traffic and Transport

## 16.1 Approach to scoping

- 16.1.1 The approach to scoping has drawn from previous experience of similar projects. Determining the scope of the Traffic and Transport assessment has included the following stages:
- Regulatory and planning policy context
  - Defining the study area
  - Engagement with stakeholders
  - Stating sources of data collected
  - Outlining baseline conditions
  - Highlighting further data to be gathered
  - Outlining environmental measures
  - Predicting likely significant effects
  - Drafting the proposed assessment methodology
  - Stating the proposed scoping of the ES
- 16.1.2 There are interrelationships related to the potential effects on traffic and transport and other environmental topics. Therefore, please also refer to the following Chapters:
- Chapter 8: Ecology and Biodiversity
  - Chapter 11: Historic Environment
  - Chapter 13: Landscape and Visual
- 16.1.3 This chapter should be read in parallel with Figure 16.1 at Appendix A.

## 16.2 Regulatory and planning policy context

### National policy

- 16.2.1 Chapter 2: Legislation and Planning Policy Context sets out the overarching policy relevant to the Project including the Overarching NPS for Energy EN-1 and NPS for Electricity Networks Infrastructure EN-5. EN-1 contains the following paragraphs relating to traffic and transport in which have been considered within this chapter:
- 16.2.2 Paragraph 5.13.6 – *“A new energy NSIP may give rise to substantial impacts on the surrounding transport infrastructure and the IPC should therefore ensure that the applicant has sought to mitigate these impacts, including during the construction phase of the development. Where the proposed mitigation measures are insufficient to reduce the impact on the transport infrastructure to acceptable levels, the IPC should consider requirements to mitigate adverse impacts on transport networks arising from the development, as set out below. Applicants may also be willing to enter into planning obligations for funding infrastructure and otherwise mitigating adverse impacts.”*
- 16.2.3 Paragraph 5.13.7 – *“Provided that the applicant is willing to enter into planning*

*obligations or requirements can be imposed to mitigate transport impacts identified in the NATA/WebTAG transport assessment, with attribution of costs calculated in accordance with the Department for Transport's guidance, then development consent should not be withheld, and appropriately limited weight should be applied to residual effects on the surrounding transport infrastructure."*

## **NPS EN-5 (and draft NPS EN-5) does not specifically cover transport.**

- 16.2.4 Draft NPS EN-1 states at paragraph 5.14.8 that "*The Secretary of State should only consider preventing or refusing development on highways grounds if there would be an unacceptable impact on highway safety, or residual cumulative impacts on the road network would be severe.*" The rest of draft NPS EN-1 is very similar to EN-1.

## **Regional and local policy**

- 16.2.5 Chapter 2: Legislation and Planning Policy Context sets out relevant regional and local planning policy. The below sets out the relevant Local Transport Plans which have also been taken into account:

- Local Transport Plan (LTP4) 2021-2036 (Norfolk County Council, 2021)
- Suffolk Local Transport Plan 2011-2031, Part 1 Transport Strategy (Suffolk County Council, 2011)
- Essex Transport Strategy: The Local Transport Plan for Essex (Essex County Council, June 2011)
- Thurrock Transport Strategy 2013-2026 (Thurrock Council, 2013)

## **16.3 Study area**

- 16.3.1 The study area for traffic and transport would include roads along the proposed construction vehicle traffic routes where:
- Roads where traffic flows would increase by more than 30% (or the number of HGVs would increase by more than 30%)
  - Other specifically sensitive areas where total traffic flow and HGV flow would have a net increase by 10% or more
  - Likely to be significantly affected by temporary road restrictions and traffic management measures required to construct the Project
- 16.3.2 Sensitive areas are defined by the presence of sensitive receptors, such as hospitals, residential properties, community centres, conservation areas, school, equestrian facilities or accidental black spots, located within 150m of the construction vehicle traffic routes.
- 16.3.3 The absence of traffic flows and routes means that the study area has not been identified at the Scoping stage. Construction vehicle traffic routes (and the study area) would be determined as the design of the Project is developed and would be identified in the ES. The study area would be based on guidance outlined within the Environmental Assessment of Road Traffic (IEMA, 1993).
- 16.3.4 The study area would include the following highway authorities:
- Norfolk County Council

- Suffolk County Council
- Essex County Council
- Thurrock Council
- National Highways

16.3.5 In the absence of a study area the baseline describes traffic and transport features within the Scoping Report Corridor.

## 16.4 Data collection

16.4.1 The construction vehicle routes to the Project are not available at this scoping stage and therefore baseline data collection has been limited to a desk-based study drawing on the following information:

- Historic traffic count data (Road Traffic Statistics of Department for Transport (DfT)) on potential A-roads that may form the Project construction vehicle routes as shown on Figure 16.1 at Appendix A

## 16.5 Engagement with stakeholders

16.5.1 A summary of engagement undertaken to date is presented in Table 16.1.

Table 16.1– Summary of engagement

Organisation and date	Summary of response	Consideration in the Scoping Report
Local Authority Thematic Group Meeting (Essex, Norfolk, Suffolk and Thurrock) - Presentation of proposed EIA Scoping approach to assessment., July 2022	Local Authorities confirmed their comments raised within their non-Statutory consultation responses. Collectively, this included the need for careful consideration to cumulative effects, abnormal loads routes, agreement on the sensitivity of roads/area, commitments for impacts resulting from decommissioning and appropriate mitigation measures.	The assessment methodology that would be used to assess the traffic and transport impacts during the construction phase of the Project are outlined in Section 16.10. A TA and draft CTMP would be prepared as outlined in Section 16.11. Cumulative effects would be assessed as outlined in Section 16.9.

16.5.2 Meetings would continue to be held with National Highways and local highway authorities at the stages of the EIA process following the development of design details, including the proposed construction vehicle traffic routes and associated traffic flows/composition.

## 16.6 Baseline conditions (inc. future baseline)

### Traffic flow Data

16.6.1 There are a number of roads within the Scoping Report Corridor which are part of the

Strategic Road Network (SRN). These include the A1(M), M25, A282, M11, A12, A14, A120, A11 and A47, as well as roads on the Primary and Secondary Road Network including the A13, A140, A143, A1066 and A133. These have been highlighted in Figure 16.1. Table 16.2 provides Annual Average Daily Traffic (AADT) data for these roads which are likely to be used by construction vehicles to/ from the Project.

**Table 16.2 – Annual Average Daily Traffic (2019) along potential construction roads**

<b>Road name</b>	<b>Location</b>	<b>AADT 2019</b>
A1(M)	A47 to A14	33,623 – 79,668
A282	Dartford Crossing to M25	128,309 – 130,265
M25	J26 to A282/A13 (J30)	81,025 – 148,117
M11	M25 to A14	25,874 – 121,964
A12	M25 to A14	39,913 – 99,263
A14	A1 to A12	28,163 – 96,072
A11	A14 to A47	27,572 – 49,334
A120	M11 to Harwich	4,240 – 67,622
A47	A1 to A140	13,384 – 59,580
A13	A282/M25 to A1013	73,543 – 95,903
A133	A120 to Clacton-on-Sea	8,531 – 32,030
A140	A47 to A14	10,375 – 23,004
A143	A14 to A140	8,620 – 22,942
A1066	A11 to A140	4,618 – 12,649

## Rail Network

16.6.2 The Scoping Report Corridor crosses the railway lines on the Anglia route, part of Network Rail’s Eastern region. The main routes are Great Eastern Mainline from Liverpool Street to Norwich and branches, operated by Greater Anglia and the Essex Thameside line from Fenchurch Street to Shoeburyness via Upminster and Tilbury operated by c2c. This is included within Figure 16.1 at Appendix A.

16.6.3 Table 16.3 presents the main rails lines and the daily frequencies during weekdays sourced from Network Rail, Greater Anglia and c2c websites (May, 2022).

**Table 16.3 – Rail network main lines and frequencies**

<b>Railway line</b>	<b>Operated by</b>	<b>Frequencies</b>
Southend Victoria / London Liverpool Street	Greater Anglia	116 trains/day
Ipswich / London Liverpool Street	Greater Anglia	99 trains/day
Norwich / London Liverpool Street	Greater Anglia	67 trains/day
Stowmarket / Ipswich	Greater Anglia	50 trains/day
Clacton-on-Sea / London Liverpool Street	Greater Anglia	43 trains/day
Sudbury / Marks Tey	Greater Anglia	36 trains/day

<b>Railway line</b>	<b>Operated by</b>	<b>Frequencies</b>
Ipswich / Cambridge	Greater Anglia	34 trains/day
Braintree / London Liverpool Street	Greater Anglia	32 trains/day
Ipswich / Peterborough	Greater Anglia	16 trains/day
Shoeburyness / London Fenchurch Street via West Horndon	c2c	122 trains/day
Southend Central / London Fenchurch Street	c2c	54 trains/day
Pitsea / London Fenchurch Street	c2c	30 trains/day
Shoeburyness / London Fenchurch Street via East Tilbury	c2c	11 trains/day
Thorpe Bay / London Fenchurch Street	c2c	6 trains/day

16.6.4 Network Rail is currently improving the railway infrastructure within the Anglia region, with a programme of renewing it up to 2024. Projects in the study area would be identified and any impact on the highway network would be analysed, if possible, to establish the baseline traffic conditions.

## 16.7 Further data to be gathered / processed in the ES

16.7.1 The assessment within the ES would be informed by the following additional information and surveys:

### Traffic flow data

16.7.2 Following consultation and once the location of the construction compounds and construction site access points are defined, a more detailed assessment of the impact on the road network including the SRN, A-roads, B-roads and local roads would be undertaken. This would provide a better understanding of the ability to accommodate construction traffic (including abnormal indivisible loads) and the mitigation works required in the form of new roads infrastructure / improvements to existing roads infrastructure. Where required, additional traffic flow data would be collected using Automatic Traffic Counts (ATCs) and Manual Classified Counts (MCC).

16.7.3 The data would present annual surveys of AADT and vehicle classification including HGVs. The AADT flows from the Department for Transport counts would be converted into average weekday traffic flows and 12-hour flows (07:00-19:00 hrs) would be derived from the Department for Transport traffic data by applying an appropriate factor. This would be based on a standard daily profile over 24-hour period from the Department for Transport's online road traffic statistics Table TRA0307 (Department for Transport, 2021).

16.7.4 The vehicle flow data would be used to assess the increase in traffic generated by the Project under existing and future baseline scenarios. Future baseline flows would be estimated taking into account predicted traffic growth using an appropriate growth factor derived from Trip End Model Presentation Program (TEMPro).

### Walking, cycling and horse-riding routes

16.7.5 There are a number of routes used by pedestrians, cyclists and equestrians within the Scoping Report Corridor. These include Public Rights of Way (PRoW), existing

carriageway facilities on the highway network and principle cycling routes from the National Cycle Network and local routes. Once the construction routes and the study area are defined, the affected walking, cycling and horse (WCH) routes would be identified and assessed. Information on WCH routes would be sourced from the most current and available OS data, Sustrans, and Local Authorities.

## PRoW user surveys

- 16.7.6 Where required, user surveys of PRoWs would be undertaken over a 12-hour period (typically 07:00 to 19:00hrs). These include footpaths, cycle paths, bridleways and equestrian routes. The surveys would typically be undertaken on a weekend where the usage would reflect the highest level of demand, however this would be reviewed in planning of surveys and engagement with local authorities.

## Public transport

- 16.7.7 There are several bus routes in the surroundings of the Project. Once the construction routes and the study are defined, the affected public transport services, known at the time of writing the ES, would be identified and assessed. Bus routes and frequencies would be sourced from Local Authorities and the relevant service providers to ensure the latest network information is considered.

## Collision data

- 16.7.8 Five-year personal injury collision data would be obtained from National Highways for all roads that form the proposed construction traffic routes to the Project on the SRN. Three-year injury collision data would be obtained from all Local Authorities for roads on the local highway network. A review of the latest Stats 19 data, obtained from the Department for Transport, would be undertaken to identify any collision cluster sites and to understand causation factors. Geographical Information Systems (GIS) software would be utilised to map these collisions. The analysis of collisions would help to identify principle areas of concern, and where needed, help with the development of potential mitigation measures relating to the increase in vehicle flow generated by the Project.

## Existing highway schemes

- 16.7.9 All existing highway schemes along proposed construction routes would be confirmed with National Highways and the relevant local highway authorities. Information regarding the duration of Project construction programmes, temporary traffic management arrangements/ phasing, available CTMP or Transport Assessment Reports (TAR), predicted operational traffic flows and any associated traffic modelling would be obtained where possible in order to understand baseline traffic conditions and reduce the impact on the highway network.

## Committed highway schemes

- 16.7.10 In addition to existing highway schemes, the timeline, and details for all committed highways schemes along proposed construction routes would need to be confirmed by National Highways and the relevant local highway authorities to understand future baseline traffic conditions on roads along proposed construction routes.

## Committed developments

- 16.7.11 All committed developments surrounding the construction routes would be confirmed with the relevant Local Authorities. Where possible, information on their timeline and predicted traffic flows would be identified to understand future baseline traffic conditions

on roads along proposed construction routes.

## Potential constraints and restrictions

- 16.7.12 Site surveys would be undertaken to allow for a visual inspection of the potential construction vehicle routes, confirming findings of background data and identifying any unknown constraints or opportunities. This would include a review of all protected and quiet lanes identified from within Local Authorities Local Plans.
- 16.7.13 If Abnormal Invisible Loads (AILs) are required for the Project, details of any existing carriageway width, height, and weight restrictions for the movement of such vehicles would be discussed with National Highways and the local highway authorities.

## Baseline mapping and highway boundary

- 16.7.14 Information on the road network that forms the construction vehicle route would be obtained from Local Authorities and National Highways, which would include baseline mapping and highway boundary information. OS mapping and Google Maps and Google street view would also be used.

## 16.8 Measures adopted as part of the Project

- 16.8.1 The Scoping Report Corridor has been designed to avoid as far as practicable sensitive traffic and transport features through the CPRSS (National Grid, 2022). Further embedded measures would be developed as the Project design evolves.
- 16.8.2 Mitigation measures for the construction phase would be provided and assessed in the draft CTMP (issued with the DCO application) and the outline CoCP (an initial outline is provided at Appendix B and an outline would be issued with the DCO application) as part of the Project. The extent of specific mitigation measures and their effectiveness would be discussed in advance with relevant stakeholders. Such measures may include the use of haul roads, suitable signage and traffic controls to be used for any access points, construction staff Travel Plan. The Main Works Contractor through adopted mitigation measures would aim to minimise disruption to existing motorised and vulnerable road users, local residents, businesses and other users of the surrounding local road network.

## 16.9 Likely Significant Effects

- 16.9.1 This section sets out the likely significant effects of the Project on traffic and transport. It assumes that the relevant embedded (design measures) such as providing haul roads, standard and additional measures outlined within the Initial Outline CoCP at Appendix B and the draft CTMP (issued with the DCO application), and the expected mitigation for any other consents or permits are in place before assessing the effects. This is in accordance with guidance from IEMA as part of preparing a proportional assessment (IEMA, 2022).

### Construction

- 16.9.2 The primary traffic and transportation effects associated with the Project would be as a direct result of an increase in traffic flows on the surrounding roads used by construction vehicles. As noted, the volume of construction traffic is not yet known. A separate TA and draft CTMP would be prepared for the Project.
- 16.9.3 The potential effects on receptors would be included in the assessment of construction



traffic where the flows generated by the Project increase baseline traffic and HGV flows by 30% or 10% in specifically sensitive areas. These thresholds are used to determine which links within the traffic and transport study area should be considered

16.9.4 Potential cumulative effects on the SRN and local highway network from this Project and all other committed highway schemes and developments would be assessed and taken account of when generating the predicted future baseline vehicle flows. Committed developments that would be considered would be confirmed with relevant local authorities.

16.9.5 The traffic and transport effects for the construction phase are therefore proposed to be **scoped in**.

### Operation (inc. maintenance)

16.9.6 During operation (inc. maintenance) of the Project, traffic generated would be associated with infrequent repair for routine maintenance, inspection activities, and a small number of operational staff (approximately 0 to 3 vehicles annually based on evidence from other OHL Projects), refer to Chapter 4: Description of the Project for further detail. The impact of operational traffic from OHL projects would be expected to be substantially lower than 30% of existing traffic and movements are not anticipated to have a material effect on the transport network and receptors, therefore classed as negligible. This approach has been successfully undertaken by National Grid on similar OHL projects, and is also suitable for this Project.

16.9.7 Traffic and transport effects during operation (inc. maintenance) are therefore proposed to be **scoped out**.

## 16.10 Proposed assessment methodology

16.10.1 This section sets out the scope and detailed assessment methodology that would be used to assess the traffic and transport impacts during the construction phase of the Project. The following methodology and assessment criteria have been developed using DMRB LA 104: Environmental Assessment and Monitoring (National Highways, 2020) and Guidelines for the Environmental Assessment of Road Traffic (IEMA, 1993) guidelines and take into account relevant policies and legislation.

16.10.2 The proposed methodology is broadly based on assessment criteria developed for similar major infrastructure projects. Professional judgement would also be applied to determine whether significant effects may arise which have not been identified by the use of the assessment criteria.

16.10.3 The assessment would examine a worst case in terms of traffic and transport effects, i.e., the peak period when the highest levels of construction traffic are expected to occur. It would be informed by a desk-based study with analysis of all data obtained, and discussions with the design team, in particular around anticipated construction traffic movements and proposed mitigation measures. Professional judgement would be applied, where there is an absence of relevant guidance or criteria, to determine whether significant effects may arise which have not been identified by the use of the assessment criteria (i.e., collision clusters and durations of diversion routes).

16.10.4 The assessment of the potential effects of the Project would be undertaken for construction traffic. The assessment would include the identification of temporary traffic management, including road and PRow closures and potential diversionary routes.

16.10.5 The assessment would take account of:

- Engineering estimates of the quantity of plant, equipment and materials to be brought on to site, and excavated material removed from the Project
- The assumed method of construction
- Expected construction programme

16.10.6 The following aspects would be assessed:

- Increase in traffic levels
  - In order to first determine the scale and extent of the assessment the following parameters would be considered:
  - The sensitivity of each road in the construction routes (to be discussed with each LPA)
  - The percentage increase in total traffic and / or HGVs as a result of the Project along each road on the construction routes. In accordance with the IEMA Guidelines, only links where increases in total traffic flow or HGV flows are in excess of 30% on any link (Rule 1) or 10% on links through sensitive areas (Rule 2) would be further assessed for effects (such as Driver and Public Transport Passenger Delay, Vulnerable Road Users Delay, Severance and Amenity, Accident and Road Safety and Parking and Loading)
- Driver delay and public transport delay to passengers
  - The following criteria from professional judgement would be used to assess effects:
    - Where there is a change in traffic flow of greater than 30%. Net traffic and/or HGV flows of 30%, 60% and 90% are considered minor, moderate and major changes in magnitude
    - Changes to bus services/bus stops or taxi facilities for over four weeks in any 12-month period
- Pedestrian, Cyclist and Horse-Rider Delay, Severance and Amenity
  - The following criteria from the IEMA Guidelines and professional judgement would be used to assess effects:
    - Where there would be a temporary maximum increase in journey length along a road or other PRow for pedestrians, cyclists or horse-riders for more than four weeks in any 12-month period
    - Pedestrian severance occurs when there is difficulty experienced in crossing a heavily trafficked route. Changes in net traffic flows of 30%, 60% and 90% are considered to have a minor, moderate and major effects in severity respectively
    - The pedestrian amenity threshold, as set out in the IEMA Guidelines to assess the significance of change, is where the traffic flow is doubled (increase over 100%) or where the HGV flows are over 30%, 60% and 90% (considered to have minor, moderate, and major effects respectively). Pedestrian amenity is defined as the relative pleasantness of a journey and is considered to be affected by traffic flow, traffic composition and footway width/separation from traffic

- Where a temporary increase is forecast of more than 30% in lorries or total flow on a route intersecting a PRow, bridleway or near an equestrian centre for more than four weeks in any 12-month period
- Fear and intimidation
  - The following criteria from the IEMA Guidelines and professional judgement would be used to assess effects:
    - Fear and intimidation occurs through a combination of traffic flow, speed, HGV composition and its proximity to people or lack of protection caused by such factors as narrow pavements. Net traffic and/or HGV flows of 30%, 60% and 90% are considered minor, moderate and major changes in magnitude to the sensitivity and vulnerability of pedestrians, cyclists and horse-riders
- Accidents and road safety
  - Accidents and safety are assessed using personal injury accident data obtained from highways authority records. The IEMA Guidelines recommend that professional judgement would be needed to assess the effects. The following criteria would be used to assess the effects:
    - Where junctions have had ten or more collisions in a three-year period; or
    - Where links have recorded ten or more collisions per 100m lengths in a three-year period
- Parking and loading
  - IEMA Guidelines recommend that professional judgement is used to assess the parking and loading effects on receptors. The following criteria would be used:
    - Loss of more than four weeks in any 12-month period of one or more on street loading bay, five or more on street residential/ business bay; five or more cycle/ motorcycle spaces or 20 general parking spaces or equivalent length of unrestricted kerbside spaces

## Ascribing value / sensitivity

- 16.10.7 Resources are the assets and facilities which may be affected by the Project such as the highway network. Receptors are the users or beneficiaries of those resources such as pedestrians, cyclists and drivers who travel within the study area. This would include the areas along the highway routes that could be sensitive to changes in traffic volumes. Sensitive areas are defined by the presence of sensitive receptors and inadequate facilities, such as community centres, schools, equestrian facilities, narrow well-used footways along busy roads or accident black spots.
- 16.10.8 The criteria used to determine the value and sensitivity of receptors specific to traffic and transport are set out in Table 16.4. These values are based on the IEMA Guidance.

**Table 16.4 – Criteria for determining value / sensitivity**

<b>Sensitivity/Value</b>	<b>Resource</b>	<b>Receptor</b>
High	Receptors of greatest sensitivity to traffic flow: schools, colleges, playgrounds, accident blackspots, retirement homes, urban/ residential	Residents, workers, pedestrians (sensitive groups such as children, elderly and

Sensitivity/Value	Resource	Receptor
	roads without footways that are used by pedestrians (para 2.5 of IEMA Guidance).	disabled), cyclists and equestrians using the highway.
Medium	Traffic flow sensitive receptors including: congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, unsegregated cycleways, community centres, parks and recreational facilities.	
Low	Receptors with some sensitivity to traffic flow: places of worship, public open space, nature conservation areas, listed buildings, tourist attractions and residential areas with adequate footway provision.	
Negligible	Receptors with low sensitivity to traffic flows and those sufficiently distant from affected roads and junctions.	

### Impact magnitude

- 16.10.9 The expected traffic generated by the Project during construction would be quantified where appropriate and assessed against anticipated background traffic flows to outline the anticipated percentage increase in total vehicles and HGVs.
- 16.10.10 The methodology proposed for determining the magnitude of impact follows guidance set out by the DMRB LA 104 together with professional judgement. The order of magnitude criteria is shown in Table 16.5.

Table 16.5 – Magnitude of change (impact) categories

Magnitude of Change	Change from Baseline
Major	Total loss or major alteration to principle elements or features of the baseline conditions to the extent that post-scenario character or composition of baseline conditions would be fundamentally changed.
Moderate	Loss or alteration to one or more principle elements or features of the baseline conditions to the extent that post-scenario character or composition of the baseline conditions would be materially changed.
Minor	Minor shift away from baseline conditions. Changes arising would be detectable but not material; the underlying character or composition of the baseline conditions would be similar to the pre-scenario situation.
Negligible	Very little change from baseline conditions. Change is barely distinguishable, approximating to a 'no change' situation.

### Significance

- 16.10.11 The significance of transport effects would be determined by considering the identified impact magnitudes on the receptors affected by those impacts (taking account of their sensitivity) to determine the significance of effects. Moderate and major adverse/beneficial effects are assumed to represent significant effects.

- 16.10.12 The significance of effects would be based on professional judgement as to whether the magnitude and duration of impacts, when combined with the characteristics of the road network and the sensitivity of receptors would cause and adverse effects.
- 16.10.13 Table 16.6 provides a matrix of magnitude of impact against sensitivity of receptors to identify where significant effects are anticipated to occur. Where the effect is seen as moderate or above, this is considered significant. A slight or neutral effect would be seen as not significant and not considered in further assessment. Where a potential significance of effect is considered of large or moderate significance, the detailed assessment would be undertaken on that link based on analysis of each of the environmental assessment criteria.

Table 16.6 – Significance of effect matrix

Sensitivity of Receptor	Magnitude of Impact			
	Major	Moderate	Minor	Negligible
High	Large	Large or Moderate	Slight or moderate	Slight
Medium	Large or Moderate	Moderate	Slight	Neutral or slight
Low	Slight or moderate	Slight	Slight	Neutral or slight
Negligible	Slight	Neutral or slight	Neutral or slight	Neutral

## 16.11 Proposed scope of the ES

- 16.11.1 The matters scoped in or out of further assessment for traffic and transport are outlined in Table 16.7.

Table 16.7 – Proposed scope of the ES

Matter	Phase	Scoped in/out	Potential Significant Effects
Assessment of traffic and transport impacts	Construction	Scoped in	To assess potential increase in traffic flows against IEMA Rule 1 and Rule 2. A separate TA and draft CTMP would also be prepared for the Project to include measures that control traffic.
Assessment of traffic and transport impacts	Operation	Scoped out	The OHL pylons are unmanned, therefore operational traffic would be associated with infrequent repair and routine maintenance works similar to the existing baseline (approximately 0 to 3 vehicles annually based on evidence from other OHL Projects). The impact of operation traffic from OHL projects would be expected to be significantly lower than 30% of existing traffic and is classed as negligible. For this reason operational movements are not anticipated to have a material effect on the transport network and receptors. This approach was successfully undertaken by National Grid on the OHL Richborough Connection Project, Reinforcement

Matter	Phase	Scoped in/out	Potential Significant Effects
			to North Shropshire Electricity Distribution Network (SP Manweb) and Bramford to Twinstead.

- 16.11.2 Additionally, a separate (TA) and a draft CTMP would be prepared.
- 16.11.3 The TA would set out transport issues relating to the Project and would identify what measures would be taken to mitigate the anticipated transport impacts to improve accessibility, encourage sustainable travel, and improve the safety for all modes of travel. The assessment would support national and local planning policy and would be developed through consultation with all relevant stakeholders.
- 16.11.4 The draft CTMP would be prepared to ensure that all traffic associated with the Project's construction works always operate in a safe and compliant manner. The draft CTMP would ensure the effects caused by construction traffic to receptors, including existing road users, local residents, properties, businesses and schools are kept to an absolute minimum where possible and would identify potential mitigation measures if deemed required.

# 17 Cumulative Effects

## 17.1 Approach and Method

- 17.1.1 Cumulative effects are the result of multiple actions on environmental receptors or resources. There are two major sources of cumulative effects: ‘intra-project’ and ‘inter-project’ effects, as outlined in The State of Environmental Impact Assessment Practice in the UK (IEMA, 2011).
- Intra-project effects (also referred to as ‘inter-relationships between topics’,) occur when a receptor, resource or group of receptors are potentially affected by more than one source of direct environmental impact resulting from the same development (IEMA, 2011). For example, a community may be affected by noise and dust impacts resulting from the construction phase activities of a single development
  - Inter-project effects (also referred to a ‘cumulative effects’, Planning Inspectorate, 2019) occur when a resource or receptor or group of receptors is potentially affected by more than one development at the same time and the impacts act together additively and/or synergistically (IEMA, 2011). For example, the construction traffic effects of a development combined with the construction traffic effects of another development may result in additional cumulative effects on the surrounding highways network

## 17.2 Intra-project Cumulative Effects

- 17.2.1 There is no standard approach to the assessment of intra-project effects, so a checklist matrix would be used to scope-in receptors with multiple effects. The matrix approach is useful as a tool to visually identify relationships between project impacts and environmental components.
- 17.2.2 Representative groups and/or individual receptors, such as people or protected species, would be identified for each topic. These would represent the areas that are most sensitive to impact interactions.
- 17.2.3 The assessment would consider the receptors which are likely to experience minor, moderate or major significance of residual effects in the individual Environmental Statement (ES) chapters. Receptors with negligible effects would not be included within the assessment. If the same receptor is identified in more than one ES chapter, this would indicate a spatial overlap of effects which would then be checked for a temporal overlap. If both spatial and temporal overlaps exist, then the receptor would be assessed for intra-project cumulative effects.
- 17.2.4 Where significant cumulative environmental effects are identified, additional mitigation measures and monitoring requirements would be considered and outlined, and any residual effects would be described.

## 17.3 Inter-project Cumulative Effects

- 17.3.1 The methodology of the inter-project cumulative effects is structured using the staged assessment approach detailed in Advice Note Seventeen (Planning Inspectorate, 2019).

## Stage 1A: Identify Zone of Influence (ZOI)

- 17.3.2 The Zone of Influence (ZOI) is the geographic area within which a development is likely to affect environmental receptors. As such, the ZOI would vary for different types of receptors. The ZOI used for this Scoping Report is based on a distance extending from either side of the Scoping Report Corridor. As the Project develops, the ZOI would be based on the relevant distances (according to the individual environmental topic) around the proposed Order Limits.
- 17.3.3 The ZOIs used for environmental topics are listed in Table 17.1. The rationale for the distances chosen are explained in the relevant topic chapters.

**Table 17.1 – ZOI for environmental topics**

<b>Environmental topic</b>	<b>ZOI</b>
Ecology and Biodiversity	0.2 - 30km
Landscape and Visual	3km
Air quality; historic environment	2km; 3km
Agriculture and soils	1km
Hydrology and Land Drainage; hydrogeology	<0.5km
Noise and Vibration	0.3km
Geology	0.25km

## Stage 1B: Identify long list of other development

- 17.3.4 For the inter-project assessment, a long list of other developments to be considered in the cumulative effects assessment would be prepared. A search of planning applications held on the relevant planning authority websites and the Planning Inspectorate's Programme of Projects would be undertaken and presented in the ES. This list would be informed through early engagement with the relevant planning authorities.
- 17.3.5 The study area within which to search for other developments that have the potential to have cumulative effects with the Project is based on the ZOI for environmental effects.
- 17.3.6 A search period of 10 years preceding the planned commencement of construction works in 2027 was chosen to take into consideration submitted or approved planning applications that may have a temporal overlap with the Project. The following development types were included:
- NSIP listed on the Planning Inspectorate's Programme of Projects
  - Developments (defined under The Town and Country Planning (Development Management Procedure) (England) Order 2010 (as amended))
  - Sites allocated in relevant Local Development Plans
- 17.3.7 Rejected and withdrawn planning applications would be included in the long list but would be excluded from the shortlist on the assumption that planning approval would not be pursued further. Allocated sites in Local Plans or other Development Plans which are not yet subject to planning applications would be identified in the long list but not shortlisted. This is because the development or operational timeframes of these proposed projects are not known.
- 17.3.8 Minor planning applications would be excluded from the assessment, as these relate to



developments of small scale and local significance. These developments are highly unlikely to give rise to significant cumulative environmental effects over and above the Project in isolation.

- 17.3.9 Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects (Planning Inspectorate, 2019) identifies three tiers of development based on where they are in the planning process and recognises that the amount of information available varies according to which tier it fits in to. Tier 1 developments are the most certain, with a high level of publicly available information, while Tier 3 developments are the least certain, with limited publicly available information.
- 17.3.10 The ZOIs would be used to identify the topic areas that could have cumulative effects with the Project. This would be used to screen the long list to identify whether developments should proceed to Stage 2.

## Stage 2: Identify shortlist of other developments

- 17.3.11 The next step would be to establish a shortlist of developments using threshold criteria to determine whether the developments have the potential to give rise to significant effects in combination with the Project.
- 17.3.12 Professional judgement would be used during the application of threshold criteria to determine whether developments should be scoped in or out of the assessment. This would include developments that were below the threshold criteria but with characteristics that were likely to give rise to a significant effect.
- 17.3.13 Professional judgement would be used to identify whether potential cumulative impacts were likely to be significant; only potential significant effects would be taken forward to the next stage of assessment. The following inclusion / exclusion criteria would be used for the assessment:
- Temporal scope:
    - Other projects with an overlapping construction phase (2027 - 2031) and in some cases operational effects would be scoped into the assessment. Planning applications submitted up to ten years prior to the planned commencement year of construction (2027) would be included in the assessment. Applications submitted outside this temporal scope would be excluded
  - Scale and nature of development:
    - Development identified as Schedule 1 and 2 developments in the EIA Regulations would be considered further. Development not identified as Schedule 1 or 2 developments would be scoped out of the assessment, except where professional judgement identifies specific scenarios where there is a high likelihood of significant environmental effects arising in combination with the Project
  - Sensitivity of the receiving environment:
    - Where there are potential source-pathway-receptor linkages between the Project and other development, cumulative effects would be considered further. Other development with no clear source-pathway-receptor linkage would be scoped out of the assessment
- 17.3.14 The long and short lists of other development would be discussed with the relevant planning authorities to seek their opinion on the developments to be included in the

cumulative assessment.

### Stage 3: Information gathering

- 17.3.15 Information on other development would be gathered and obtained from local planning authority planning portals, the Planning Inspectorate’s website, discussion with other developers and engagement with local planning authorities.

### Stage 4: Assessment

- 17.3.16 The assessment would describe and evaluate the likely significant inter-project cumulative effects arising from the Project and other developments. The results of the assessment would be documented and presented in an accessible format similar to the Matrix 2 provided at Appendix 2 of the Planning Inspectorate’s *Advice Note Seventeen*.
- 17.3.17 The value of a resource and magnitude of impact would be determined according to the criteria set within the environmental topic sections in this Scoping Report. Significance of effect would be lifted from the environmental topic sections to identify the significance of cumulative effects with other developments. Effects would be identified as direct, indirect, short-term or long-term, permanent or temporary.

### Stage 5: Cumulative assessment of clusters of other Projects

- 17.3.18 Where two or more other developments are identified in Matrix 2 as likely to affect the same receptor as the Project, the cumulative effect of all the developments would be described in Matrix 3, which would summarise the effect of the Project on the receptor, the effect of all the other developments on the same receptor, and then the combined effect of all developments on the same receptor. The table would also record the need for any additional mitigation.

## 17.4 Proposed scope of the ES

- 17.4.1 The matters that are proposed to be scoped in and out of the assessment which would be presented in the ES are summarised in Table 17.1.

Table 17.2 – Proposed Scope of the ES

Sub-topic	Potential Significant Effects	Timing	Scoped in/out
Intra-project cumulative effects	There is the potential for significant effects arising between environmental topics on the same receptors.	Construction	Scoped in
		Operation	Scoped in
Inter-project cumulative effects	There is the potential for significant effects arising between the Project and other development.	Construction	Scoped in
		Operation	Scoped in

\*Operation referred to above also includes maintenance.

# 18 Summary and proposed scope of the ES

## 18.1 Introduction

18.1.1 This chapter summarises the aspects that are proposed to be scoped into and out of the ES, and the proposed content of the ES. It also sets out the proposed next steps as the Project moves forward.

## 18.2 Topics proposed to be scoped in and out

18.2.1 Table 18.1 sets out the matters National Grid propose to scope into and out of the assessment within the ES. This is based on the baseline data (receptors) gathered to date, and a prediction of whether the Project is likely to result in significant effects on the identified receptors. Table 18.1 also provides signposts to where effects would be reported, including those predicted to be 'not significant' (and therefore sit outside of the ES) together with links to other key supporting documents. Further details and the justification for this scope is set out within environmental topic chapters 6 - 17.

Table 18.1 - Proposed scope of the ES and signposts to other documents

<p><b>Chapter 6: Agriculture and Soils</b></p> <p>Scoped in:</p> <ul style="list-style-type: none"><li>• Effects on agricultural land during construction and operation</li><li>• Effects on agricultural holdings during construction</li><li>• Effects on soil quality associated with ecosystem services during construction</li></ul> <p>Scoped out:</p> <ul style="list-style-type: none"><li>• Effects on agricultural holdings during operation</li><li>• Effects on soil quality associated with ecosystem services during operation</li><li>• Economic effects on landowners during construction and operation</li></ul> <p>Signpost to other documents:</p> <ul style="list-style-type: none"><li>• Land agreements with specific landowners would address economic effects of impacts to third party land</li><li>• An outline CoCP would be submitted alongside the ES with the DCO application. The outline CoCP would describe mitigation measures to protect soil during construction. Appended to the outline CoCP would be the outline LEMP which would set out reinstatement requirements</li></ul>
<p><b>Chapter 7: Air Quality</b></p> <p>Scoped in:</p> <ul style="list-style-type: none"><li>• Effects of construction traffic on local air quality receptors (if screening criteria is met or exceeded)</li></ul> <p>Scoped out:</p> <ul style="list-style-type: none"><li>• Effects from construction dust</li><li>• Effects from generators during construction</li></ul>

- Effects of operational vehicle emissions

Signpost to other documents:

- An outline CoCP would be submitted alongside the ES with the DCO application. The outline CoCP would include a Dust Risk Assessment which would include standard mitigation measures to reduce and manage dust during construction

## **Chapter 8: Ecology and Biodiversity**

Scoped in:

- Effects on International sites designated for biodiversity during construction and operation (with the exception of Norfolk Valley Fens SAC which is scoped out during operation)
- Effects on National and local sites designated for biodiversity during construction
- Local (statutory) sites designated for biodiversity during construction
- Local (non-statutory) sites designated for biodiversity during construction and operation
- Effects on ancient woodland and important hedgerows during construction
- Effects on Habitats of Principal Importance in England during construction
- Effects on Ground Water Dependent Terrestrial Ecosystems, Vascular and non-vascular plants, fungi and INNS during construction
- Effects on protected species: fish, invertebrates, reptiles, breeding birds, badger, hazel dormouse, otter, water vole, white-clawed crayfish and amphibians (excluding GCN)) during construction
- Effects on wintering/passage birds and bats during construction and operation

Scoped out:

- Effects on Norfolk Valley Fens SAC during operation
- Effects on National and local sites designated for biodiversity during operation
- Local (statutory) sites designated for biodiversity during operation
- Effects on ancient woodland and important hedgerows during operation
- Effects on Habitats of Principal Importance in England during operation
- Effects on Ground Water Dependent Terrestrial Ecosystems, Vascular and non-vascular plants, fungi and INNS during operation
- Effects on protected species: fish, invertebrates, reptiles, breeding birds, badger, hazel dormouse, otter, water vole, white-clawed crayfish and amphibians during operation
- Effects on GCN and other notable mammals (brown hare, hedgehog, and harvest mouse) during construction and operation

Signpost to other documents:

- A Biodiversity Legislation and Compliance Report would be prepared. It would form an appendix to the ecology and biodiversity ES chapter. It would set out Project specific measures relating to protected species and invasive non-native species
- An outline CoCP would be submitted alongside the ES as part of the DCO application. The CoCP would include standard mitigation measures to reduce effects on ecology and biodiversity features
- Appended to the CoCP would be the outline LEMP. The outline LEMP would set out the measures to protect habitats and details regarding the reinstatement and enhancement of habitats including biodiversity net gain
- A Biodiversity Net Gain (BNG) assessment report would be produced for the Project. This would detail standard and additional mitigation proposed to achieve net gain targets
- A HRA would be prepared in parallel to the ES. This would assess and outline the effects of the Project on European designated sites
- LONI would be sought from Natural England to ensure there would be no issues with obtaining protected species licences for the Project
- A DLL Letter of Comfort would be obtained and appended to the ecology and biodiversity ES chapter

## **Chapter 9: Geology and Hydrogeology**

Scoped in:

- Effects on mineral reserves during construction and operation
- Disturbance and mobilisation of existing contamination during construction
- Effects of dewatering during construction
- Effects on connected aquifer units during construction

Scoped out:

- Effects on geohazards and ground instability during construction and operation
- Effects on sites of geological importance during construction and operation
- Disturbance and mobilisation of existing contamination during operation
- Discovery of unexpected contamination during construction and operation
- Introduction of new contamination within construction and operation
- Effects of dewatering during operation
- Effects of groundwater discharges during construction and operation
- Effects on connected aquifer units during operation

Signpost to other documents:

- An outline CoCP would be submitted alongside the ES submitted with the DCO application. The outline CoCP would outline measures to protect

groundwater sources and to manage potential contaminated land during construction

### **Chapter 10: Health and Wellbeing**

Scoped in:

- A separate health and wellbeing ES chapter is not proposed

Scoped out:

- Effects on health-related environmental change (for example, air quality, noise, traffic and transport health related impacts) during construction and operation – as effects would be considered in other ES chapters
- Effects of electric and magnetic fields during construction and operation

Signpost to other documents:

- Effects on health-related environmental change would be assessed within their individual chapters i.e. Air Quality, Noise and Vibration, Socio-Economics, Recreation and Tourism and Geology and Hydrogeology. Cumulative health effects would be assessed within the cumulative chapter within the ES
- Effects of electric and magnetic fields would be reported within a standalone report, which would be submitted alongside the DCO application

### **Chapter 11: Historic Environment**

Scoped in:

- Physical effects on archaeology during construction
- Setting and indirect effects on archaeology during construction and operation
- Setting and indirect effects on built heritage during construction and operation
- Effects on historic landscape character during construction and operation

Scoped out:

- Physical effects on archaeology during operation
- Physical effects on built heritage during construction and operation
- Effects on inter-tidal and marine archaeology during construction and operation

Signpost to other documents:

- A draft Mitigation Strategy and Outline WSI would be prepared alongside the ES. This would set out proposed requirements for further archaeological investigations
- An outline CoCP would be submitted alongside the ES as part of the DCO application. The outline CoCP would include standard mitigation measures to reduce effects during construction

### **Chapter 12: Hydrology and Land Drainage**

Scoped in:

- Effects on surface water quality during construction

- Effects on hydromorphology of watercourses during construction
- Effects of flood risk from rivers and the sea during construction and operation
- Effects of flood risk from surface water and effects on the land drainage regime during construction and operation
- Effects of flood risk from groundwater during construction and operation

Scoped out:

- Effects on surface water quality during operation
- Effects on hydromorphology of watercourses during operation
- Effects of flood risk from other sources (sewers, artificial waterbodies) during construction and operation
- Effects on existing water interests (abstractions and discharges) during construction and operation

Signpost to other documents:

- A FRA would be submitted alongside the ES. This would document the potential effects on fluvial, surface water and ground water flood risk
- The WFD Assessment would be submitted alongside the ES. This would document how the Project would achieve compliance with the objectives of the WFD
- An outline CoCP would be submitted alongside the ES with the DCO application. The outline CoCP would include standard mitigation measures to reduce the risk of pollution to hydrology and land drainage receptors during construction as well as measures to reduce the effects on water quality in surface water features

## **Chapter 13: Landscape and Visual**

Scoped in:

- Effects on Designated landscapes – Dedham Vale AONB during construction and operation
- Effects on designated landscapes – Suffolk Coasts and Heaths AONB during construction and operation
- Effects on designated landscapes – SLAs during construction and operation
- Effects on landscape character during construction and operation
- Effects on representative viewpoints during construction and operation
- Effects on visual receptors at settlements / communities / groups of properties during construction and operation
- Effects on receptors travelling on roads during construction and operation
- Effects on recreational receptors, including Public Rights of Way and long-distance routes and visitor attractions during construction and operation

Scoped out:

- Effects on designated landscapes, landscape character and views – at night during construction and operation

- Effects on visual receptors outside of the ZTV during construction and operation
- Effects on receptors travelling on railways during construction and operation
- Effects on private views during construction and operation

Signpost to other documents:

- An outline CoCP would be submitted alongside the ES with the DCO application. The outline CoCP would include standard mitigation measures to reduce effects during construction.
- Appended to the outline CoCP would be the outline LEMP. The outline LEMP would include standard and additional mitigation comprising:

Landscape planting to reduce visual impact in views

Landscape planting to deliver wider landscape restoration to offset the residual harm by the introduction of new transmission pylons and other associated infrastructure

## **Chapter 14: Noise and Vibration**

Scoped in:

- Effects from noise and vibration during construction
- Effects from traffic noise during construction

Scoped out:

- Effects from traffic vibration during construction
- Effects of noise from substations, overhead lines, CSEC and underground cables during operation
- Effects of vibration during operation
- Effects of noise and vibration associated with maintenance activities during operation

Signpost to other documents:

- An outline CoCP would be submitted alongside the ES with the DCO application. The outline CoCP would include the Best Practicable Means (BPM) to manage noise during construction
- A draft CTMP would also support the DCO application. The draft CTMP would outline standard and additional mitigation measures to manage traffic movements during construction

## **Chapter 15: Socio-economic, Recreation and Tourism**

Scoped in:

- Effects on the local economy and employment during construction
- Potential sterilization of new areas for future development during construction and operation
- Effects on community facilities during construction and operation

Scoped out:



- Effects on the local economy and employment during operation
- Effects of potential disruption to future and existing businesses during construction and operation
- Financial effects on individual businesses or property prices during construction and operation

Signpost to other documents:

- An outline CoCP would be submitted alongside the ES with the DCO application. The outline CoCP would set out measures to help ensure continued access to land parcels that help to avoid severance effects during construction
- Financial effects on businesses or properties would be subject to individual landowner negotiations and does not form part of EIA. However, potential impacts on farm businesses would be included in the Soil and agriculture assessment
- The cumulative effects assessment would consider intra-project cumulative effects on amenity such as traffic, noise and dust

## **Chapter 16: Traffic and Transport**

Scoped in:

- Effects of traffic and transport during construction

Scoped out:

- Effects of traffic and transport during operation

Signpost to other documents:

- A stand-alone TA would be submitted with the DCO application. This would set out transport issues relating to the Project and would identify what measures would be taken to deal with the anticipated transport impacts to improve accessibility, encourage sustainable travel, and improve the safety for all modes of travel
- A draft CTMP would be submitted with the DCO application. This document would ensure that construction traffic operates in a safe and compliant manner. The draft CTMP would ensure the effects caused by construction traffic to receptors, including existing road users, local residents, properties, businesses and schools are reduced and would identify standard and additional mitigation measures

## **Chapter 17: Cumulative Effects**

Scoped in:

- Intra-project cumulative effects during construction and operation
- Inter-project cumulative effects during construction and operation

Scoped out:

- No matters are proposed to be scoped out

Signpost to other documents:

- An outline CoCP would be submitted alongside the ES with the DCO application. The CoCP would include standard mitigation measures to manage effects during construction

18.2.2 Separate chapters within the ES are not proposed for major accidents and disasters, material assets (and waste) or climate. Separate assessments are also not proposed for the decommissioning phase. Full details of the proposed approaches to these topics and matters are outlined in Chapter 5: EIA Approach and Method, however a summary is provided below:

- Major accidents and disasters – where appropriate, an assessment of the likely risks to the Project in relation to potential areas of vulnerability would be included within separate topic chapters. For example, any flood risk concerns would be considered within Chapter 12: Hydrology and Land Drainage and would be addressed as part of the Flood Risk Assessment
- Material assets (and waste) - further information regarding materials and waste would be provided within the description of the Project chapter within the ES
- Climate - in terms of vulnerability to climate change National Grid has previously investigated whether climate change might require overhead lines to be redesigned but found there not to be a need. Flooding would however, be considered as part of the FRA. Details of the likely construction materials would be included within the Project description within the ES together with a simple estimate of the GHG emissions associated with the construction phase of the Project and potential opportunities to save carbon
- Decommissioning - the ES would include a high-level summary of potential effects as a result of decommissioning for each environmental topic within an appendix to the description of the Project chapter within the ES

### 18.3 Proposed content of the ES

18.3.1 The ES would be produced in a number of volumes. The volumes are expected to comprise:

- Non-Technical Summary: This would summarise the main elements of the Project and the significant environmental effects identified through the EIA process. It would be written in plain English for a non-technical audience
- Main Text and associated figures: This would detail the findings of the EIA. It would include the chapters listed in Table 18.2
- Technical Appendices: This would contain accompanying reports or documents to support the Main Text

18.3.2 The proposed structure of the ES is set out in Table 18.2, however this may be revised following receipt of the Scoping Opinion.

Table 18.2 – Proposed contents of the ES

Chapter	Title
1	Introduction
2	Regulatory and Planning Policy Context
3	Main Alternatives Considered

<b>Chapter</b>	<b>Title</b>
4	Project Description
5	EIA Approach and Method
6	Agriculture and Soils
7	Air Quality
8	Ecology and Biodiversity
9	Geology and Hydrogeology
10	Historic Environment
11	Hydrology and Land Drainage
12	Landscape and Visual
13	Noise and Vibration
14	Socio-Economic, Recreation and Tourism
15	Traffic and Transport
16	Cumulative Effects
17	Summary

18.3.3 The ES would be supported by a number of documents either as appendices or standalone DCO application documents, including:

- Habitats Regulations Assessment Report
- Biodiversity Legislation Compliance Report
- BNG assessment
- DLL Letter of Comfort
- LONIs for Protected Species licences
- Outline CoCP (including a Dust Risk Assessment)
- Draft CTMP
- TA
- Outline LEMP (including Arboricultural Impact Assessment and Dust Risk Assessment)
- Evidence supporting the coping out of effects related to EMFs
- Flood Risk Assessment
- Water Framework Directive (WFD) Assessment
- Archaeological Draft Mitigation Strategy and Outline Written Scheme of Investigation
- Details of other Consents and Licences

## 18.4 Assessing a long linear project

- 18.4.1 The Project has been split in to nine geographic sections, largely based on Local Authority boundaries, ranging from approximately 10km to approximately 34km (see Chapter 4: Description of the Project for further detail and Figure 1.1 Appendix A). The use of geographic sections allows receptors along the Scoping Report Corridor to be allocated to one or two sections. In turn, this helps to make the large volume of baseline and assessment information associated with the Project easier to navigate, especially for stakeholders interested in specific geographic areas.
- 18.4.2 Individual topic assessments would make it clear which geographic section(s) each receptor is located in. This would be presented within the description of the baseline conditions relevant to that topic. In most cases, the subsequent assessment would be receptor based, assessing each receptor from north to south.
- 18.4.3 In conjunction with the presentation of the baseline and assessment information within ES chapters, consideration would also be given to the proportionate use of interactive mapping to present relevant information.

## 18.5 Next steps

- 18.5.1 Following submission of this Scoping Report, the Project design, planning and EIA would be progressed, including:
- Obtaining the Scoping Opinion and reviewing scoping consultation feedback to refine the scope of surveys and assessments to inform the ES
  - Continued desk studies, data collection and field surveys to obtain further baseline information to support the assessment
  - Continued stakeholder engagement and consultation with both statutory and non-statutory consultees and also landowners and tenants together with consideration of feedback received
  - Ongoing design evolution and identification of a preferred route, identification of required mitigations measures as well and identification of potential environmental enhancements
  - Development of the outline CoCP and other supporting documents
  - Production and submission of the draft Habitats Regulations Assessment Report to Natural England for comment before finalising
  - Preparation of the Preliminary Environmental Information Report, which would be submitted as part of the engagement material presented at Statutory Consultation.
  - Preparation of the ES, which would be submitted as part of the application for development consent

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# Appendix A – Figures

# Appendix B – Initial Outline CoCP

# East Anglia Green Energy Enablement (GREEN)

Initial Outline Code of Construction Practice

November 2022

nationalgrid



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# 1. Initial Outline Code of Construction Practice

## 1.1 Introduction

1.1.1 East Anglia GREEN Energy Enablement Project (the 'Project') is being developed by National Grid and comprises a reinforcement of the electricity transmission system in the East of England. The Project would facilitate the transfer of power from the East Anglia region to the rest of the Main Interconnected Transmission System (MITS) enabling the connection of offshore wind generation.

1.1.2 The Project would include:

- A new 400kV electricity transmission line, majority being overhead lines (OHL), of approximately 180km
- New undergrounding of 400kV cabling (approximately 10km) is also proposed in particular through the Dedham Vale Area of Outstanding Natural Beauty (AONB)
- New Cable Sealing End Compounds (CSEC) to connect the OHLs to the underground cables
- A new 400kV connection substation
- Works at Norwich Main, Bramford and Tilbury Substations
- Temporary works associated with construction of the Project

1.1.3 In addition, third party utilities diversions and / or modifications may also be required to facilitate the construction of the Project. Further details would be included within the Environmental Statement (ES).

1.1.4 The Project has been divided into nine sections (from north to south) by local authority area (refer to Figure 1.1 in Appendix A of the Scoping Report):

- Section 1: South Norfolk
- Section 2: Mid Suffolk
- Section 3: Babergh and Colchester
- Section 4: Tendring
- Section 5: Colchester
- Section 6: Braintree
- Section 7: Chelmsford
- Section 8: Basildon and Brentwood
- Section 9: Thurrock

## 1.2 Purpose of this Initial Outline Code of Construction Practice

1.2.1 The purpose of this document is:

- To provide an initial outline of the more detailed outline Code of Construction Practice (CoCP) that will be submitted with the DCO application

- To support the scoping out of matters within the Scoping Report and the ES where matters would not result in a likely significant effect with standard measures / environmental commitments in place
- To document standard mitigation and control measures that will be implemented during the construction of the Project

## 1.3 Preparation of the CoCP

1.3.1 This section describes the three stage iterative approach to developing the CoCP from the initial outline through to the CoCP the Main Works Contractor will implement throughout the construction of the Project.

### Stage 1: Initial Outline CoCP

1.3.2 This document is the initial outline Code of Construction Practice (CoCP) for the Project, has been produced to support the Scoping Report and to identify the mechanism in which the Project will capture and present the environmental commitments / measures that are required to manage, minimise and mitigate the environmental effects of the Project.

### Stage 2: Outline CoCP

1.3.3 The initial outline CoCP will be developed into the outline CoCP and submitted as part of the DCO application.

1.3.4 The outline CoCP will be prepared in parallel with the preliminary design, proposed construction methodology and the EIA. Environmental commitments / measures within the outline CoCP will include proposed design and construction mitigation which is identified through the technical assessments reported in the ES.

1.3.5 In addition, a number of outline Environmental Control Plans (ECPs) will be developed and appended to the outline CoCP.

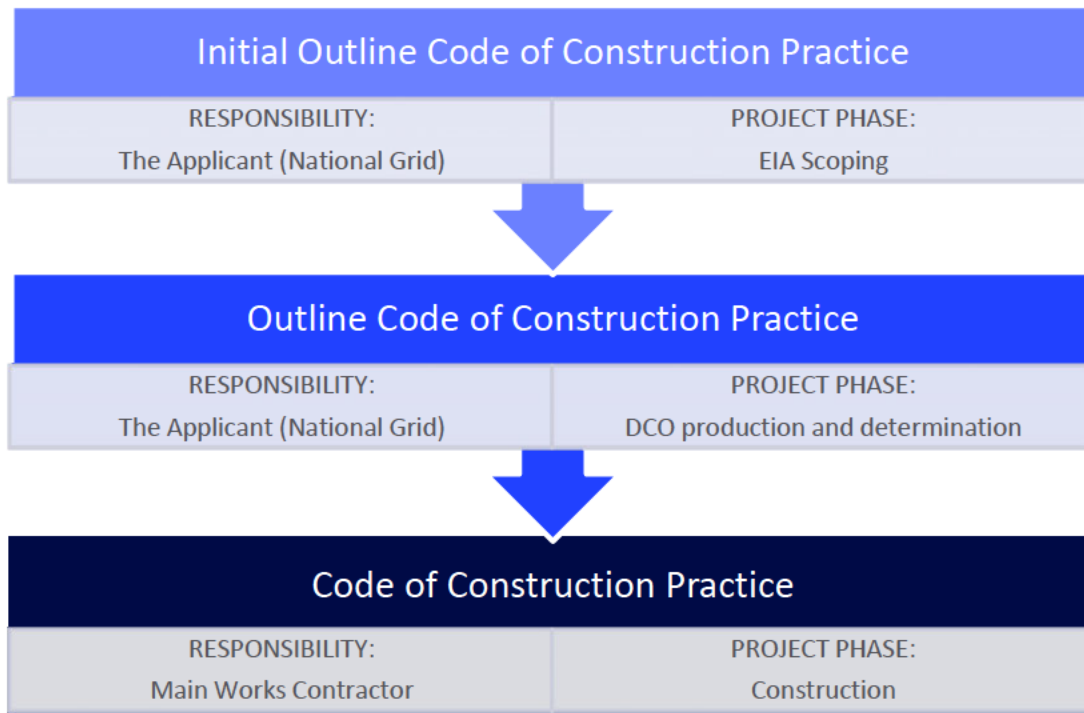
### Stage 3: CoCP

1.3.6 The outline CoCP will be developed into the CoCP by the Main Works Contractor prior to construction and adhered to throughout the construction phase.

1.3.7 The CoCP will include specific organisational information such as organograms, contact details of the Environmental Managers / Environmental Clerks of Works, specific organisational commitments etc.

1.3.8 The outline ECPs will be developed by the Main Works Contractor prior to the commencement of construction into final control plans and appended to the CoCP. Where relevant the ECPs will include contractor specific working methodologies.

Image 1.1: Iterative Code of Construction Practice Process



## 1.4 Compliance with the CoCP

- 1.4.1 The CoCP will be secured by a Requirement in the DCO (together with being a contractual obligation the appointed Main Works Contractor will have to follow). The CoCP will be prepared by the Main Works Contractor to discharge the Requirement in the DCO (there may be more than one submission e.g. if the Project is split into sections, construction is phased etc).

## 1.5 Construction Schedule

- 1.5.1 Subject to gaining development consent, construction works would be expected to start in 2027 and the Project be operational by 2031. Certain advance works (such as archaeological trial trenching or protected species mitigation) may take place in advance of the main construction period.

## 2. Measures and Environmental Commitments

- 2.1.1 Measures / environmental commitments (standard control measures) have been identified that would reduce impacts from the Project on the environment and are presented in Table 2.1. These are generally measures that would normally be implemented on a well-run construction site, but also include a number of good practice measures that have been identified through scoping. They also include measures that have typically been employed on other National Grid projects. Measures / environmental commitments in Table 2.1 are assigned a reference number, for example (GG01) for ease of cross-reference.
- 2.1.2 Table 2.1 will be updated within the outline CoCP (submitted with the DCO application) to include all embedded, standard and additional mitigation required during construction. Mitigation within the outline CoCP will be consistent with mitigation outlined within the ES.
- 2.1.3 Alongside the measures / environmental commitments outlined in Table 2.1, the following ECPs have been identified as being required:
- Landscape and Ecological Management Plan (LEMP) (an outline LEMP will be submitted as part of the DCO application)
  - Construction Traffic Management Plan (CTMP) and Construction Staff Travel Plan (an outline CTMP will be submitted as part of the DCO application)
  - Site Waste Management Plan (SWMP) (a draft SWMP will be submitted as part of the DCO application)
  - Emergency Action Plan (including but not limited to site flooding and pollution incidents) (details of the contents of this plan will be included within the outline CoCP)
  - Soil Resources Plan (including but not limited to details of soil resources present, soil management and storage, and measures for soil restoration) (details of the contents of this plan will be included within the outline CoCP)
  - Draft Archaeological Mitigation Strategy and Outline Written Scheme of Investigation (WSI) (a draft Mitigation Strategy and outline WSI will be submitted as part of the DCO application)
- 2.1.4 As the EIA progresses additional environmental control plans will be identified, depending on predicted impacts, these may include:
- Soil Management Plan
  - Noise and Vibration Management Plan
  - Materials Management Plan
  - Ecology and Biodiversity Enhancement Strategy

Table 2.1: Measures / Environmental Commitments

Ref	Measures / Environmental Commitments
<b>General Project Commitments</b>	
<b>GG01</b>	The Project will be run in compliance with all relevant legislation, consents and permits - <i>a list will be included within the outline CoCP submitted with the DCO application.</i>
<b>GG02</b>	The Project design will be compliant with the guidelines and policies relating to electromagnetic fields stated in National Policy Statement EN-5, including the International Commission on Non-Ionizing Radiation Protection guidelines (1998).
<b>GG03</b>	A CoCP, a Landscape and Ecological Management Plan (LEMP) and a Construction Traffic Management Plan (CTMP) will be produced prior to the defined ‘commencement’ of construction. The Main Works Contractor(s) shall undertake daily site inspections to check conformance to the Management Plans.
<b>GG04</b>	Suitably experienced team of Environmental Managers / Environmental Clerk of Works will be appointed for the duration of the construction phase. The qualified and experienced Environmental Clerk of Works will be available during the construction phase to advise, supervise and report on the delivery of the mitigation methods and controls outlined in the CoCP. The Environmental Clerk of Works will monitor that the works proceed in accordance with relevant environmental DCO requirements and adhere to the required good practice and mitigation measures. The Environmental Clerk of Works will be supported as necessary by appropriate specialists, including ecologists and arboriculturists.
<b>GG05</b>	<p>Construction workers will undergo training to increase their awareness of environmental issues as applicable to their role on the Project. Topics will include but not be limited to:</p> <ul style="list-style-type: none"> <li>● Pollution prevention and pollution incident response</li> <li>● Dust management and control measures</li> <li>● Location and protection of sensitive environmental sites and features</li> <li>● Adherence to protected environmental areas around sensitive features</li> <li>● Working hours and noise and vibration reduction measures</li> <li>● Working with potentially contaminated materials</li> <li>● Waste management and storage</li> <li>● Flood risk response actions</li> <li>● Agreed traffic routes, access points, etc.</li> </ul>

Ref	Measures / Environmental Commitments
	<ul style="list-style-type: none"> <li>• Training of construction and maintenance workers in the handling and use of potentially hazardous substances and the associated risks.</li> </ul>
<b>GG06</b>	A record of condition will be carried out (photographic and descriptive) of the working areas that may be affected by the construction activities. This record will be available for comparison following reinstatement after the works have been completed to ensure that the standard of reinstatement at least meets that recorded in the pre-condition survey.
<b>GG07</b>	Land used temporarily will be reinstated where practicable to its pre-construction condition and use (or a condition agreed with the land owner). Hedgerows, fences and walls (including associated earthworks and boundary features) will be reinstated to a similar style and quality to those that were removed, with landowner agreement.
<b>GG08</b>	Where sensitive features are to be retained within or immediately adjacent to the Order Limits, an appropriate protective area will be established using appropriate fencing and signage and will be inspected, repaired and replaced as necessary. The protective areas will be shown on the Retention and Reinstatement Plans contained within the LEMP.
<b>Construction Site Set Up</b>	
<b>GG09</b>	The name and contact details for the Project will be displayed at the entrance to all compounds. This will include an emergency number.
<b>GG10</b>	Any activity carried out or equipment located within a construction compound that may produce a noticeable nuisance, including but not limited to dust, noise, vibration and lighting, will be located away from sensitive receptors such as residential properties or ecological sites where practicable.
<b>GG11</b>	<p>Appropriate site layout and housekeeping measures will be implemented by the Main Works Contractor(s) at all construction sites. This will include but not be limited to:</p> <ul style="list-style-type: none"> <li>• Preventing pests and vermin control and treating any infestation promptly, including arrangements for the proper storage and disposal of waste produced on site</li> <li>• Inspecting and collecting any waste or litter found on site</li> <li>• Locating or designing site offices and welfare facilities to prevent the overlooking of residential properties where possible</li> <li>• Locating designated smoking/vaping areas to avoid nuisance to neighbours</li> <li>• Managing staff/vehicles entering or leaving site, potentially through using a 'gate man', especially at the beginning and end of the working day</li> <li>• Managing potential off-site contractor and visitor parking to ensure they are safe</li> </ul>

<b>Ref</b>	<b>Measures / Environmental Commitments</b>
<b>GG12</b>	<p>Plant and construction vehicles will conform to relevant applicable standards for the vehicle type as follows:</p> <ul style="list-style-type: none"> <li>● Euro 4 (NOx) for petrol cars, vans and minibuses</li> <li>● Euro 6 (NOx and PM) for diesel cars, vans and minibuses</li> <li>● Euro VI (NOx and PM) for lorries, buses, coaches and Heavy Goods Vehicles (excluding specialist abnormal indivisible loads)</li> </ul> <p>Vehicles will be correctly maintained and operated in accordance with manufacturer's recommendations and in a responsible manner. All plant and vehicles will be required to switch off their engines when not in use and when it is safe to do so.</p>
<b>GG13</b>	<p>Materials and equipment will not be moved or handled unnecessarily. When loading and unloading materials from vehicles, including cable drums and excavated materials, drop heights will be limited.</p>
<b>GG14</b>	<p>Fuels, oils and chemicals will be stored responsibly, away from sensitive water receptors. Where practicable, they will be stored &gt;15m from watercourses, ponds and groundwater dependent terrestrial ecosystems. Where it is not practicable to maintain a &gt;15m distance, additional measures will be identified. All refuelling, oiling and greasing of construction plant and equipment will take place above drip trays and also away from drains as far as is reasonably practicable. Vehicles and plant will not be left unattended during refuelling. Appropriate spill kits will be made easily accessible for these activities. Potentially hazardous materials used during construction will be safely and securely stored including use of secondary containment where appropriate. Stored flammable liquids such as diesel will be protected either by double walled tanks or stored in a bunded area with a capacity of 110% of the maximum stored volume. Spill kits will be located nearby.</p>
<b>GG15</b>	<p>Runoff across the site will be controlled through a variety of methods including header drains, buffer zones around watercourses, on-site ditches, silt traps and bunding. There will be no intentional discharge of site runoff to ditches, watercourses, drains or sewers without appropriate treatment and agreement of the appropriate authority (except in the case of an emergency).</p>
<b>GG16</b>	<p>Wash down of vehicles and equipment will take place in designated areas within construction compounds. Wash water will be prevented from passing untreated into watercourses and groundwater. Appropriate measures will include use of sediment traps.</p>
<b>GG17</b>	<p>Wheel washing will be provided at each main compound access point on to the highway. An adequate supply of water will be made available at these locations at all times. Road sweepers will be deployed on public roads where necessary to prevent excessive dust or mud deposits.</p>
<b>GG18</b>	<p>Earthworks and stockpiled soil will be protected (to avoid dust generation) by covering, seeding or using water suppression where appropriate.</p>
<b>GG19</b>	<p>Bonfires and the burning of waste material will be prohibited.</p>



<b>Ref</b>	<b>Measures / Environmental Commitments</b>
<b>GG20</b>	Construction lighting will be of the lowest luminosity necessary to safely perform each task, and include motion sensors or switched off when not in use. It will be designed, positioned and directed to reduce the intrusion into adjacent properties, protected species and habitats.
<b>GG21</b>	A Site Waste Management Plan (SWMP) will be developed prior to construction. The Main Works Contractor(s) will maintain and monitor the SWMP throughout the construction phase and oversee that any sub-contractor(s) adhere to the SWMP. The SWMP will set out, in an auditable manner, how waste will be reduced, reused, managed and disposed of in accordance with the waste hierarchy. Dedicated areas will be identified on the construction plans to allow materials and wastes to be segregated at source, reducing the risk of damage or contamination.
<b>GG22</b>	An Emergency Action Plan will be developed for the construction phase which will outline procedures to be implemented in case of unplanned events, including but not limited to site flooding and pollution incidents.
<b>GG23</b>	Where necessary stone pads will be installed in areas where heavy equipment, such as cranes and piling rigs, are to be used. The stone pads will provide stable working areas and will reduce disturbance to the ground. The stone pad area will be stripped of the topsoil, which will be stored and reinstated in accordance with the soil management measures contained in the CoCP.
<b>GG24</b>	Working areas will be appropriately fenced. The type of fencing installed will depend on the area to be fenced and will take into consideration the level of security required in relation to the surrounding land and public access, rural or urban environment and arable or stock farming. For some locations the fence used may also serve to provide acoustic and visual screening of the work sites and reduce the potential for disturbance of users in the surrounding areas. Fencing will be regularly inspected and maintained and removed as part of the demobilisation unless otherwise specified.
<b>GG25</b>	Members of the community and local businesses will be kept informed regularly of the works through active community liaison. This will typically include the notification of 'noisy activities', heavy traffic periods and start and end dates of key phasing. A contact number will be provided which members of the public can use to raise any concerns or complaints about the Project. All construction-related complaints will be logged by the Main Works Contractor(s) in a complaints register, together with a record of the responses given and actions taken.
<b>GG26</b>	Active private water supplies would be identified with landowners through the landowner discussions. Appropriate measures would be considered during construction. In the event of a landowner or tenant reporting that installation activities have affected their private water supplies, an initial response would be provided. Where the installation works have affected a private water supply, an alternative water supply would be provided, as appropriate.

Ref	Measures / Environmental Commitments
<b>Agriculture and Soils</b>	
<b>AS01</b>	<p>Soil management measures will be detailed in a Soil Resources Plan (SRP) which will form part of the CoCP (a draft SPR would be appended to the outline CoCP within the DCO application). Measures will include but not be limited to the following:</p> <ul style="list-style-type: none"> <li>● Details of the soil resources present</li> <li>● How topsoil and subsoil will be stripped and stockpiled</li> <li>● Suitable conditions for when handling soil will be undertaken, for example avoiding handling of waterlogged soil</li> <li>● Indicative soil storage locations</li> <li>● How soil stockpiles will be designed taking into consideration site conditions and the nature/composition of the soil</li> <li>● Specific measures for managing sensitive soils</li> <li>● Suitable protective surfacing where soil stripping can be avoided, based on sensitivity of the environment and proposed works</li> <li>● Approach to reinstating soil that has been compacted, where required</li> <li>● Details of measures required for soil restoration</li> </ul>
<b>AS02</b>	<p>Land required temporarily for construction will be returned to its former use / condition or a use / condition agreed with the landowner.</p>
<b>AS03</b>	<p>Where practicable and safe to do so, existing access to and from residential, commercial, community and agricultural land uses will be maintained throughout the construction period or as agreed through the landowner discussions. This may require signed diversions or temporary restrictions to access. The means of access to affected properties, facilities and land parcels will be communicated to affected parties at the start of the Project / at the start of the relevant sections, with any changes communicated in advance of the change being implemented. Where field-to-field access points require alteration as a result of construction, alternative field access will be provided in consultation with the landowner/occupier.</p>

Ref	Measures / Environmental Commitments
AS04	Existing water supplies for livestock will be identified before construction commences. Where supplies will be lost or access compromised by construction works, temporary alternative supplies will be provided where necessary. Water supplies will be reinstated following construction.
AS05	Consultation with affected landowners will be carried out to investigate the current extent of land drainage. A scheme of pre-construction land drainage will be designed with the intent of maintaining the efficiency of the existing land drainage system and to assist in maintaining the integrity of the working area during construction. The Project may include a system of 'cut-off' drains which feed into a new header drain and the Project will also take into account surface water runoff measures.
AS06	Should animal bones be discovered during construction, which may indicate a potential burial site, works will cease, and advice will be sought from the Animal Health Regional Office on how to proceed, relevant to the origin and age of the materials found.
AS07	All movement of plant and vehicles between fields will cease in the event of a notification by the Department for Environment, Food and Rural Affairs (Defra) of a disease outbreak in the vicinity of the site that requires the cessation of activities. Advice will be sought from Defra in order to develop suitable working methods required to reduce the biosecurity risk associated with the continuation of works.
AS08	Where deemed necessary, clay bungs or other vertical barriers will be constructed within trench excavations where deemed necessary by a suitably experienced person, to prevent the creation of preferential drainage pathways.
AS09	Measures to manage dust, waste, water, noise, vibration and soil during construction. The Main Works Contractor(s) will undertake daily site inspections to check conformance.
AS10	Stone pads will be installed in areas where heavy equipment, such as cranes and piling rigs, are to be used. The stone pads will provide stable working areas and will reduce disturbance to the ground. The stone pad area will be stripped of the topsoil, which will be stored and reinstated in accordance with the soil management measures contained in the CoCP.
<b>Air Quality</b>	
N/A	There are no air quality specific measures. Those that are relevant to Air Quality include GG10, GG12, GG13, GG17, GG18, GG19.

Ref	Measures / Environmental Commitments
<b>Ecology and Biodiversity</b>	
<b>B01</b>	The Main Works Contractor(s) will comply with relevant protected species legislation. Appropriate licences will be obtained where necessary from Natural England for all works affecting protected species as identified in the ES and through pre-construction surveys. All applicable works will be undertaken in accordance with the relevant requirements and conditions set out in those licences.
<b>B02</b>	The assumption will be that vegetation with the potential to support breeding birds will not be removed during the breeding bird season (March to August inclusive). If any works become necessary during the breeding bird season, works will be supervised by an Environmental Clerk of Works. Appropriate protection measures will be put in place should active nests be found. These will include exclusion zones around active nests until chicks fledge or nests become inactive as determined by monitoring by the Environmental Clerk of Works.
<b>B03</b>	Where there will be a risk of animal entrapment, a means of escape will be installed into all excavations left open overnight.
<b>B04</b>	To control the spread of invasive weeds in accordance with the Wildlife and Countryside Act 1981, any plant or machinery that has been used in areas infested with invasive species (both terrestrial and aquatic), such as Japanese knotweed and Himalayan balsam, will be thoroughly cleaned. Water used to clean vehicles will be controlled to prevent the spread of the plant (through seeds, rhizomes, fragments, etc.). The area will be cordoned off to prevent any inadvertent spreading.
<b>B05</b>	All habitats suitable for common reptiles will be subject to two-stage habitat manipulation that will take place between mid-March and mid-October. Firstly, vegetation will be cut to approximately 150mm (with the arisings removed) under the supervision of an Environmental Clerk of Works and the site left for a minimum of 24 hours to allow reptiles to naturally disperse from the area. Secondly, vegetation will be cleared down to ground level under the supervision of an Environmental Clerk of Works. Vegetation will be cleared using appropriate equipment based on the type of vegetation to be removed, the area affected, and the risk of mortality or injuring reptiles. Construction works could commence immediately after completion of the second stage. Reptile hibernacula will be retained and protected during construction where practicable. If unavoidable, the removal of vegetation and groundworks at hibernacula will be timed to avoid the hibernation season (late October to early March). Replacement hibernacula and refugia will be provided.
<b>B06</b>	Alternative roost structures (bat boxes) will be provided (with landowner consent) on retained trees within the Order Limits or areas outside of the Order Limits agreed with landowners. Three boxes will be provided for each tree with moderate bat roost potential to be felled. Five boxes will be provided for each tree with high bat roost potential to be felled.

Ref	Measures / Environmental Commitments
B07	Where the works require the crossing or removal of hedgerows, the gap will be reduced to a width required for safe working. Where hedge removals are necessary, 'dead hedging' should be used, where practicable, in the interim periods to retain connectivity during construction. Dead hedging can comprise vegetation arisings or artificial provision, such as willow screening panels or Heras fencing covered in camouflage netting. New hedgerow planting will contain native, woody species of local provenance.
<b>Geology and Hydrogeology</b>	
GH01	Intrusive ground investigations and assessment would be undertaken prior to construction which would inform appropriate geotechnical design in relation to the site/structure specific ground conditions including ground instability/adverse ground conditions.
GH02	Construction methods such as appropriate piling techniques (if required) to minimise the risk of mixing of aquifer bodies through the creation of new pathways. This includes the provision of a Foundation Works Risk Assessment (FWRA), which would be undertaken once the proposed foundation solutions are known, in accordance with Environment Agency guidance 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination'.
GH03	Use of appropriate occupational health and safety measures e.g. Personal Protective Equipment (PPE), and statutory health and safety compliance (e.g. compliance with the Confined Spaces Regulations, 1997 in relation to ground gas from working in confined spaces/trenches) to minimise the risks associated with anticipated/unexpected contamination.
GH04	All use and storage of chemicals to be undertaken in accordance with Environment Agency and Government Pollution Prevention for business, and controlled and monitored through the CoCP and general construction site good environmental and waste management procedures.
GH05	The control of earthworks or materials movement (including any re-use of materials) under appropriate Environmental Permits, exemptions or CL:AIRE The definition of Waste: The development industry Code of Practice.
GH06	Any temporary dewatering activities during construction would be undertaken in accordance with Environment Agency guidance, and if required, an Abstraction Licence and Environmental Permit (for the discharge) and would be limited to the depth and time required to facilitate construction activities.

Ref	Measures / Environmental Commitments
GH07	A protocol for dealing within any unexpected contamination (this would be included within the outline CoCP submitted with the DCO application).
<b>Historic Environment</b>	
H01	Locations of known archaeological interest/value, or areas where archaeological work is planned, will be signposted/fenced off to avoid unintentional damage.
H02	Where a previously unknown heritage asset is discovered, or a known heritage asset proves to be more significant than foreseen at the time of application, the Project will inform the local planning authority and will agree a solution that protects the significance of the new discovery, so far as is practicable, within the Project parameters.
H03	Where practicable, maintain elements within the landscape such as vegetation and hedgerows (including re-instating hedgerows, fences and walls).
<b>Hydrology and Land Drainage</b>	
W01	All works within main rivers or ordinary watercourses will be in accordance with a method approved under environmental permits issued under the Environmental Permitting Regulations or the protective provisions of the DCO for the benefit of the Environment Agency and the Lead Local Flood Authorities.
W02	<p>For open cut watercourse crossings and installation of vehicle crossing points, good practice measures will include but not be limited to:</p> <ul style="list-style-type: none"> <li>● Where practicable, reducing the working width for open cut crossings of a main or ordinary watercourse whilst still providing safe working and reinstating the riparian vegetation and natural bed of the watercourse, using the material removed when appropriate on completion of the works and compacting as necessary</li> <li>● Installation of a pollution boom downstream of open cut works</li> <li>● The use and maintenance of temporary lagoons, tanks, bunds, silt fences or silt screens as required</li> <li>● Have spill kits and straw bales readily available at all crossing points for downstream emergency use in the event of a pollution incident</li> <li>● The use of all static plant such as pumps in appropriately sized spill trays</li> </ul>

Ref	Measures / Environmental Commitments
	<ul style="list-style-type: none"> <li>● Prevent refuelling of any plant or vehicle within 15m of a watercourse</li> <li>● Prevent storing of soil stockpiles within 15m of a main river</li> <li>● Inspect all plant prior to work adjacent to watercourses for leaks of fuel or hydraulic fluids</li> <li>● Reinstating the riparian vegetation and natural bed of the watercourse, using the material removed when appropriate, on completion of the works and compacting as necessary. If additional material is required, appropriately sized material of similar composition will be used</li> </ul>
<b>W03</b>	Riverbank and in-channel vegetation will be retained where not directly affected by installation works. Natural substrate will be provided through temporary watercourse crossings box culverts.
<b>W04</b>	Active private water supplies will be identified with landowners through the landowner discussions. Appropriate measures will be considered during construction. In the event of a landowner or tenant reporting that installation activities have affected their private water supplies, an initial response will be provided within 24 hours. Where the installation works have affected a private water supply, an alternative water supply will be provided, as appropriate.
<b>W05</b>	In the event of a significant spill during construction, all relevant landowners/tenants will be contacted in proximity of the spill, to determine if there are any private water supplies that might be affected; an assessment of the likelihood of groundwater contamination reaching identified private water supplies will be undertaken, and where a private water supply is judged likely to be affected, an alternative water supply will be provided, as appropriate.
<b>W06</b>	Where a main river is crossed by a trenchless crossing, the cables will be laid at least 1m below the hard bed level of the river and will remain at or below this level for a distance of not less than 3m from the brink of the riverbank before rising at a slope no greater than 1 vertical in 1.5 horizontal. Marker posts shall also be positioned on each bank of the river to indicate the location of the under-crossing and the nature of the works.
<b>W07</b>	Where construction activities take place in Flood Zone 3, construction compounds would be laid out in accordance with the Sequential Test and incorporate flood resilience measures where necessary. Storage of construction equipment and materials would be done in such a way as to avoid forming barriers to floodplain flows.
<b>W08</b>	Surface water runoff from operational above ground infrastructure would be managed in accordance with the requirements and standards of the relevant Lead Local Flood Authority (LLFA), and adopt suitable sustainable drainage techniques, designed to allow for climate change resilience.

<b>Ref</b>	<b>Measures / Environmental Commitments</b>
<b>Landscape and Visual (including Trees)</b>	
<b>LV01</b>	An Environmental Manager/ Environmental Clerk of Works will be appointed for the duration of the construction phase.
<b>LV02</b>	A pre-condition survey will be undertaken to ensure appropriate reinstatement is undertaken.
<b>LV03</b>	Sensitive areas will be protected during construction.
<b>LV04</b>	Construction lighting will be directional and minimised where possible.
<b>LV05</b>	Retention of vegetation where practicable and where vegetation cannot be retained, replacement will be used as appropriate.
<b>LV06</b>	The Main Works Contractor(s) will apply the relevant protective principles set out in British Standard (BS) 5837:2012: Trees in relation to design, demolition and construction. This will be applied to trees within the Order Limits which will be preserved through the construction phase, and to trees outside of the Order Limits where such measures do not hinder or prevent the use of the relevant working width for construction. All works to high grade trees, including trees under Tree Preservation Orders and veteran trees, will be undertaken or supervised by a suitably qualified arboriculturist.
<b>Noise and Vibration</b>	
<b>NV01</b>	Contractors will be required to follow good construction practices (referred to as best practicable means (BPM)) as outlined in BS 5228-1 and BS 5228-2 to control noise and vibration respectively. BS 5228-1 and BS 5228-2 have Approved Code of Practice status (in England) under the powers conferred by Sections 71(1)(b), (2) and (3) of the Control of Pollution Act 1974, as enacted under The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015. Compliance with the good practice noise and vibration requirements stated therein became a statutory obligation under the Act.
<b>NV02</b>	BPM measures will be identified within the CoCP and may include housing continuous noisy plant in acoustic enclosures, siting semi-static equipment as far as reasonably practicable away from occupied buildings, and fitting equipment with suitable enclosures or screening.
<b>NV03</b>	In certain instances where construction noise and/ or vibration may cause a significant adverse effect at nearby NSRs, applications for prior consent under Section 61 of the Control of Pollution Act 1974 may be submitted to the



Ref	Measures / Environmental Commitments
	relevant local authority to ensure that BPM are applied to control noise and vibration. This would be considered within the mitigation outlined in the Outline CoCP to support the DCO application.
<b>Socio-economics, Recreation and Tourism</b>	
<b>S01</b>	Provision of training to construction workers, particularly in relation to working hours and the management of emissions (dust, noise, vibration, etc).
<b>S02</b>	PRoWs crossing the working areas will be managed in discussion with the relevant local authorities and potential temporary closures applied for discussed with the relevant local authority. Access disruption would be reduced while construction activities occur. Any required temporary diversions will be clearly marked at both ends with signage explaining the diversion, the duration of the diversion and a contact number for any concerns.

# Appendix C – Competent Experts

Our team are all part of experienced, professional planning consultancies with many years' experience working on strategic development projects, including NSIPs. The preparation of chapters and input into the delivery of the EIA Scoping Report has been undertaken by:

<b>Topic/role</b>	<b>Relevant academic and professional qualifications</b>	<b>Relevant experience in the environmental assessment of infrastructure projects</b>
EIA Lead	<ul style="list-style-type: none"> <li>• BSc (Hons) Biological Sciences</li> <li>• LLM Environmental Law</li> <li>• Diploma in Management (DipMgmt)</li> <li>• Chartered Environmentalist (CEnv)</li> <li>• Member of Institute of Environmental Management and Assessment (MIEMA)</li> </ul>	They have over 22 years' experience directing multidisciplinary teams to deliver robust and defensible planning and EIA positions for major infrastructure projects, often in the context of challenging programmes. They are an expert in securing consent through applications for DCOs having led and integrated large teams.
Air Quality	<ul style="list-style-type: none"> <li>• BSc (Hons) Geography</li> <li>• MSc Environmental Technology</li> <li>• Chartered Environmentalist</li> <li>• Chartered Scientist</li> <li>• Institute of Air Quality Management</li> <li>• Institute of Environmental Management and Assessment</li> </ul>	They have 14 years' experience leading air quality assessments for major infrastructure schemes in the UK, including, A14 DCO, M25 J10-16, A30 DCO, A417 DCO, A66 DCO, HS2 phase 2b (Leeds), Luton airport expansion DCO, Gatwick Northern Runway expansion DCO. These schemes have included detailed modelling, analysis of monitoring data, assessment of human and ecological receptors and assessment of significance.
Agriculture and Soils	<ul style="list-style-type: none"> <li>• BSc (Hons) Forestry and Soil Science</li> <li>• PhD Soil Science</li> <li>• Fellow, British Society of Soil Science</li> <li>• Member, Chartered Institute of Ecology and Environmental Management</li> <li>• Chartered Environmentalist</li> </ul>	They have nearly 30 years' experience as a soil and environmental scientist. They have led numerous soil and Agricultural Land Classification assessments as part of Environmental Statements on highways projects such as the A585 and A66, linear gas pipeline schemes and major development such as the Sizewell C nuclear new build.
Biodiversity	<ul style="list-style-type: none"> <li>• BSc (Hons) Ecology and Environmental Management</li> <li>• MCIEEM</li> <li>• Bat Survey Licence</li> </ul>	They are a Principal Ecologist with considerable local project management experience of strategic planning and delivery of a wide variety of developments, primarily for

Topic/role	Relevant academic and professional qualifications	Relevant experience in the environmental assessment of infrastructure projects
	<ul style="list-style-type: none"> <li>• GCNLicence</li> <li>• NPTC Tree Climbing and Aerial Rescue</li> </ul>	<p>linear and energy schemes local to the region with a strong background in Environmental Impact Assessment. In addition to an excellent technical knowledge, specialising in ornithology, knowledge of current planning guidance and legislation</p>
Geology and Hydrology	<ul style="list-style-type: none"> <li>• BEng (hons) Industrial Geology</li> <li>• MSc Geotechnical Engineering</li> </ul>	<p>They have 22 years' experience in geotechnical and geoenvironmental engineering across a full range of greenfield and brownfield land development schemes. She has considerable EIA and DCO experience and has acted as Geology and Ground Conditions lead on a number of DCO schemes including Millbrook Power Project, Riverside Energy Park and M3 J9 and is currently fulfilling this role on Bramford to Twinstead Reinforcement and SeaLink DCO Projects.</p>
Health and Wellbeing	<ul style="list-style-type: none"> <li>• BSc (Hons) Environmental Conservation</li> <li>• Member of Institute of Environmental Management and Assessment</li> <li>• Chartered Environmentalist</li> </ul>	<p>They are a Chartered Environmentalist, specialising in Impact Assessment. With over 12 years' experience, they project manage and provide technical and quality expertise for a number of environmental assessment projects. Their varied experience and technical interests include health in EIA, HIA, equality impact assessment, EIA, Strategic Environmental Assessment (SEA) and Integrated Impact Assessment (IIA). Recent project experience includes the health and wellbeing assessments of the Humber Low Carbon Pipelines and East Anglia Green, the ISA of England's Economic Heartland's regional Transport Strategy, HS2 Phase 2b, East West Rail, and the assessment of health</p>

Topic/role	Relevant academic and professional qualifications	Relevant experience in the environmental assessment of infrastructure projects
		and equality across a range of other highways and commercial schemes.
Historic Environment	<ul style="list-style-type: none"> <li>• PhD Archaeology</li> <li>• MPhil Archaeological Practice</li> <li>• BA (Hons) Ancient History and Archaeology</li> </ul>	They are a Principal Archaeologist with 11 years relevant experience and has led the cultural heritage assessment on the DCO for an electricity transmission project and contributed to the heritage assessment on a high-pressure gas pipeline replacement DCO. They have most recently worked on the heritage assessment for the Lower Thames Crossing scheme for National Highways.
Hydrology and Land Drainage	<ul style="list-style-type: none"> <li>• BSc (Hons) Environmental Biology</li> <li>• MSc Water Management</li> <li>• Member of the Chartered Institution of Water and Environmental Management</li> </ul>	They have been working in water environment assessment for 19 years and has acted as the water environment lead on numerous projects including the Silvertown Tunnel, the M4 J3 to J12 Smart Motorway and A585 Skippool to Windy Harbour DCO applications and currently is fulfilling this role on the Lower Thames Crossing, Humber Low Carbon Pipelines and Bramford to Twinstead Reinforcement DCO projects.
Landscape and Visual	<ul style="list-style-type: none"> <li>• MA Landscape Design</li> <li>• BSc (Hons) Geography</li> <li>• Chartered Member of the Landscape Institute</li> </ul>	They have over 25 years of experience in the field of LVIA and has worked on numerous grid connection and renewable energy projects across the UK. They are experienced in working with the wider team to influence project design and minimise environmental impacts, whilst helping to develop practical solutions. They are a respected Expert Witness who has prepared precognitions, proofs of evidence and written and graphical productions for Public Inquiries, Hearings and Examinations throughout the UK and Ireland.

Topic/role	Relevant academic and professional qualifications	Relevant experience in the environmental assessment of infrastructure projects
Arboriculture	<ul style="list-style-type: none"> <li>• Technicians Certificate in Arboriculture</li> <li>• HND in Horticulture</li> <li>• Professional Tree Inspector</li> <li>• Level 5 Diploma in Management &amp; Leadership</li> <li>• Professional member of the Arboricultural Association</li> <li>• Associate member of the Chartered Institute of Forestry</li> </ul>	<p>They have over 30 years of experience within Arboriculture and Horticulture working in the private sector in both contracting and consultancy. They have experience in managing and delivering environmental arboricultural reports for large scale infrastructure projects across the highways, rail, utility and environmental sectors throughout the United Kingdom. Other experience extends to tree asset management, health and safety tree condition assessment, tree related subsidence, tree planting and establishment, and forestry windthrow assessment.</p>
Noise and Vibration	<ul style="list-style-type: none"> <li>• BSc (Hons) Acoustics</li> <li>• Corporate Member of the Institute of Acoustics (MIOA)</li> </ul>	<p>They have over 15 years' experience working on a wide range of projects in the field of acoustics, noise and vibration.</p>
Socio-economics, Recreation and Tourism	<ul style="list-style-type: none"> <li>• BA (Hons) Economics</li> <li>• MSc Development and Planning</li> <li>• RTPI Chartered Member</li> </ul>	<p>They are an Associate Technical Director with Arcadis, having around 15 years' experience in economic analysis and strategic planning policy. They have produced numerous socioeconomic and health impact assessments to support major infrastructure schemes. They have appeared as an expert witness on employment land related matters at public planning inquiries including a DCO inquiry.</p>
Traffic and Transport	<ul style="list-style-type: none"> <li>• BSc Geography (Hons)</li> <li>• MCILT (Chartered Member of Institute of Logistics Transport)</li> <li>• MSoRSA (Member of Society of Road Safety Auditors)</li> </ul>	<p>They are an Associate Technical Director that can bring significant experience and knowledge to the project, through her involvement in numerous multi-discipline schemes covering transport planning, urban realm / streetscape design, sustainable travel, traffic management and diversion planning,</p>

<b>Topic/role</b>	<b>Relevant academic and professional qualifications</b>	<b>Relevant experience in the environmental assessment of infrastructure projects</b>
		environmental assessment, highway design and stakeholder engagement. She has experience assessing traffic impacts on the local and strategic highway network, identifying risks, constraints and mitigation.

# Appendix D – Transboundary Impacts



<b>Criteria and Relevant Considerations</b>	<b>Result of the Screening Considerations</b>
<p><b>Characteristics of the development:</b>            Size of the development            Use of natural resources            Production of waste            Pollution and nuisances            Risks of accidents            Use of technologies</p>	<p>The East Anglia GREEN project is a proposal to consent and build a new approximate 180km 400kV electricity reinforcement and associated infrastructure between Norwich, Bramford and Tilbury Substations. It includes the construction and operation of a new 400kV substation located at Tendring.</p> <p>Some of the resources required for the construction of the Project are likely to be obtained from the global market, e.g. steel. It is envisaged that materials would be obtained locally where practicable.</p> <p>It is not likely that any waste, nuisances or accidents would extend beyond the border of the UK. No novel technologies are proposed that have potential for transboundary effects.</p>
<p><b>Location of the development (including existing use) and geographical area:</b>            What is the existing use?             What is the distance to another European Economic Area (EEA) state? (Name EEA state)             What is the extent of the area of a likely impact under the jurisdiction of another EEA state?</p>	<p>The existing land use is largely agricultural land interspersed with villages and larger urban settlements.</p> <p>The location of the development is approximately 110km from France (the closest EEA state).</p> <p>No physical works or impacts are likely to extend beyond the jurisdiction of the UK.</p>

<b>Criteria and Relevant Considerations</b>	<b>Result of the Screening Considerations</b>
<p><b>Environmental importance:</b> Are particular environmental values (e.g. protected areas – name them) likely to be affected?</p> <p>Capacity of the natural environment.</p> <p>Wetlands, coastal zones, mountain and forest areas, nature reserves and parks, Natura 2000 sites, areas where environmental quality standards already exceeded, densely populated areas, landscapes of historical, cultural or archaeological significance.</p>	<p>An assessment relating to potential likely significant effects to European sites (SPA, SAC and Ramsar sites, including potential sites) has not been completed at this stage. However, transboundary effects are unlikely on these sites and their qualifying species. A Habitats Regulations Assessment would accompany the application for development consent which would include an assessment of likely significant effects on European Sites. An assessment would also be presented in the Ecology and Biodiversity Chapter of the ES.</p> <p>The Project also crosses the Dedham Vale AONB, which is designated for its national (rather than international) landscape quality and cultural associations. It is the Project's intention to use underground cables within the AONB boundary to reduce the impact on the landscape.</p> <p>The Project is likely to result in localised impacts to landscape, cultural heritage (including archaeology), soils, adjacent landowners and residents, biodiversity (including protected species), and the water environment. These impacts would be mitigated to reduce the significance of any effect. These impacts would not result in impacts to any other European Economic Area (EEA) state.</p>
<p><b>Potential impacts and carrier:</b> By what means could impacts be spread (i.e. what pathways)?</p>	<p>The pathways by which impacts could be spread are via air and water (such as rivers). However, none of the anticipated effects are likely impact another EEA state.</p>
<p><b>Extent:</b> What is the likely extent of the impact (geographical area and size of the affected population)?</p>	<p>The extent of the impacts would vary for different Environmental Impact Assessment (EIA) topics. However, no significant effects are anticipated that could impact on another EEA state</p>
<p><b>Magnitude:</b> What would the likely magnitude of the change in relevant variables relative to the status quo, taking into account the sensitivity of the variable?</p>	<p>The magnitude would vary for different Environmental Impact Assessment (EIA) topics. However, no significant effects are anticipated that could impact on another EEA state</p>
<p><b>Probability:</b> What is the degree of probability of the impact?</p>	<p>It is very unlikely that effects from the Project could impact on another EEA state during both normal conditions and exceptional situations such as accidents</p>

<b>Criteria and Relevant Considerations</b>	<b>Result of the Screening Considerations</b>
Is the impact likely to occur as a consequence of normal conditions or exceptional situations such as accidents?	
<b>Duration:</b> Is the impact likely to be temporary, short-term or long-term? Is the impact likely to relate to the construction, operation or decommissioning phase of the activity?	No significant effects are anticipated that could impact on another EEA state.
<b>Frequency:</b> What is likely to be the temporal pattern of the impact?	No significant effects are anticipated that could impact on another EEA state.
<b>Reversibility:</b> Is the impact likely to be reversible or irreversible?	No significant effects are anticipated that could impact on another EEA state.
<b>Cumulative impacts:</b> Are other major developments close by?	There are a number of other proposed developments within the Scoping Report Corridor and beyond. Potential cumulative effects would be assessed within the EIA. However, no significant effects are anticipated that could impact on another EEA state.

# Appendix E – Biodiversity – Sites Designated for Biodiversity

Table E1 - Sites designated for biodiversity within the Study Area

Site	Location		Description
<b>Internationally Designated</b>			
Norfolk Valley Fens SAC	0.18km south-east		<p>Norfolk Valley Fens is one of two sites selected in East Anglia, where the main concentration of lowland Alkaline fens occurs. This site comprises a series of valley-head spring-fed fens. Such spring-fed flush fens are very rare in the lowlands. Most of the vegetation at this site is of the small sedge fen type but there are transitions to reedswamp and other fen and wet grassland types. The individual fens vary in their structure according to intensity of management and provide a wide range of variation. There is a rich flora associated with these fens, including species such as grass-of-Parnassus (<i>Parnassia palustris</i>), common butterwort (<i>Pinguicula vulgaris</i>), marsh helleborine (<i>Epipactis palustris</i>) and narrow-leaved marsh-orchid (<i>Dactylorhiza traunsteineri</i>).</p> <p>Norfolk Valley Fens also represents narrow-mouthed whorl snail (<i>Vertigo angustior</i>) in East Anglia. At Flordon Common a strong population occurs in flushed grassland with yellow iris (<i>Iris pseudacorus</i>) maintained by light grazing. Norfolk Valley Fens is one of several sites representing Desmoulin's whorl snail (<i>Vertigo moulinsiana</i>) in East Anglia.</p>
Thames Estuary and Marshes Ramsar site and SPA	0.33km east		<p><u>Ramsar site</u></p> <p>The site comprises a complex of brackish, floodplain grazing marsh ditches, saline lagoons and intertidal saltmarsh and mudflat along the River Thames between Gravesend and Sheerness in Essex and Kent. The habitats support internationally important numbers of wintering waterfowl, and the saltmarsh and grazing marsh are of international importance for their diverse assemblages of wetland plants and invertebrates. The site performs important hydrological functions, including shoreline stabilisation, sediment trapping, flood water storage and desynchronization of flood peaks, and maintenance of water quality by removal of nutrients.</p> <p><u>SPA</u></p> <p>The site is classified for the protection of the largest aggregation of wintering red-throated diver (<i>Gavia stellata</i>) in the UK, an estimated population of 6,466 individuals, which is 38% of the wintering population of Great Britain. It also protects foraging areas for common tern (<i>Sterna hirundo</i>) and little tern (<i>Sternula albifrons</i>) during the breeding season.</p>

Site	Location	Description
Redgrave and South Lopham Fens Ramsar site	1.84km west	An excellent example of spring-fed lowland valley fen, exhibiting several distinct vegetation communities, supporting a diverse and well-studied invertebrate fauna. The site is one of only two British localities for the fen raft spider ( <i>Dolomedes plantarius</i> ).
Waveney and Little Ouse Valley Fens SAC	1.87km west	<p>This site represents purple moor-grass (<i>Molinia caerulea</i>) – meadow thistle (<i>Cirsium dissectum</i>) fen-meadow associated with spring-fed valley fen systems in East Anglia, where <i>Molinia</i> grassland is very rare. The <i>Molinia</i> meadows are found here in conjunction with black sedge (<i>Schoenus nigricans</i>) – blunt-flowered rush (<i>Juncus subnodulosus</i>) mire and calcareous fens with great fen-sedge (<i>Cladium mariscus</i>). Where the fen-meadow is grazed it is more species-rich, with frequent southern marsh-orchid (<i>Dactylorhiza praetermissa</i>).</p> <p>This site occurs in the East Anglian centre of distribution of calcareous fens and contains very extensive <i>Cladium</i> beds, including managed examples, as well as stands in contact zones between small sedge mire and species poor <i>Cladium</i>. The habitat type here occurs in a different hydrological situation to the Broads – spring-fed valley fen rather than flood-plain mire.</p> <p>This site is one of several representing Desmoulin’s whorl snail in East Anglia. At Weston Fen populations of this snail occur in a valley fen.</p>
Stour and Orwell Estuaries Ramsar site and SPA	3.02km north-east	<p><u>Ramsar site</u></p> <p>An estuary comprising extensive mudflats, low cliffs, saltmarsh, and areas of vegetated shingle on the lower river reaches. The site supports internationally and nationally important numbers of numerous species of wintering wildfowl and waders. Several nationally scarce plants and invertebrates occur.</p> <p><u>SPA</u></p> <p>The site supports overwintering hen harrier (<i>Circus cyaneus</i>) and the following migratory overwintering species: black-tailed godwit (<i>Limosa limosa islandica</i>); dunlin (<i>Calidris alpina alpina</i>); grey plover (<i>Pluvialis squatarola</i>); pintail (<i>Anas acuta</i>), redshank (<i>Tringa totanus</i>), ringed plover (<i>Charadrius hiaticula</i>), shelduck (<i>Tadorna tadorna</i>) and turnstone (<i>Arenaria interpres</i>). It also regularly supports at least 20,000 waterfowl.</p>
<b>Nationally Designated</b>		

Site	Location		Description
Wortham Ling SSSI	Within the Scoping Report Corridor		A lowland dry heath and acidic grassland site developed on sandy, glaciofluvial drift deposits. Alongside typical characteristic vegetation, the moss lichen flora presents a significant element of the site. Good populations of the grayling butterfly ( <i>Hipparchia semele</i> ) are also supported within the site.
Middle Wood, Offton SSSI	Within the Scoping Report Corridor		A complete medieval woodland, containing semi-natural stands of several different wood types and is predominantly of coppice-with-standards-structure, several hectares to the south are still within a coppice rotation. The main stand-type is ash-maple on wet boulder clay. The varying chalk content of the clay is reflected in the exceptionally diverse ground flora, which contains many species typical of ancient woodland, including one locally rare plant.
Gipping Great Wood SSSI	Within the Scoping Report Corridor		The site is an ancient coppice-with-standards wood on a plateau site situated close to the headwaters of the River Gipping. The wood is a good example of the north-east Suffolk type of hornbeam wood with several giant coppice stools. A complex mosaic of stand types is present including extensive areas of acid pedunculate oak-hazel-ash woodland and pedunculate oak-hornbeam woodland with patches of wet ash-maple woodland and invasive elm. The ground flora is characteristic of an ancient woodland site on slightly calcareous boulder clay and includes two uncommon species.
River Ter SSSI	Within the Scoping Report Corridor		This reach of the River Ter is representative of a lowland stream with a distinctive floor regime. It is flashy, draining a low-lying catchment on glacial till, and has a very low base flow discharge but high flood peaks; daily, monthly and annual flow variability are also high. In addition, the site demonstrates characteristic features of a lowland stream including pool-riffle sequences, bank erosion, bedload transport and dimensional adjustments to flooding frequency.
Newney Green Pit SSSI	Within the Scoping Report Corridor		Geological SSSI – Not considered as part of this assessment.
Marks Tey Brickpit SSSI	Within the Scoping Report Corridor		Geological SSSI – Not considered as part of this assessment.
Shelfanger Meadows SSSI	0.03km west		This site is an outstanding example of traditionally managed, herb-rich, hay meadows and located in a tributary valley of the River Waveney and is one of

Site	Location		Description
			the most important areas of unimproved grassland in Norfolk.
Barking Woods SSSI	0.1km south-east		An inter-related group of ancient woodlands, and earthbanks. The woodland structure is predominantly coppice-with-standards, composed of a variety of different stand-types. The diverse ground flora is typical of ancient woods and reflects a change in soils from the heavy boulder clay of Priestley and Swingen's Woods to the chalky sand of Titley Hill Wood. One of the few sites in southern England for the rare wild pear tree ( <i>Pyrus pyraeaster</i> ). [REDACTED]
Flordon Common SSSI	0.16km south-east		The site represents one of the best remaining examples of calcareous spring-fed fens in Britain. The species rich area contains a number of uncommon flora, including two species of rare and uncommon orchid. The area also has recordings of the very rare narrow-mouthed whorl snail.
Hascot Hill Pit SSSI	0.19km west		Geological SSSI – Not considered as part of this assessment.
Mucking Flats and Marshes SSSI	0.34km east		This site comprises an extensive stretch of Thames mudflats and saltmarsh, together with sea wall grassland. Wintering wildfowl and waders reach both nationally and internationally important numbers on the mudflats, roosting and feeding on adjacent saltmarsh and disused silt lagoons. The mudflats form the largest intertidal feeding area for wintering wildfowl and waders west of Canvey Island on the north bank of the Thames. Ringed Plover occur in internationally important numbers, with nationally important populations of shelduck, grey plover, dunlin, black-tailed godwit and redshank. Other species occur in good numbers, with avocet ( <i>Recurvirostra avosetta</i> ) regularly present, sometimes in nationally important numbers.
Elmsett Park Wood SSSI	0.36km south-west		An ancient wood site, with a diverse selection of ground flora, considered to be one of the richest small woods in Suffolk. Many plants that are indicators of ancient woodland are present and include various uncommon species.
Langdon Ridge SSSI	0.43km east		The site is a landscape-scale interconnected area of conservation priority which supports the following nationally important features that occur within and are supported by the wider habitat mosaic: -species-rich neutral grasslands -fen meadows



Site	Location		Description
			<p>-ancient and long-established semi-natural woodlands</p> <p>-assemblages of invertebrates chiefly associated with open short sward and scrub-heath</p> <p>-populations of the plant Deptford pink (<i>Dianthus armeria</i>).</p>
Burgate Wood SSSI	0.79km west		The site is a particularly good example of the type of oak-hornbeam woodland characteristic of this part of north Suffolk. It is ancient, with a coppice-with-standards structure and continues to support entirely semi-natural stands. Many giant coppiced stools are present which indicate its great antiquity. The ground flora is diverse and includes several species that are indicators of ancient woodland, including one rarity.
Ardleigh Gravel Pit SSSI	0.81km south-west		Geological SSSI – Not considered as part of this assessment.
Aslacton Parish Land SSSI	0.86km south-east		Characteristic example of a type of unimproved spring-line meadow featuring a range of inter-grading wet and dry grassland types and rich flora, reflecting the variety of soil and habitat conditions, also contains a number of uncommon and declining species. A few pairs of snipe ( <i>Gallinago gallinago</i> ) breed in most years.
Fornsett Meadows SSSI	0.98km east		<p>Fornsett Meadows form one of only three examples of unimproved meadow now remaining in the valley of the River Tas. An interesting mosaic of grassland types has developed in response to natural variation in soil type and wetness and to a long period of stable non-intensive grazing management. The upper parts of the valley slope support a short rabbit-grazed sward with frequent anthills. The chalky nature of the soil is reflected in the rich variety of species present which include common quaking grass (<i>Briza media</i>), hairy sedge (<i>Carex hirta</i>), bird's foot trefoil (<i>Lotus corniculatus</i>), cowslip (<i>Primula veris</i>), germander speedwell (<i>Veronica chamaedrys</i>), crosswort (<i>Cruciata laevipes</i>), lady's bedstraw (<i>Galium verum</i>) and the locally rare green-winged orchid (<i>Orchis morio</i>).</p> <p>Wet, marshy grassland occupies much of the lower valley slope where a seepage line is active and here, two species of rush (<i>Juncus subnodulosus</i> and <i>Juncus inflexus</i>) and lesser pond sedge (<i>Carex acutiformis</i>) form the predominant species.</p>
Combs Wood SSSI	1.01km west		An ancient woodland site with a well-developed coppice with standards structure, on boulder clay overlain with variable amounts of sand and loess. The consequent range of soil types has led to the

Site	Location	Description
		development of a variety of woodland types. Pedunculate oak-hornbeam woodland is predominant, with areas of typical ash-maple woodland, this grading into the heavy soil form of pedunculate oak-hazel-ash woodland where the soils are more acid. There are a number of rides within the site, the unimproved grassland of these rides and a small pond provide valuable additional habitat for invertebrates.
Creeting St. Mary Pits SSSI	1.23km east	Geological SSSI – Not considered as part of this assessment.
Thorndon Park SSSI	1.56km west	The site is an area of semi-natural broad-leaved woodland and ancient parkland supporting a range of habitat types developed over Claygate and Bagshot Beds and gravels to the south of Brentwood. The woodland includes the lowland birch-sessile oak, pedunculate oak and hornbeam types and the site supports an outstanding assemblage of beetles ( <i>Coleoptera</i> ) including one species which is rare and vulnerable in Britain. The areas of extant parkland consist of old oak pollards and standards growing over acidic or neutral grassland with common bent ( <i>Agrostis capillaris</i> ), creeping soft-grass ( <i>Holcus mollis</i> ), Yorkshire fog ( <i>Holcus lanatus</i> ) and soft rush ( <i>Juncus effusus</i> ). Other habitats present include a small area of dry acidic dwarf-shrub heath dominated by heather ( <i>Calluna vulgaris</i> ), an area of fen dominated by lesser reedmace ( <i>Typha angustifolia</i> ), ponds with submerged and emergent vegetation and a number of small unvegetated streams.
Gypsy Camp Meadows, Thrandeston SSSI	1.61km east	The site represents one of the few remaining wet meadow sites in Suffolk, consists of a large and a smaller species rich wet meadow, situated on poorly drained Suffolk boulder-clay. A system of drainage ditches runs through the site and adds further diversity to the plant communities present.
Bullock Wood SSSI	1.66km south	An ancient coppice-with-standards woodland with a wide range of tree species. The principal woodland type is the nationally rare Lowland Hazel-Sessile Oak woodland type modified in places by the presence of Sweet Chestnut <i>Castanea sativa</i> . The wood is situated on an almost level plateau with acidic soils developed over Brickearth, and lies within the former Royal Forest of Kingswood. The wood also contains the nationally rare plateau alder and acid sessile oak-hazel-ash woodland types. The sessile oak coppice is of particular interest and has been recorded from very few other sites in Essex. The understorey is dominated by coppiced hazel and Bullock Wood is

Site	Location		Description
			the only site in eastern England where this species is known to form mor humus. Water avens ( <i>Geum rivale</i> ), a very uncommon plant in Essex, has also been recorded.
Hintlesham Woods SSSI	1.71km west		One of the largest remaining areas of ancient coppice-with-standards woodland in Suffolk. Historical and archaeological evidence show the woods to have been in existence at least since the 12th century. Ramsey Wood is an intact ancient wood, linked to Hintlesham Wood by secondary woodland established between the 16th and 19th centuries. Other secondary extensions occurred during this time including Keebles Grove. Wide selection of tree species including one uncommon. A variety of birds breed in these woods, encouraged by the recent resumption of coppicing in Wolves Wood. Species include woodcock, nightingale ( <i>Luscinia megarhynchos</i> ), tawny owl ( <i>Strix aluco</i> ), nuthatch and whitethroat ( <i>Sylvia communis</i> ).
Redgrave and Lopham Fens SSSI	1.86km west		<p>This site consists of an extensive area of spring-fed valley fen at the headwaters of the River Waveney. It supports several distinct fen vegetation types, ranging from <i>Molinia</i>-based grasslands, mixed sedge fen to reed-dominated fen. There are small areas of wet heath, sallow carr and birch woodland. The invertebrate fauna is extensive and well-studied and the site is the only British locality for the fen raft spider.</p> <p>The River Waveney and its feeder drains are sluggish eutrophic waters supporting a rather narrow range of aquatic plants. starwort (<i>Callitriche</i> sp.), floating pondweed (<i>Potamogeton natans</i>), curled pondweed (<i>Potamogeton crispus</i>) and fennel-like pondweed (<i>Potamogeton pectinatus</i>) are the dominant species. In addition, there are a number of small pools in the fen areas, some of which are the flooded relics of former peat cuts. They form the habitat for the nationally rare fen raft spider which is listed in Schedule 5 of the Wildlife and Countryside Act 1981. Aquatic plants include bladderwort (<i>Utricularia vulgaris</i>), fen Pondweed (<i>Potamogeton coloratus</i>) and charophytes, all indicators of unpolluted, low fertility spring water.</p>
Redgrave and Lopham Fens NNR	1.86km west		Redgrave and Lopham Fen NNR is an extensive area of spring-fed valley fen in the headwaters of the River Waveney on the Suffolk/Norfolk border. It is the largest fen in lowland England. The reserve has a range of distinct habitats including the internationally important saw sedge beds and purple-moor

Site	Location	Description
		grasslands. It is also home to one of only 2 British populations of the fen raft spider.
South Thames Estuary and Marshes SSSI	1.98km south	The site consists of an extensive mosaic of grazing marsh, saltmarsh, mudflats and shingle characteristic of the estuarine habitats of the north Kent marshes. Freshwater pools and some areas of woodland provide additional variety and complement the estuarine habitats. The site supports outstanding numbers of waterfowl with total counts regularly exceeding 20,000. Many species regularly occur in nationally important numbers and some species regularly use the site in internationally important numbers. The breeding bird community is also of particular interest. The diverse habitats within the site support a number of nationally rare and scarce invertebrate species and an assemblage of nationally scarce plants.
Hangman's Wood and Deneholes SSSI	2.29km west	Hangman's Wood deneholes, the remains of medieval chalk mines, provide the most important underground hibernation site for bats in Essex. Three species have been recorded; brown long-eared bat, Natterer's bat ( <i>Myotis nattereri</i> ) and Daubenton's bat ( <i>Myotis daubentonii</i> ). Numbers of bats recorded have increased steadily since human access to the site was limited in 1985, and a total of 62 was recorded early in 1991. Hangman's Wood itself is included within the SSSI, as an area of semi-natural habitat in which bats can feed. It is a relict fragment of ancient woodland, dominated by pedunculate oak ( <i>Quercus robur</i> ), ash ( <i>Fraxinus excelsior</i> ) and sycamore ( <i>Acer pseudoplatanus</i> ) with occasional wild cherry ( <i>Prunus avium</i> ) and elm ( <i>Ulmus spp.</i> ). Typically, the woodland floor is dominated by such widespread plants as smooth and rough meadow-grass ( <i>Poa pratensis</i> and <i>P. trivialis</i> ), cock's-foot ( <i>Dactylis glomerata</i> ), cow parsley ( <i>Anthriscus sylvestris</i> ), common nettle ( <i>Urtica dioica</i> ) and bramble ( <i>Rubus fruticosus agg.</i> ).
Cattawade Marshes SSSI	3.02km north-east	Cattawade Marshes lie at the head of the Stour Estuary, between freshwater and tidal channels of the River Stour. These grazing marshes with associated open water and fen habitats are of major importance for the diversity of their breeding bird community, which includes species that have become uncommon throughout lowland Britain as a result of habitat loss. The marshes are also of value as a complement to the adjacent Stour Estuary SSSI where breeding habitats for birds are relatively scarce. The undisturbed nesting habitats are particularly favourable to waders and wildfowl. Redshank,

Site	Location		Description
			lapwing and oystercatcher ( <i>Haematopus ostralegus</i> ) breed within the cattle-grazed pasture, while ringed plover and shelduck nest on the relict seawalls. Marshy pools and a system of dykes within the grassland, together with dense riverside vegetation, provide further nesting habitats, most notably for shoveler ( <i>Anas clypeata</i> ), teal ( <i>Anas crecca</i> ), tufted duck ( <i>Aythya fuligula</i> ) and water rail ( <i>Rallus aquaticus</i> ).
Stour Estuary SSSI	3.63km north-east		The Stour Estuary is nationally important for 13 species of wintering waterfowl and three species on autumn passage. The estuary is also of national importance for coastal saltmarsh, sheltered muddy shores, two scarce marine invertebrates and a vascular scarce plant assemblage. The Stour Estuary also includes three nationally important geological sites. These provide exposures of early Eocene sediments containing the volcanic ash formations between Harwich and Wrabness. The same rocks are also important for the fossil fruits and seeds that they contain. At Stutton, much younger Pleistocene sediments have yielded an important and rich fossil vertebrate fauna.
<b>Locally Designated</b>			
Linford Wood LNR	Within the Scoping Report Corridor		The site covers 39.3 ha and has been woodland for at least 700 years. It was enclosed as a deer park in 1284 with a bank, ditch and fence, providing for hunting, pig pannage and other grazing and was managed for several centuries as part of the Great Linford Manor Estate. The wood was connected to its north-east by a tree-lined lane to Great Linford village and the Manor House.
Hutton Country Park LNR	0.26km west		This site covers 36ha and contains areas of natural grassland, ancient woodland, ponds, wetlands and borders with the River Wid to the north. The site is managed as an area of conservation value due to the array of native flora and fauna.
Fen Alder Carr LNR	0.39km east		Predominantly an alder-carr woodland under a system of coppice management. Features include a flora rich rough grass meadow, fen wetland, a pond and a network of defunct ditches.
Dunston Common LNR	0.58km east		This 4ha site is an historic common and features a mosaic of woodland and grassland, lying on mostly acidic soils.
Roydon Fen LNR	0.79km south-east		The 49ha site features spring-fed deep peats, woodlands and mown fen areas rich with species

Site	Location		Description
			such as marsh helleborine and marsh fragrant orchid ( <i>Gymnadenia densiflora</i> ).
Grove House Wood LNR	0.96km east		A small (2.35 ha) woodland adjoining the River Hassenbrooke. The site supports a range of woodland bird, and the dead elms provide nesting sites for woodpeckers.
Railway Walk, Hadleigh LNR	1.03km north-west		The site is a 11.6ha reserve which runs for 2 miles along the route of the former Hadleigh railways south-east from Hadleigh in Suffolk.
Needham Lake LNR	1.17km east		The 13ha site centres around a flooded disused gravel pit. The wider site consists of wetland areas, meadows and a small woodland.
Smockmill Common LNR	1.27km south-east		This site covers 10ha and consists of a large central area of dry grassland, with a river and marshland to the west. The diverse woodland is also host to a wide variety of fungi.
Brockwell Meadows LNR	1.28km south-east		The 4.5 acre site consists of areas of fen and meadow on the west bank of the River Blackwater in Kelvedon. Cricket bat willows have been planted and also reed, to reduce water pollution. The meadows are cut for hay and scrub is cleared on rotation.
Church Meadow LNR	1.67km west		<p>The site covers 3.8ha, it was formerly the garden of Combs Hall, which was demolished in 1756, that stood next to St Mary's Church, Church Meadow now supports a variety of wildlife. The meadows support many wildflowers and recently southern marsh orchids have made a welcome reappearance. The upper meadow is bright with buttercups in early summer. In the lower meadow the small pond supports many dragonflies whilst grass snakes can sometimes be seen around its edges.</p> <p>Some of the features of the former gardens still survive – a symmetrical field, a round pond, levelled embankments and the edges of the formal lake though nature has quickly reclaimed the once manicured grounds.</p>
Bramford Meadows LNR	1.82km north-east		The site consists of a series of floodplain meadows which are separated by a number of drainage ditches. The water in these ditches is of a high quality and supports diverse aquatic and flora species. A botanical survey undertaken in July 1993 identified water-plantain, purple loosestrife ( <i>Lythrum salicaria</i> ) and flowering-rush plants along the ditch edges. The latter species is a scarce plant in Suffolk and is restricted to the fringes of clean watercourses. Small areas of scrub and trees are also present particularly on the area between the railway line and the old

Site	Location		Description
			water course parallel to the River Gipping. A detailed invertebrate survey of the meadows also carried out in 1993 showed that the site was of considerable importance for its invertebrate populations. A total of seven species of grasshoppers and crickets were recorded during two visits to the site.

The Scoping Report Corridor falls within the following Impact Risk Zones for projects involving pylons and overhead lines:

- South Thames Estuary and Marshes SSSI
- Mucking Flats and Marshes SSSI
- Thorndon Park SSSI
- Langdon Ridge SSSI
- River Ter SSSI
- Bullock Wood SSSI
- Stour Estuary SSSI
- Cattawade Marshes SSSI
- Hintlesham Woods SSSI
- Elmsett Park Wood SSSI
- Middle Wood, Offton SSSI
- Barking Woods SSSI
- Combs Wood SSSI
- Gipping Great Wood SSSI
- Burgate Wood SSSI
- Gypsy Camp Meadows, Thrandeston SSSI
- Wortham Ling SSSI
- Shelfanger Meadows SSSI
- Aslacton Parish Land SSSI
- Flordon Common SSSI
- Forncett Meadows SSSI
- Redgrave and Lopham Fens SSSI

# Appendix F – Biodiversity – Proposed Survey Methodology



The following approach to survey work is considered sufficient to capture a suitable baseline to inform impact assessment. Where it is considered that survey work is not required, this has been justified in the text below.

## Habitat

### **Ancient / veteran hedgerow features**

Like ancient woodland, ancient / veteran hedgerows features could be considered irreplaceable habitat and should therefore be considered as part of the impact assessment and the biodiversity net gain assessment. Given the large number of hedgerows present within the Scoping Report Corridor, it is considered a practical solution to target survey work by a specialist arboricultural consultant on directly impacted hedgerows that meet criteria 1-5 (Archaeology and History) of Part II, Schedule 1 of the Hedgerows Regulations (HMSO, 1997).

### **Habitats of Principal Importance in England**

All habitat identified as a Priority Habitat would be ground-truthed in the field as part of a detailed habitat assessment and further botanical survey if required. Detailed survey work (to be completed) would also determine if any habitats meet the criteria for Habitat of Principal Importance in England under the NERC Act (HMSO, 2006).

### **Important' hedgerows**

All intersected hedgerows that have existed for more than 30 years, would be assessed by an ecologist as to whether they meet any of the eight criteria outlined in Part II, Schedule 1 of the Hedgerows Regulations (HMSO, 1997). This would involve:

- An assessment of historical maps to assess the archaeology and the history of each hedgerow
- A review of biological records and protected species survey data relating to each hedgerow
- Any hedgerows with five or more woody species to be subjected to further botanical assessment to ascertain if the hedgerow in question meets the criteria

### **Ground water dependent terrestrial ecosystems**

The potential for GWDTEs within the Scoping Report Corridor is currently unknown. This habitat would be assessed through a combination of desk study and field work.

## Protected / notable / invasive species

### **Vascular, non-vascular plants and fungi**

The requirements for targeted botanical surveys for vascular, non-vascular plants and fungi are to be assessed following a review of existing data and an initial habitat assessment. Following the review of existing data, the most appropriate scope and method of survey (for example National Vegetation Classification) would be applied.

Survey areas would be influenced by several factors such as:

- Where the presence of legally protected species has been identified
- Within or adjacent to a statutory or non-statutory designated site where a vascular, non-vascular plant or fungi species has been identified as a notable feature
- Areas identified as particularly botanically diverse and/or sensitive, or a habitat type restricted in the UK/Region

The survey programme and effort would be determined following the preliminary assessment and based on the targeted species or species groups and the context of the local habitat. The Project would 'seek to avoid' habitats that may support protected /notable botanical species.

## **Fish**

The requirements for fish survey are to be assessed following a review of existing data and an initial habitat assessment. Following the review of existing data, the most appropriate scope and method of survey would be agreed with the local Environment Agency team on a location-by-location basis for assessing the potential for significant impacts on fish. Where potential impacts on fish are identified, the Project would look to implement measures to avoid impacts (such as seeking alternative crossing locations or implementing clears-span bridges). Further, due to the largely temporary nature of the Project, adverse effects to fish are expected to be temporary and minor. As such the need to fish surveys can be largely avoided.

## **Invertebrates**

The Project extends through a largely agricultural landscape of structurally poor arable and grazed pasture fields. Subsequently, large populations, or presence of protected invertebrates and/or notable invertebrate assemblages are considered to be restricted to distinct areas/habitats that would be identified during the preliminary assessment. Further, due to the largely temporary nature of the Project in terms of impacts, adverse effects to most invertebrate populations are expected to be temporary and minor. As such we propose so scope out the requirement for terrestrial invertebrate surveys.

Where potential impacts on water features are identified which may result in potential adverse effects on aquatic invertebrates, the Project would look to implement measures to avoid impacts where applicable (such as seeking alternative crossing locations or implementing clears-span bridges). Further, due to the largely temporary nature of the Project, adverse effects to aquatic invertebrates are expected to be temporary and minor. As such the need for aquatic invertebrate surveys can be largely avoided.

If the potential for a significant negative effect on invertebrates is identified in a particular location that cannot be avoided. The scope of targeted surveys for terrestrial or aquatic invertebrates would be subject to agreement with consultees.

## **Reptiles**

Widespread presence and large populations of reptiles are thought to be unlikely due to the unsuitable nature of most of the habitats (predominately structurally poor agricultural fields) within the Scoping Report Corridor.

Nevertheless, it is anticipated that a range of habitats within the land required for the construction of the Project would provide suitable habitat to support more widespread reptile species, namely adder (*Vipera berus*), slow-worm (*Anguis fragilis*), grass snake (*Natrix helvetica*) and common lizard (*Zootoca vivipara*) and it is assumed that some (or all) of these species would be present within the footprint of the Project.

## **Proposed methodology**

Aerial imagery (APEM, 2022) would be reviewed to identify and map areas potentially suitable to support reptiles within or adjacent to the Project. The results of the preliminary assessment would also be reviewed to refine potential survey areas and identify any additional areas of potentially suitable habitat.

It is proposed that reptile surveys would be targeted at any areas considered exceptional habitat for reptiles where there is the potential for negative effects. These areas would consider the following factors; location in relation to species range, vegetation structure; insolation (sun

exposure); aspect, topography, surface geology, connectivity to nearby good quality habitat, prey suitability, refuge opportunity, hibernation habitat potential, disturbance and egg-laying sites (grass snake only).

Due to the largely temporary nature of the Project, potential adverse effects to reptiles are expected to be temporary and minor and can likely be avoided through precautionary working methods. As such the need for reptile surveys can be largely avoided.

Where the requirement for survey work is identified reptile presence/likely absence surveys would be conducted according to the below methodology which draws heavily upon guidance produced by Herpetofauna Groups of Britain and Ireland (HGBI, 1998), Froglife (1999 and 2015) and Natural England (2022).

In each survey area, refugia (comprising a 50:50 ratio of corrugated metal/onduline and roofing felt measuring a minimum 0.5m x 0.75m in size) would be numbered and placed in suitable habitat.

In non-linear habitats, refugia would be placed at a density of at least 100/ha (for very small sites this density may be increased appropriately with a justification provided). In linear habitats of less than 10m in width (e.g., hedgerows) refugia would be placed at a frequency of at least one every 10m of suitable habitat. Where varying from the refugia ratio and densities, a justification would be provided, based on the habitat type and target species concerned. Once placed, artificial refugia would be left to settle for at least 14 days prior to conducting the first survey.

Each survey area would be checked for reptiles a minimum of seven times, with binoculars used where appropriate to check for reptiles on and between refugia, as well as careful checks beneath each refugia. Each refugia check would be conducted during appropriate weather conditions (i.e., air temperature 10°C-20°C, still to moderate winds and no or very light rain).

During each check the surveyor would record details of all reptiles encountered during the survey including refugia number/location, species, number, life stage (adult, subadult, juvenile) and where possible, sex.

### **Breeding birds**

It is anticipated that a range of habitats within the land required for the construction of the Project would provide suitable habitat to support nesting birds and particularly those associated with farmland habitat.

The general approach to impact assessment for breeding birds is to ensure that the Project results in an increase in area of better-quality habitat (patch quality) than that affected by the Project and ensure that these habitats are well connected to the wider landscape. This would be achieved by avoiding permanent impacts to habitats of perceived value, reinstating habitats affected in areas of temporary habitat loss to equal or better condition than existing and improving the quality and availability of ecological networks across the Project. By following this approach, it is proposed that the need for breeding bird surveys can largely be avoided.

The requirement for breeding bird surveys would be based on the results of the preliminary assessment, focusing on suitable habitat within the land required for construction largely associated with the underground cabling, sealing end compounds and the new substation. The extent of survey would be defined by the outcome of a two staged screening exercise as defined below.

## Stage 1 – Site of known importance for breeding birds

The desk study (undertaken during the preliminary assessment) would be used to identify sites of known importance for breeding birds where there is the potential for negative effects because of the Project. Any such sites would be included for further survey.

## Stage 2 – Other areas identified as being of potential importance for breeding birds

A review of the following information sources would be undertaken to identify the locations of sites of potential importance for breeding birds (i.e. areas which are considered to have potential to support notable species such as those listed on Annex 1 of the Birds Directive (European Commission, 2009), Schedule 1 of the Wildlife and Countryside Act (HMSO, 1981), or red or amber listed species on the Birds of Conservation Concern list (Eaton *et al*, 2021); or which may support notable assemblages of common birds) within the Scoping Report Corridor and that are potentially subject to negative effects:

- Aerial photography and Ordnance Survey mapping
- Phase 1 habitat survey results
- Discussions with local consultees

## Proposed methodology

### *Bird survey guidelines for assessing ecological impacts*

In accordance with the breeding bird survey methodology (Bird Survey and Assessment Steering Group, 2022) surveys would comprise six survey visits during the breeding season (broadly mid-March to early July). Survey visits would be undertaken on dry days with no more than moderate wind. Survey during dawn mist is acceptable, but survey during dense fog would be avoided. Site visits would commence no later than one hour after sunrise. The starting position of each survey would be varied between visits to reduce survey bias.

For survey areas comprising a large expanse of open grassland or arable field, the boundaries would be walked and all birds within the field recorded. In other habitat where access and views allow, efforts would be made to record all bird activity within 50m of the Order Limits. Where no access is available, PRow (where available) and local roads (where it is deemed safe to do so) would be utilised.

In all cases all birds seen or heard would be identified and recorded on a suitable scale map of the site to allow the information to be clearly recorded using standard British Trust for Ornithology species and activity codes.

Large wetland areas would also be covered by a slightly modified Common Bird Census style survey to include recording the activity of individual birds and counts of birds on the water from the lake edge.

### *Species specific surveys*

Species specific surveys would be conducted as appropriate and were considered to be required (as described above).

As a minimum this would include consideration of potential nesting locations for Schedule 1 species such as barn owl (*Tyto alba*). Survey for Schedule 1 species would follow established best practice survey methodologies as follows:

- Barn owl – Shawyer (2011)

- Red kite (*Milvus milvus*) / hobby (*Falco subbuteo*) / peregrine (*Falco peregrinus*) / black redstart (*Phoenicurus ochruros*) / nightjar (*Caprimulgus europaeus*) / kingfisher (*Alcedo atthis*) – Gilbert *et al.* (1998)

Where crepuscular or nocturnal species such as nightjar are suspected then evening survey visits (in addition to those forming part of the Common Bird Census survey) would be undertaken. At each appropriate site at least two evening visits including the hour after sunset should be conducted.

Surveys would take place during the core breeding period (mid-March to early July) although this would be flexible for Schedule 1 species/taxa depending on the target species.

#### *Collision risk during the breeding season*

No surveys would be undertaken specifically to monitor potential collision risk of birds with overhead lines during the breeding season. The risk of collision is considered low for the majority for bird species during the breeding season and appropriate measures would be incorporated into the design to reflect the level of risk to birds such as geese and swans. However, this would be reviewed following the results of the wintering / passage collision risk assessment.

#### **Wintering / passage birds**

See Annex I for agreed survey methodology.

#### **Badger**

Based on the suitability of habitats and rural location of most of the Project, it is envisaged that badgers (*Meles meles*) are widespread throughout. Potential impacts on badgers are likely to be loss of setts within the land required for the construction of the Project and potential for disturbance of setts close to the land required.

#### Proposed methodology

Given the length of programme and the fact that badger setts can appear (as well as be abandoned) at any time, it is proposed that a survey as part of the ES focusses on main badger setts. Further badger survey work relating to all other badger setts would be undertaken as part of the pre-construction works post DCO submission to ensure adherence to legislation and animal welfare. Pre-construction surveys and sett classifications would follow Harris *et al.* (1989) methodology for badger survey.

In compliance with the Protection of Badgers Act (HMSO, 1992), all information related to badgers (including survey methodology, baseline information, mitigation and residual effects and cumulative effects), would be presented in a Confidential Appendix. Release of the Confidential Appendix would only be to the Planning Inspectorate, and on request from suitably qualified professionals.

#### **Bats**

Habitat likely to support a wide range of bat species (including barbastelle (*Barbastella barbastellus*)) is present within the Scoping Report Corridor. As such, all habitat with the potential to support bats would be considered as 'seek to avoid'. In the instance the loss of a tree(s) with potential to support roosting bats cannot be avoided, then these would be inspected / surveyed in accordance with the Bat Conservation Trust guidelines (Collins, 2016), described below.

There are no SACs identified within 30km of the Scoping Report Corridor which are designated for bats. Potential impacts to foraging/commuting bats from construction activities are expected to be temporary, as the number and length of hedgerows and woodland expected to be severed

would be minimised, with measures put in place to further reduce impacts (e.g., coppicing woodland to allow overhead lines to pass over and temporarily bridging gaps in hedgerows at night). The works are unlikely to avoid locally important linear features, but there would be minimal habitat loss. All linear habitat features (including hedgerows and watercourses) and woodlands that may be used by bats are to be reinstated post-construction, with native planting. This means that post-construction there would be new and, where possible, enhanced commuting corridors and foraging habitat for bats. As such, it is considered that bat activity surveys can be avoided for large parts of the Project.

During the preliminary assessment - field survey, trees, woodland blocks and structures with potential roosting features would be identified. Those with potential roosting features which cannot be avoided by the Project would subsequently receive further bat roost surveys including preliminary roost assessment (PRA), inspection and/or emergence/re-entry surveys.

### Proposed methodology

#### *Preliminary roost assessment*

Trees identified for PRA would be identified in the preliminary assessment. Where potential roosting features (PRFs) are present on or within a tree, these would be assessed to determine suitability for roosting bats alongside professional judgement. Trees would be classified as confirmed, high, moderate, low, or negligible roosting suitability in accordance with best practice guidelines (Collins, 2016). All trees with potential to support roosting bats would be recorded on a Tablet linked to GPS and GIS to provide accurate referencing. Trees may be classified as high on a precautionary basis if the PRA can only take place from the ground when trees are in full foliage.

Trees assessed as high or moderate roost suitability would be inspected as outlined below. Trees classified as low or negligible roost suitability would not be subject to further survey, but as a mitigation measure those classified as low roost suitability that need to be removed/pruned would be soft-felled/pruned under supervision of a bat licenced ecologist in accordance with best practice guidelines (Collins, 2016).

It is anticipated that all buildings would be avoided and therefore no survey work relating to bats roosting in structures is required.

#### *Tree inspections*

Trees with high or moderate roost suitability would be inspected further, where possible. Where a cherry picker is not feasible and/or a PRF cannot be inspected with an endoscope from the ground or by ladder, trees would be climbed by a licenced bat ecologist with tree climbing qualifications.

Where evidence of bats is found (such as droppings) and bats are not present, or an inspection method is not safe nor suitable, emergence/re-entry surveys would be undertaken. Trees may be down-graded to low roost suitability following inspection. Droppings that are found during inspections may be sent for eDNA analysis to determine the species.

#### *Evening emergence/ dawn re-entry*

Where a thorough tree inspection (as outlined above) is not possible to classify the bat roost, the following methods would be applied.

For trees with moderate roost suitability, two separate surveys are required and consist of one emergence and one re-entry survey spaced at least 14 days apart between May and September. For trees with confirmed roost or high roost suitability, three surveys are required under the same conditions.

Emergence surveys are to be undertaken from 15 minutes before sunset until two hours after sunset, and re-entry surveys undertaken from two hours before sunrise until 15 minutes after sunrise. All surveys would be undertaken in appropriate weather conditions. Surveyors would use echolocation detectors that would record bat activity across surveys. If considered necessary infra-red cameras may be used to support survey work. Recorded data would subsequently be analysed using appropriate software to identify species and inform mitigation requirements where necessary.

- PRAs would aim to take place before or after trees are in full foliage, i.e., between October and March
- Inspections of trees with high or moderate roost suitability would take place during the bat 'active' period of May to September (unless a PRF has been identified as having hibernation roost suitability)
- Emergence/ re-entry surveys would be undertaken between May and September, in line with Collins (2016)

### *Bat activity surveys*

Where it is considered that habitat impacts would have a significant potential adverse effect on bats, bat activity surveys would be undertaken to establish a baseline. Based on the information outline in Section 8.12.42, it is considered that impacts on foraging and commuting bats can be scoped out for the sections of overhead line (including the associated haul route).

In terms of the approach to determining survey locations, the following impacts would be considered potentially significant for the sections of underground cabling, sealing end compounds, the new substations and associated construction areas:

Direct severance/ fragmentation of woodland and linear habitat features (e.g., hedgerows and watercourses).

Direct loss of woodland with good connectivity to the wider landscape.

The survey approach would broadly follow good practice guidance (Collins, 2016) in terms of habitat assessment and survey effort. Survey would focus on the strategic placement of automated detectors to ensure sufficient coverage of suitable habitat. It is considered that the information gathered from the strategic placement of automated detectors over a long period of time is of greater benefit to determining species frequency and diversity associated with key habitat features than traditional transect methods. However, it is acknowledged that in some instances transects (or spot counts) may be required in addition to automated detectors to further assess bat behaviour in the field.

Transect surveys would only be undertaken in key locations, based on the level of impact anticipated on species of conservation concern (above that of site level). In East Anglia the rarer species of concern are serotine (*Eptesicus serotinus*) Myotis (*Myotis* spp.) and barbastelle bats. These species are more likely to be impacted by habitat severance/ fragmentation than more widespread species such as pipistrelle (*Pipistrellus* spp.), brown long-eared bat (*Plecotus auritus*) and Nyctalus (*Nyctalus* spp.).

### **Hazel dormouse**

Although hazel dormouse (*Muscardinus avellanarius*) is distributed throughout Essex it is largely absent in Norfolk and present in low numbers across Suffolk. Habitat preferences usually consist of species-rich hedgerows or broad-leaved woodland (Wembridge *et al.*, 2016), habitats which the Project would 'seek to avoid'. Dormouse has a strong preference for woodland which includes coppiced Hazel (*Corylus avellana*), a species often found in

woodlands designated as ancient woodland. It is also classified as an indicator species due to its sensitivity to changes in habitat quality (Mortelliti *et al.*, 2014). The requirements for hazel dormouse surveys would be assessed following a review of existing data and an initial habitat assessment (including looking at connectivity through hedgerows). Following the review of existing data, the most appropriate scope and method of survey would be applied.

The requirements for hazel dormouse survey would be based on the results of the preliminary assessment, focussing on suitable habitat within the land required for construction.

Survey areas would be influenced by several factors such as:

- Existing records of hazel dormouse proved by local record centres and wildlife groups
- Within or adjacent to a statutory or non-statutory designated site where hazel dormouse has been recorded recently

Where surveys are required, the survey boundary would include a habitat specific Zol.

### Proposed methodology

When designing the survey, the potential impacts of the Project would be considered to make sure that adequate information would be obtained to inform impact assessment.

All potentially suitable dormouse habitat would be mapped during the preliminary assessment field survey to determine the location of hazel dormouse survey in combination with the desk-based assessment. The objectives of dormouse surveys would be to:

- Establish the presence or likely absence of dormouse
- Determine the distribution of the species, should it be present
- Assess the potential constraints and implications for Project
- Provide recommendations for further survey work and mitigation, if required

Specialist dormouse tubes comprise a plastic tube containing a removable wooden floor and end wall. Tubes would be attached to branches within suitable habitat at suitable intervals along identified habitat features (typically one tube every 20m).

During the dormouse checks, surveyors would approach each tube with caution, using a mirror where necessary to view inside the tubes without causing disturbance. In addition to the physical presence of dormouse in the nest tubes and boxes, surveyors would also look for characteristic signs such as:

- Gnawed hazel nuts - dormouse leave a smooth round hole with few tooth-marks that run parallel to the edge of the hole, rather than outwards from its centre, so that the rim looks smooth. In contrast, the tooth-marks of mice and voles run outwards, so that the rim of the hole looks like the milled edge of a coin
- Nests - typically grapefruit-size, spherical and woven from strips of honeysuckle bark, or similar material, and frequently have whole leaves incorporated into the outer layers

### **Otter**

Potential negative effects on otter (*Lutra lutra*) from construction activities could occur near to watercourses where underground (holts) or above-ground resting sites (couches) may be located, or along watercourses that otter use as corridors. The Scoping Report Corridor extends



across multiple watercourses of varying size and it is well documented that otter are present throughout East Anglia in good numbers.

Construction activities would mitigate impacts to watercourses and time works to avoid disturbance to resting sites whilst occupied. Additionally, pylons, compounds and haul roads would be micro-sited a minimum distance of 5m from watercourses (except where a temporary crossing is required).

Otter surveys would be undertaken in accordance with Chanin, 2013 and taking account of best practice guidance (Chanin, 2003; Liles, 2003; and Chanin, 2005) and CIEEM competencies for undertaking otter surveys (CIEEM, 2013).

### Proposed methodology

#### *Aquatic/riparian habitats*

Watercourses and associated riparian habitat to be directly impacted, which have been identified as having the potential to support otter would be surveyed for evidence, 300m up and down stream of the point of impact (for evidence of otter holts), in line with guidelines in Chanin (2003). Evidence of water vole and American mink (*Neovison vison*) would additionally be recorded.

#### *Terrestrial habitats*

Woodland, scrub, and derelict man-made features within and immediately adjacent to construction areas, which has been identified as having the potential to support otter –would be surveyed for potential otter breeding holts. A holt would be classified as active where any of the following signs are present:

- Spraint or footprint within tunnel or immediate ground outside
- Scratch marks and/or body rubbing against tunnel wall
- Otter hair within tunnel or immediate ground outside

If a resting site or breeding holt is recorded, the location would be recorded on a GPS and suitably sized buffer zones would be identified to ensure no works that could otherwise elicit disturbance take place. Disturbance buffer zones would be classed as 30m for an active otter resting place and, depending on the magnitude of works and local topography, 100-200m for an active breeding holt.

In the unlikely event that any otter resting places need to be removed, the temporary loss would be mitigated for under licence from Natural England.

### **Water vole**

Potential adverse effects on water vole from construction activities could occur near to watercourses where burrows may be located, or along watercourses that otter use as corridors. The Scoping Report Corridor extends across multiple watercourses of varying size and it is well documented that water voles are present throughout East Anglia in good numbers.

The Project extends through a largely rural landscape, crossing multiple watercourses of various size. Construction activities would 'seek to avoid' impacts to watercourses where possible but temporary impacts to sections of field drains/ditches are anticipated and therefore temporary and minor impacts to water vole and their burrows are expected during construction. Additionally, pylons, compounds and haul roads would be micro-sited a minimum distance of 5m from watercourses (except where a temporary crossing is required).

By following this approach, it is proposed that detailed water vole survey work can largely be avoided, with only targeted surveys where there may be a potential impact. Survey methodology would follow the Water Vole Mitigation Handbook (Dean *et al.*, 2016).

### Proposed methodology

Two survey visits (one in Spring and one in Autumn) would be undertaken at each selected site to collect evidence of water vole presence, including latrines, burrows, runs, footprints, feeding remains and stashes, droppings, and sightings. Surveys would cover 300m up and downstream of the point of impact. Additional information on the habitat would be collected during the first water vole survey, including water flow direction, bank substrate, existing disturbance, bank vegetation type and structure, and adjoining land use.

Where there is uncertainty over droppings and additional field signs are inconclusive, dropping samples would be collected and sent away for DNA analysis. Once survey data has been obtained, the relative population size in each stretch of watercourse or surveyed habitat would be calculated using the methods in the water vole conservation handbook (Dean *et al.*, 2016).

### **Ecological Features Not Requiring Further Survey**

#### White-clawed crayfish

The Project and its ZoI are located within an area with little known sites still supporting white-clawed crayfish (*Austropotamobius pallipes*), which have been negatively affected by non-native species in East Anglia, through direct competition and the introduction of disease. They would still be considered as part of the desk study and further consultation with Environment Agency regarding any isolated populations would also be undertaken.

#### GCN and other amphibians

GCN are widespread throughout East Anglia and therefore licensing and mitigation would be required to minimise impacts to this species.

District Level Licensing (DLL) is a type of strategic mitigation licence for GCN granted in certain areas at a Local Authority or wider scale, with the aim of improved conservation outcomes for GCN. Where a DLL scheme is in place, developers can make a financial contribution to strategic, off-site habitat compensation instead of applying for a separate licence or carrying out individual detailed surveys.

DLL is currently available in Norfolk, Suffolk and Essex and it is currently proposed that the DLL approach to GCN conservation can be taken forward for the Project in its entirety.

Once the detailed design has been finalised, a formal application would be made to Natural England under the DLL scheme which would include the results of the desk study undertaken during the preliminary assessment.

By demonstrating that a DLL scheme for GCN would be used, GCN can be scoped out of impact assessment. This is because, the DLL approach includes strategic area assessment, the identification of risk zones and strategic opportunity area maps, and a mechanism to ensure adequate compensation is provided.

The outcome of this assessment is documented within the Impact Assessment and Conservation Payment Certificate (IACPC) which would be appended to the ES to identify what the impacts associated with the Project equate too (in terms of compensatory ponds that would be created by Natural England within strategic locations) and confirm that, as a minimum, the impact to GCN associated with the Project would not be significant.

It is also proposed that the DLL approach, coupled with the temporary nature of the Project and the commitment to habitat improvements (and avoidance of suitable ponds) is also satisfactory to scope out other amphibians from consideration within the impact assessment.

#### Other notable mammals

Brown hare, harvest mouse and hedgehog are widespread across East Anglia. Impacts would be temporary and as habitats would be reinstated (to equal or better condition than existing), no significant impacts are envisaged. Typical best practice development measures (to minimise disturbance and entrapment within excavations for example) would be included within the Code of Construction Practice (CoCP) and it is not proposed that these species are specifically identified as a receptor within the impact assessment.

# **Appendix G – Key Characteristics of Landscape Character Assessment**

This appendix sets out the key characteristics of the LCTs and landscape character areas (LCA) as described in published documents and should be read in conjunction with Figure 13.1 National and Regional Landscape Character Areas and Designated Landscapes.

Table G1: Key Characteristics of Landscape Character Areas and Types within the Scoping Report Corridor

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
South Norfolk Landscape Character Assessment (2001)		
Settled Plateau Farmland	D1: Wymondham Settled Plateau Farmland	<ul style="list-style-type: none"> <li>• <i>A settled landscape with large edge-of-plateau towns (including market towns and those of more modern origin) and villages plus smaller, nucleated settlements which are dispersed across the plateau.</i></li> <li>• <i>Large expanse of flat landform with little variation over long distances with strong open horizons – the archetypal ‘Norfolk’ landscape of popular imagination.</i></li> <li>• <i>Large scale open arable fields including sugarbeet, cereal and oilseed rape monocultures creating simple, often monotonous, character.</i></li> <li>• <i>Long views from plateau edge, including to Norwich from the northern plateau edge.</i></li> <li>• <i>Poor hedgerows generally, which accentuates the openness of the landscape. The resulting wide verges beside roads often contain attractive wildflowers. Some mature hedgerow trees are found, particularly beside roads, which are a distinctive feature. Areas of more intact hedgerow network sometimes occur around settlements.</i></li> <li>• <i>Sparsely wooded but with occasional woodland blocks, sometimes associated with former parkland areas, creating a more wooded character and wooded horizons in parts of this generally open landscape.</i></li> <li>• <i>Vernacular buildings particularly brick built, timber framed, and stepped gables. Some isolated churches, sometimes hidden by dense screening churchyard vegetation.</i></li> <li>• <i>Historic Market Town at Wymondham<sup>13</sup>.</i></li> </ul>
	D2: Poringland Settled Plateau Farmland	<ul style="list-style-type: none"> <li>• <i>Flat landscape, which rises to a gentle central dome, with strong open horizons.</i></li> <li>• <i>Densely settled core area, predominantly of ribbons of post-war bungalows and other development which</i></li> </ul>

<sup>13</sup> <https://www.southnorfolkandbroadland.gov.uk/downloads/file/1330/land-use-consultants-2001-d1-wymondham-settled-plateau-farmland>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<p><i>interconnect the older village cores. These older cores have a stronger vernacular appeal.</i></p> <ul style="list-style-type: none"> <li>• <i>Large scale open arable fields including sugarbeet, cereal and oilseed rape monoculture.</i></li> <li>• <i>Long views from plateau edge including to Norwich from northern plateau edge and to the Tas Valley.</i></li> <li>• <i>Poor hedgerows but wide roadside verges and numerous remnant hedgerow standards. Particularly around settled areas.</i></li> <li>• <i>Wooded character in parts and when viewed from afar, particularly around the settlements and due to the presence of woodland blocks in the north of the character area.</i></li> <li>• <i>Prominent landmark telecommunications towers (radio and radar) located at the high point of the plateau and visible from a large area of the surrounding countryside.</i></li> <li>• <i>Vernacular buildings present but somewhat ‘diluted’ by more recent development.</i></li> <li>• <i>Recreational routeways including Boudica’s Way leading to the Tas Valley.<sup>14</sup></i></li> </ul>
Valley Urban Fringe LCT	LCA F1: Yare Valley Urban Fringe	<ul style="list-style-type: none"> <li>• <i>Broad semi-enclosed valley form with wide flat flood plain and enclosing valley sides, occasionally opening up to adjoining tributary river valleys, resulting in a sense of containment and unity.</i></li> <li>• <i>Large meandering river flanked by characteristic wetland vegetation including reeds and fringing alder/willow woodland and grassland.</i></li> <li>• <i>Presence of attractive flooded gravel workings as a result of historic extraction of the glacial gravel deposits which are present.</i></li> <li>• <i>Sense of inaccessibility with transportation routes restricted to discrete transverse river crossings and non-vehicular bridleways.</i></li> <li>• <i>Perceived absence of settlement within the valley although influenced by developments in the City of Norwich.</i></li> <li>• <i>Sense of remoteness and solitude within the valley, remarkable given the closeness to a major city.</i></li> <li>• <i>Green buffer and comprehensible development edge to the City of Norwich.</i></li> </ul>

<sup>14</sup> <https://www.southnorfolkandbroadland.gov.uk/downloads/file/1315/land-use-consultant-2001-d2-poringland-settled-plateau-farmland>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• Presence of recreational landscapes including country parks and walks. Evidence of early human activity, for example Arminghall henge.</li> <li>• Strongly influenced by modern transportation corridors, in particular the Norwich Southern Bypass.<sup>15</sup></li> </ul>
Tributary Farmland with Parkland	C1: Yare Tributary Farmland with Parkland	<ul style="list-style-type: none"> <li>• Shelving landform with a gently undulating topography created by the presence of small tributary stream valleys cutting through the landscape providing a variety of open/more intimate landscape settings and long/framed views.</li> <li>• Transitional landscape occupying the mid ground between the upland plateau of the Wymondham-Hethersett settled plateau farmland and the principal Yare Valley and forming part of the transition between the rural and urban landscape.</li> <li>• Peaceful farmland with small farm woodlands and intermittently wooded tributary valleys creating a quiet rural atmosphere.</li> <li>• Presence of large parkland estates, particularly associated directly with the tributary valleys. Estate railings, boundary fences, tree-lined avenues and traditional wooded parkland contribute to landscape character.</li> <li>• Sparsely settled landscape of small clusters of farmhouses, small villages and rural dwellings interspersed with large manorial buildings and halls.</li> <li>• A sense of impenetrability and remoteness despite the presence of major transportation corridors. The Norwich Southern Bypass and A11 Wymondham Road trisect the landscape and the area is also traversed by the main Norwich-London railway line. These routes create corridors of movement and noise in this otherwise peaceful landscape. Elsewhere, there is an intricate network of narrow rural roads and lanes.</li> <li>• Yare Minor Tributaries Streams elusive – evident but usually hidden within the landscape by topography or trees noticeable only at fording points or at close-range.</li> <li>• Arable and pastoral farmland of cereals and sugarbeet with more pastoral land uses within the</li> </ul>

<sup>15</sup> <https://www.southnorfolkandbroadland.gov.uk/downloads/file/1316/land-use-consultants-2001-f1-yare-valley-urban-fringe>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<p><i>immediate tributary valley corridor. Fields surrounded by sparse hedges and hedgerow trees, with occasional mature/veteran oaks forming a distinctive feature alongside the lanes.</i></p> <ul style="list-style-type: none"> <li>• <i>Vernacular architectural character, predominantly of rural buildings and estate dwellings. More modern dwellings are found in the larger villages.</i></li> <li>• <i>High number of large dwellings set in extensive grounds including characteristic large detached halls and manor houses, usually constructed of brick, of high architectural quality, associated with the parkland estates of Keswick, Intwood, Thickthorn and Colney. These are frequently screened by woodland, and therefore visible only at close range.</i></li> <li>• <i>Intermittent long views towards the City of Norwich.</i></li> <li>• <i>Presence of large institutional buildings including new hospital and areas of the Research Park at Colney.<sup>16</sup></i></li> </ul>
Plateau Farmland	E1: Ashwellthorpe Plateau Farmland	<ul style="list-style-type: none"> <li>• <i>Distinctive flat, elevated landform, above the 50m contour.</i></li> <li>• <i>A large-scale landscape of both openness and enclosure provided by woodland.</i></li> <li>• <i>Panoramic views and some framed views along roads.</i></li> <li>• <i>Predominantly arable farming within large geometric fields.</i></li> <li>• <i>Mature remnant oak hedgerow trees occur within trimmed hawthorn hedges.</i></li> <li>• <i>Moats are a feature, sometimes associated with halls and sometimes occurring in isolation.</i></li> <li>• <i>Linear settlement occurs along roads with some vernacular buildings intermixed with more modern development.</i></li> <li>• <i>Rural roads have very straight stretches and are often flanked by wide grass verges.</i></li> <li>• <i>Presence of tall structures, with the prominent mast of Tacolneston transmitting station plus lines of telegraph poles.</i></li> <li>• <i>An overall peaceful rural character created by the absence of main roads and development.<sup>17</sup></i></li> </ul>

<sup>16</sup> <https://www.southnorfolkandbroadland.gov.uk/downloads/file/1313/land-use-consultants-2001-c1-yare-tributary-with-parkland>

<sup>17</sup> <https://www.southnorfolkandbroadland.gov.uk/downloads/file/1331/land-use-consultants-2001-e1-ashwellthorpe-plateau>



Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
	E2: Great Moulton Plateau Farmland	<ul style="list-style-type: none"> <li>• <i>Flat, elevated plateau landform above the 50m contour with little topographic variation.</i></li> <li>• <i>Extensive arable farmland with large-scale fields and notable absence of boundaries.</i></li> <li>• <i>A large-scale landscape of openness and exposure.</i></li> <li>• <i>Isolated and infrequent blocks of mixed woodland, otherwise woodland is confined to tiny farm copses.</i></li> <li>• <i>A number of greens and commons, some with associated pond habitats.</i></li> <li>• <i>Expansive skies are a defining feature with distant views and farm buildings visible in the open landscape.</i></li> <li>• <i>Hedgerows are sparse with fuller enclosure along roadsides.</i></li> <li>• <i>Hedgerow trees are an important feature marking the lines of former boundaries.</i></li> <li>• <i>A140 cuts north-south through the centre of the character area. Otherwise straight rural roads cut through the area.</i></li> <li>• <i>Grass verges and occasionally ditches occur along road sides.</i></li> <li>• <i>Timber framed houses and moats.</i></li> <li>• <i>Large scale farm buildings, water towers, telegraph poles exposed in this open landscape and distinct absence of churches.</i></li> <li>• <i>Sparsely settled with scattered farmhouses, some linear settlement with absence of centre/core.</i></li> <li>• <i>Disused airfields are a feature of the plateau at Shelton and Pristow Green.<sup>18</sup></i></li> </ul>
Tributary Farmland	B1: Tas Tributary Farmland	<ul style="list-style-type: none"> <li>• <i>Open, gently undulating to flat and sloping landscape incised by shallow tributary valleys, the tributary streams of which are not prominent landscape features.</i></li> <li>• <i>Large open arable fields of cereal, sugarbeet and occasionally sweetcorn.</i></li> <li>• <i>Framed open views across the countryside and into adjacent character areas.</i></li> <li>• <i>Small blocks of deciduous woodland of high ecological and visual quality. These create wooded</i></li> </ul>

<sup>18</sup> <https://www.southnorfolkandbroadland.gov.uk/downloads/file/1332/land-use-consultants-2001-e2-great-moulton-plateau>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<p><i>horizons which add variety to and create intimacy within the landscape.</i></p> <ul style="list-style-type: none"> <li>• <i>Damp grasslands of ecological importance located within the tributary valleys.</i></li> <li>• <i>Scattered remnant hedgerow trees, particularly oak, sometimes including intact avenues lining the roads or marking former, denuded, field boundaries.</i></li> <li>• <i>Transportation corridors including main connecting roads.</i></li> <li>• <i>Network of recreational footpaths.</i></li> <li>• <i>Ditches, low banks and wide grass verges associated with the network of rural roads.</i></li> <li>• <i>Settlement characterised by a small number of large villages including the administrative centre of South Norfolk – Long Stratton – with smaller hamlets, scattered farmhouses and agricultural buildings.</i></li> <li>• <i>Mixed vernacular of timber-frame, stepped and Dutch Gables, thatch and round-towered churches.<sup>19</sup></i></li> </ul>
	B4: Waveney Tributary Farmland	<ul style="list-style-type: none"> <li>• <i>Transitional landscape occupying the mid ground between the upland plateau (Great Moulton Plateau Farmland) and the main river valley (Waveney Valley).</i></li> <li>• <i>Undulating landform to the south of the area where it is dissected by tributaries. Land is higher and flatter towards the north of the character area adjoining the Great Moulton Plateau Farmland.</i></li> <li>• <i>A large-scale open landscape on the higher ground with some distant views. Pockets of enclosure and intimacy associated with the tributaries.</i></li> <li>• <i>Narrow streams, drainage channels (within grass verges) ponds and moats are characteristic. Ditches occur along road sides and in places divide fields.</i></li> <li>• <i>Predominantly arable farmland with a varied field pattern. Fields are small to the south of the character area, larger on the higher plateau areas.</i></li> <li>• <i>Mature hedgerow trees are very distinctive especially large mature oaks.</i></li> <li>• <i>Hawthorn/ blackthorn hedges divide fields.</i></li> <li>• <i>Scattered blocks of woodland with some larger blocks having SSSI designations.</i></li> </ul>

<sup>19</sup> <https://www.southnorfolkandbroadland.gov.uk/downloads/file/1323/land-use-consultants-2001-b1-tas-tributary-farmland>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• <i>Pockets of parkland and remnant parkland occur.</i></li> <li>• <i>Diversity of ecological assemblages including grassland, wet habitats, woodland, some of which are SSSI.</i></li> <li>• <i>Round tower and isolated churches are distinctive landmarks. Moats and earthworks are a feature.</i></li> <li>• <i>Settlement occurs throughout the character area. Villages are frequently linear along roads with some villages set around greens.</i></li> <li>• <i>Large farm units and processing units are present plus pylons which cut through this area.</i></li> <li>• <i>The A140 and the Norwich-Diss railway line cut across the character area north south. Otherwise winding rural roads, and sunken lanes dissect the rural area.</i></li> <li>• <i>Peaceful and rural landscape.<sup>20</sup></i></li> </ul>
Rural River Valley	A1: Tas Rural River Valley	<ul style="list-style-type: none"> <li>• <i>Distinct, moderately wide simple valley form with medium-scale clearly defined flat valley floor, shallow side slopes and adjoining smaller-scale tributary valleys.</i></li> <li>• <i>Less enclosed than some other valleys with a feeling of exposure and openness and some long views within the valley but restricted external views.</i></li> <li>• <i>River alternately visible and hidden marked by sparse waterside vegetation including reed filled ditches and narrow woodland belts. The flat, wide, green valley floor is a distinctive feature.</i></li> <li>• <i>A large number of attractive fords and small bridges occurring at regular intervals along the river and side tributaries.</i></li> <li>• <i>Pastoral valley floor with cattle grazing and distinctive willow pollards lining the watercourses on the valley floor.</i></li> <li>• <i>Upper tributary valleys of great ecological richness and importance, including areas of fen, marsh and unimproved wet and neutral grassland.</i></li> <li>• <i>Fragmented woodlands and shelterbelts on the valley sides creating a wooded fringe to much of the valley interspersed with more open areas of arable land.</i></li> <li>• <i>Presence of historic earthworks including Scheduled Ancient Monuments, including the large highly visible</i></li> </ul>

<sup>20</sup> <https://www.southnorfolkandbroadland.gov.uk/downloads/file/1326/land-use-consultants-2001-b4-waveney-tributary>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<p><i>defensive earthworks of Venta Icenorum and the earthworks at Tasburgh.</i></p> <ul style="list-style-type: none"> <li>• <i>Sparsely settled character with buildings clustered around fording points and at the top of the valley sides.</i></li> <li>• <i>Characteristic vernacular buildings particularly notably including weather boarded mill houses and Dutch gable ends.</i></li> <li>• <i>Presence of a small number of distinctive halls and parkland including English Heritage listed parkland at Rainthorpe Hall.</i></li> <li>• <i>Network of narrow peaceful rural lanes throughout the valley including sunken lanes.</i></li> <li>• <i>A more disturbed character in the north of the area due to the influence of pylons, railway and roads.</i></li> <li>• <i>Role in dividing and defining east and west of South Norfolk District.<sup>21</sup></i></li> </ul>
	A5: Waveney Rural River Valley	<ul style="list-style-type: none"> <li>• <i>Flat, wide floodplain with gently sloping valley sides forming a broad valley.</i></li> <li>• <i>A relatively large-scale open valley landscape (compared to other river valleys within the district) with some long views within the valley. More intimate and enclosed areas also occur along the river course.</i></li> <li>• <i>The course of the river is not always distinct, flowing across the character area boundary into Suffolk in some instances and in other areas braided into numerous small channels.</i></li> <li>• <i>A number of attractive fords (e.g. at Brockdish) and small bridges (e.g. Doit Bridge west of Diss) occur along the river course.</i></li> <li>• <i>Arable and pastoral farming is characteristic of the valley sides.</i></li> <li>• <i>Diversity of land cover along the valley floor including fen, heath and meadow creates ecological richness.</i></li> <li>• <i>Discrete woodland blocks occur along the valley floor, with larger and more significant woodland areas on the valley sides.</i></li> <li>• <i>Presence of Scole Roman Settlement Scheduled Ancient Monument.</i></li> </ul>

<sup>21</sup> <https://www.southnorfolkandbroadland.gov.uk/downloads/file/1320/land-use-consultants-2001-a1-tas-rural-river-valley>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• <i>Strong market town character at Diss and Harleston (plus Bungay in Suffolk) with nucleated and linear settlement occurring along the valley.</i></li> <li>• <i>Mills (e.g. Windmill at Billingford) and Churches (including round tower churches, e.g. at Needham) form distinctive landmark features throughout the character area.</i></li> <li>• <i>The A1066 and A143 run along the upper valley sides, cutting into the character area in places. The A140 cuts across the character area west of Scole.</i></li> <li>• <i>A peaceful and tranquil character is retained away from the main roads.</i></li> <li>• <i>Intact river valley character.</i></li> <li>• <i>Role in dividing and defining the counties of Norfolk and Suffolk.<sup>22</sup></i></li> </ul>
<i>Suffolk Landscape Character Assessment</i>		
Rolling Valley Farmlands and Furze	N/A (Types only)	<ul style="list-style-type: none"> <li>• <i>Valleys with prominent river terraces of sandy soil.</i></li> <li>• <i>Small areas of gorse heathland in a clayland setting.</i></li> <li>• <i>Straight boundaries associated with late enclosure.</i></li> <li>• <i>Co- axial field systems.</i></li> <li>• <i>Mixed hedgerows of hawthorn, dogwood and blackthorn with oak, ash and field maple.</i></li> <li>• <i>Fragmentary cover of woodland.</i></li> <li>• <i>Sand and gravel extraction.</i></li> <li>• <i>Golf courses.</i></li> <li>• <i>Focus for larger settlements.<sup>23</sup></i></li> </ul>
Wooded Valley Meadowlands and fens	N/A (Types only)	<ul style="list-style-type: none"> <li>• <i>Flat valley bottom.</i></li> <li>• <i>Extensive peat deposits.</i></li> <li>• <i>Cattle grazed pasture.</i></li> <li>• <i>Network of drainage ditches.</i></li> <li>• <i>Areas of unenclosed “wild” fenland.</i></li> <li>• <i>Widespread plantation and carr woodland.</i></li> <li>• <i>Important sites for nature conservation.</i></li> <li>• <i>Localised settlement on the valley floor “islands”.</i></li> <li>• <i>Sense of quiet and rural isolation in many places.<sup>24</sup></i></li> </ul>

<sup>22</sup> <https://www.southnorfolkandbroadland.gov.uk/downloads/file/1322/land-use-consultants-2001-a5-waveney-rural-river>

<sup>23</sup> <https://suffolklandscape.org.uk/landscapes/rolling-valley-farmlands-furze/>

<sup>24</sup> <https://suffolklandscape.org.uk/landscapes/wooded-valley-meadowlands-fens/>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
Rolling Valley Claylands	N/A (Types only)	<ul style="list-style-type: none"> <li>• Gently sloping valleys on medium clay soils.</li> <li>• Occasional notable steeper slopes.</li> <li>• Fields often smaller than on surrounding plateaux.</li> <li>• Localised influence of landscape parks.</li> <li>• Focus of settlement.</li> <li>• Few large greens or commons.</li> <li>• Ancient woodland on the upper fringes of the valley sides.<sup>25</sup></li> </ul>
Ancient Plateau Claylands	N/A (Types only)	<ul style="list-style-type: none"> <li>• Flat or gently rolling arable landscape of clay soils dissected by small river valleys.</li> <li>• Field pattern of ancient enclosure – random patterns in the south but often co-axial in the north. Small patches of straight-edged fields associated with the late enclosure of woods and greens.</li> <li>• Dispersed settlement pattern of loosely clustered villages, hamlets and isolated farmsteads of medieval origin.</li> <li>• Villages often associated with medieval greens or tyes.</li> <li>• Farmstead buildings are predominantly timber-framed, the houses colour-washed and the barns blackened with tar. Roofs are frequently tiled, though thatched houses can be locally significant.</li> <li>• Scattered ancient woodland parcels containing a mix of oak, lime, cherry, hazel, hornbeam, ash and holly.</li> <li>• Hedges of hawthorn and elm with oak, ash and field maple as hedgerow trees.</li> <li>• Substantial open areas created for WWII airfields and by 20<sup>th</sup> century agricultural changes.</li> <li>• Network of winding lanes and paths often associated with hedges create visual intimacy.<sup>26</sup></li> </ul>
Plateau Claylands	N/A (Types only)	<ul style="list-style-type: none"> <li>• Plateaux of heavy clay soil very gently undulating or flat dissected by small streams.</li> <li>• Ancient organic pattern of fields, some co-axial in the north-east.</li> <li>• Substantial hedges of hawthorn blackthorn and elm with oak and ash predominant hedgerow trees.</li> <li>• Extensive areas of hedgerow loss creating “arable prairies”.</li> </ul>

<sup>25</sup> <https://suffolklandscape.org.uk/landscapes/rolling-valley-claylands/>

<sup>26</sup> <https://suffolklandscape.org.uk/landscapes/ancient-plateau-claylands/>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• <i>Dispersed settlement, villages with multiple nuclei, landscape scattered with farmsteads and hamlets.</i></li> <li>• <i>Large greens – many now enclosed but with ‘ghost’ outlines – on the flatter parts; houses around their margins, but medieval churches are only very rarely present.</i></li> <li>• <i>Rich stock of medieval and later vernacular buildings, but generally less glamorous than those in south Suffolk.</i></li> <li>• <i>Large modern agricultural buildings a recurrent feature.</i></li> <li>• <i>Redundant World War 2 (WWII) airfields.</i></li> <li>• <i>Almost no woodland.</i></li> <li>• <i>Small copses in villages and around farmsteads.</i></li> <li>• <i>A working landscape on which suburbanisation is only beginning to make an impact compared with other parts of the county.<sup>27</sup></i></li> </ul>
Ancient Estate Claylands	N/A (Types only)	<ul style="list-style-type: none"> <li>• <i>Dissected Boulder Clay plateau.</i></li> <li>• <i>Organic pattern of field enclosures.</i></li> <li>• <i>Straight boundaries where influence of privately owned estates is strongest.</i></li> <li>• <i>Enclosed former greens and commons.</i></li> <li>• <i>Parklands.</i></li> <li>• <i>WWII airfields.</i></li> <li>• <i>Villages with dispersed hamlets and farmsteads.</i></li> <li>• <i>Timber framed buildings.</i></li> <li>• <i>Distinctive estate cottages.</i></li> <li>• <i>Ancient semi-natural woodland.<sup>28</sup></i></li> </ul>
Rolling Estate Farmlands	N/A (Types only)	<ul style="list-style-type: none"> <li>• <i>Gently sloping valley sides and plateau fringes.</i></li> <li>• <i>Generally deep loamy soils.</i></li> <li>• <i>An organic pattern of fields modified by later realignment.</i></li> <li>• <i>Important foci for early settlement.</i></li> <li>• <i>Coverts and plantations with some ancient woodlands.</i></li> <li>• <i>Landscape parks with a core of wood pasture.</i></li> </ul>

<sup>27</sup> <https://suffolklandscape.org.uk/landscapes/plateau-claylands/>

<sup>28</sup> <https://suffolklandscape.org.uk/landscapes/ancient-estate-claylands/>

<b>Landscape Character Type (LCT)</b>	<b>Landscape Character Area (LCA)</b>	<b>Key Characteristics</b>
		<ul style="list-style-type: none"> <li>• <i>Location for mineral workings and related activity, especially in the Gipping valley.<sup>29</sup></i></li> </ul>
Valley Meadowlands	N/A (Types only)	<ul style="list-style-type: none"> <li>• <i>Flat landscapes of alluvium or peat on valley floors.</i></li> <li>• <i>Grassland divided by a network of wet ditches.</i></li> <li>• <i>Occasional carr woodland and plantations of poplar.</i></li> <li>• <i>Occasional small reedbeds.</i></li> <li>• <i>Unsettled.</i></li> <li>• <i>Cattle grazed fields.</i></li> <li>• <i>Fields converted to arable production.<sup>30</sup></i></li> </ul>
Plateau Estate Farmlands	N/A (Types only)	<ul style="list-style-type: none"> <li>• <i>Flat landscape of light loams and sandy soils.</i></li> <li>• <i>Large scale rectilinear field pattern.</i></li> <li>• <i>Network of tree belts and coverts.</i></li> <li>• <i>Large areas of enclosed former heathland.</i></li> <li>• <i>18<sup>th</sup>- 19<sup>th</sup> and 20<sup>th</sup> century landscape parks.</i></li> <li>• <i>Clustered villages with a scattering of farmsteads around them.</i></li> <li>• <i>Former airfields.</i></li> <li>• <i>Vernacular architecture is often 19<sup>th</sup> century estate type of brick and tile.<sup>31</sup></i></li> </ul>
Rolling Valley Farmland	N/A (Types only)	<ul style="list-style-type: none"> <li>• <i>Gentle valley sides with some complex and steep slopes.</i></li> <li>• <i>Deep well drained loamy soils.</i></li> <li>• <i>Organic pattern of fields smaller than on the plateaux.</i></li> <li>• <i>Distinct areas of regular field patterns.</i></li> <li>• <i>A scattering of landscape parks.</i></li> <li>• <i>Small ancient woodlands on the valley fringes.</i></li> <li>• <i>Sunken lanes.</i></li> <li>• <i>Towns and villages with distinctive mediaeval cores and late mediaeval churches.</i></li> <li>• <i>Industrial activity and manufacture, continuing in the Gipping valley.</i></li> <li>• <i>Large, often moated, houses.<sup>32</sup></i></li> </ul>
Plateau Farmlands	N/A (Types only)	<ul style="list-style-type: none"> <li>• <i>Plateaux of land between river valleys.</i></li> <li>• <i>Loamy soils amenable to arable farming.</i></li> </ul>

<sup>29</sup> <https://suffolklandscape.org.uk/landscapes/rolling-estate-farmlands/>

<sup>30</sup> <https://suffolklandscape.org.uk/landscapes/valley-meadowlands/>

<sup>31</sup> <https://suffolklandscape.org.uk/landscapes/plateau-estate-farmlands/>

<sup>32</sup> <https://suffolklandscape.org.uk/landscapes/rolling-valley-farmlands/>



Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• <i>Irrigated crops.</i></li> <li>• <i>Sinuuous lanes and hedge lines.</i></li> <li>• <i>Substantial elements of planned landscape.</i></li> <li>• <i>Plantation woodland.</i></li> <li>• <i>Parkland and planting of exotic trees.</i></li> <li>• <i>Feeling of isolation and tranquillity.</i></li> <li>• <i>Dissected by major roads.</i><sup>33</sup></li> </ul>
Ancient Estate Farmlands	N/A (Types only)	<ul style="list-style-type: none"> <li>• <i>Flat central spine of land, with sloping sides dissected by river valleys.</i></li> <li>• <i>Deep loamy soil that originated as wind-blown sediments from glacial sources.</i></li> <li>• <i>Large-scale arable blocks divided into rectilinear fields.</i></li> <li>• <i>Substantial number of ancient woodlands.</i></li> <li>• <i>Suckering elm hedges with pollard oaks; also holly hedges.</i></li> <li>• <i>Network of parks and designed landscapes.</i></li> <li>• <i>Nucleated villages, but with some dispersed farmsteads and clusters of houses.</i></li> <li>• <i>Localised development pressures.</i><sup>34</sup></li> </ul>
Ancient Rolling Farmlands	N/A (Types only)	<ul style="list-style-type: none"> <li>• <i>Rolling arable landscape of chalky clays and loams.</i></li> <li>• <i>Dissected widely, and sometimes deeply, by river valleys.</i></li> <li>• <i>Field pattern of ancient random enclosure. Regular fields associated with areas of heathland enclosure.</i></li> <li>• <i>Hedges of hawthorn and elm with oak, ash and field maple as hedgerow trees.</i></li> <li>• <i>Substantial open areas created for airfields and by post WWII agricultural improvement.</i></li> <li>• <i>Scattered with ancient woodland parcels containing a mix of oak, lime, cherry, hazel, hornbeam, ash and holly.</i></li> <li>• <i>Network of winding lanes and paths, often associated with hedges, create visual intimacy.</i></li> <li>• <i>Dispersed settlement pattern of loosely clustered villages, hamlets and isolated farmsteads of mediaeval origin.</i></li> </ul>

<sup>33</sup> <https://suffolklandscape.org.uk/landscapes/plateau-farmlands/>

<sup>34</sup> <https://suffolklandscape.org.uk/landscapes/ancient-estate-farmlands/>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• <i>Farmstead buildings are predominantly timber-framed, the houses colour-washed and the barns blackened with tar. Roofs are frequently tiled, though thatched houses can be locally significant.</i></li> <li>• <i>Villages often associated with village greens or the remains of greens.<sup>35</sup></i></li> </ul>
Wooded Valley Meadowlands	N/A (Types only)	<ul style="list-style-type: none"> <li>• <i>Flat narrow valley floors.</i></li> <li>• <i>Wet clay and peat soils.</i></li> <li>• <i>Small meadows bounded by ditches or hedges.</i></li> <li>• <i>Plantations of poplar and cricket bat willow.</i></li> <li>• <i>Carr woodland and scrub.</i></li> <li>• <i>Confined views.<sup>36</sup></i></li> </ul>
<i>Tendring District Landscape Character Assessment (2001)</i>		
	Cattawade Marshes	<ul style="list-style-type: none"> <li>• <i>Tranquil floodplain upstream of Cattawade Bridge, forming part of the River Stour floodplain.</i></li> <li>• <i>North part of floodplain is a mosaic of herb-rich neutral grasslands, marshland, open water, fen and marginal vegetation.</i></li> <li>• <i>South part of floodplain is drained and improved grassland divided by low, scrubby hedgerows.</i></li> <li>• <i>Cattawade Marshes provides important bird nesting sites and for this reason is designated as a SSSI.</i></li> <li>• <i>Long distance footpath, St Edmund Way, from Manningtree to Flatford Mill.</i></li> <li>• <i>Forms part of the Dedham Vale AONB and has artistic associations with John Constable.</i></li> <li>• <i>Mainline railway on embankment. Manningtree Station is one of the few buildings on the floodplain.</i></li> <li>• <i>Industrial estate, sewage works and electricity pylons characterise the edges of Manningtree.</i></li> </ul>
	Stour Estuary Open Marshes	<ul style="list-style-type: none"> <li>• <i>Tidal estuary of the River Stour forming a dynamic landscape setting to the Suffolk Coast and Heaths AONB to the north.</i></li> <li>• <i>Intertidal muds are extremely rich in invertebrates and the estuary is of international importance for wildfowl and wading birds.</i></li> </ul>

<sup>35</sup> <https://suffolklandscape.org.uk/landscapes/ancient-rolling-farmlands/>

<sup>36</sup> <https://suffolklandscape.org.uk/landscapes/wooded-valley-meadowlands/>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• <i>Large scale working river landscape frequented by water-borne transport and bordered by historic ports of Mistley and Manningtree.</i></li> <li>• <i>Influenced by large scale shipping and activity surrounding Harwich International Port.</i></li> <li>• <i>Absence of settlement or infrastructure within area.</i></li> <li>• <i>Dramatic views across the estuary to the Suffolk coast.</i></li> <li>• <i>Wooded Stour slopes, in Suffolk to the north and Essex to the south, form a setting to the open estuary marshes.</i></li> </ul>
	Stour Valley System	<ul style="list-style-type: none"> <li>• <i>Southern slopes and scenic tributary valleys of the Stour, forming a setting to one of the most important wildlife estuaries in Europe and a setting to the Suffolk Coasts and Heaths AONB.</i></li> <li>• <i>Steep wooded sides form a rural backdrop to the open waters of the Stour Estuary.</i></li> <li>• <i>Tributary valleys provide hidden landscapes where thick hedgerows with hedgerow oaks divide fields of arable and pasture.</i></li> <li>• <i>Dramatic buildings, including quayside warehouses, maltings, church spires and towers, provide focal points along the river.</i></li> <li>• <i>Leafy lanes drop steeply down the valley sides providing scenic drives.</i></li> <li>• <i>B1352 and mainline railway pass along the coast with outstanding views of the estuary and Suffolk shore.</i></li> <li>• <i>Historic port of Manningtree and village of Mistley are located on the southern bank of the Stour Estuary facing the Suffolk landscape across the mile-wide river.</i></li> <li>• <i>The area north-west of Lawford forms part of the Dedham Vale AONB.</i></li> </ul>
	Bromley Heaths	<ul style="list-style-type: none"> <li>• <i>Exposed and windswept plateau corresponding to the highest part of the district.</i></li> <li>• <i>Deep, coarse, loamy and often stoneless brown soils which support a high grade agricultural land.</i></li> <li>• <i>Large scale productive arable fields divided by low, gappy hedgerows where hedgerow oaks stand out as silhouettes against the skyline.</i></li> <li>• <i>Apple orchards around Ardleigh, Elmstead and Frating are sheltered by belts of poplar or fast growing Leylandii.</i></li> </ul>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• Former heaths largely converted to smallholdings or regenerating as woodland. Small areas of remnant heath survive.</li> <li>• Neglected oak/sweet chestnut coppice with ground flora typical of acidic woodland soils.</li> <li>• Low density, rural settlement pattern of scattered farms and halls, hamlets, villages and small market towns.</li> <li>• Network of narrow lanes connects the scattered farms and villages and roadside verges often contain gorse and bracken.</li> <li>• Dramatic, dominating skyline.</li> </ul>
	Ardleigh Valley System	<ul style="list-style-type: none"> <li>• Steep sided wooded valley hidden from the surrounding farmed plateau.</li> <li>• Ancient deciduous woodland clings to valley sides and alder and willow dominate streamlines.</li> <li>• Leafy lanes drop steeply down the valley side and cross the streams on stone bridges e.g. Springvalley Lane.</li> <li>• The A120 and railway line, in contrast, cut across the valley on embankments, fragment the valley both visually and physically.</li> <li>• Spring Valley Mill is the only remaining example of a water mill in Tendring.</li> <li>• Ardleigh Reservoir floods the two northernmost arms of the valley system.</li> </ul>
	Alresford Valley System	<ul style="list-style-type: none"> <li>• A series of distinct river valleys, steep sided in places, containing Sixpenny, Tenpenny and Bentley Brooks and including the slopes descending to the Colne Estuary.</li> <li>• The intimate, leafy character contrasts with the adjacent expansive open arable landscapes of the Heathland Plateaux.</li> <li>• Large areas of deciduous woodland including Thorringtonhall Wood, one of the largest ancient woodlands in the district.</li> <li>• Old coppice stools are visible in many of the woodlands.</li> <li>• Historic lanes drop steeply down the valley side and cross the brooks at ancient crossing points.</li> <li>• Sparse settlement consisting of scattered cottages and isolated farms.</li> </ul>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• <i>Recent infill has resulted in ribbon development on the edge of Thorrington Cross.</i></li> <li>• <i>Gravel pits and sewage works are present.</i></li> </ul>
	Holland Valley System	<ul style="list-style-type: none"> <li>• <i>Steep sided valley containing Holland Brook and its tributaries, Tendring Brook and Weeley Brook and Picker's Ditch.</i></li> <li>• <i>Contrast with the flat landscapes of the Tendring Plateau.</i></li> <li>• <i>Seasonally waterlogged soils support a mixed wooded and pastoral landscape.</i></li> <li>• <i>Ancient woodlands, typically dominated by oak, ash and sweet chestnut, are located in the wetter areas and on the steeper slopes.</i></li> <li>• <i>Lanes drop down the valley sides and cross the streams, at historic crossing points, on stone or brick bridges.</i></li> <li>• <i>Typically devoid of built development except for isolated cottages and a former corn mill at crow bridge.</i></li> <li>• <i>Picker's Ditch has been encroached upon by residential development at Clacton.</i></li> <li>• <i>Forms a setting to the Holland Floodplain SSSI.</i></li> </ul>
<i>Colchester Borough Landscape Character Assessment (2005)</i>		
	Langham Farmland Plateau	<ul style="list-style-type: none"> <li>• <i>Langham airfield – clipped straight hedges adjacent to Park Lane.</i></li> <li>• <i>Silver birches within field boundaries to the east of disused Langham airfield.</i></li> <li>• <i>Large-scale arable fields with some remnant orchards now cover the large expanse of airfield.</i></li> <li>• <i>Paddocks, surrounded by wooden post and rail fences.</i></li> <li>• <i>Airfield dominates field pattern.</i></li> </ul>
	Messing Wooded Farmland	<ul style="list-style-type: none"> <li>• <i>Sparse settlement pattern consisting of the small village of Messing, and a number of small isolated farmsteads.</i></li> <li>• <i>Elevated plateau landform which is situated on a broad ridge and dissected by small streams, providing undulations in topography.</i></li> <li>• <i>Large areas of mixed woodland (for example Layer Wood and Pods Wood).</i></li> <li>• <i>Number of small ponds and lakes.</i></li> </ul>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• <i>Single mature trees at field boundaries or standing within fields.</i></li> </ul>
	Stour River Valley Slopes	<p>Overall Key Characteristics</p> <ul style="list-style-type: none"> <li>• <i>Sloping valley side – topography.</i></li> <li>• <i>Patches of deciduous woodland.</i></li> <li>• <i>Mixture of irregular arable and pasture fields.</i></li> <li>• <i>Field boundaries comprising pure elm hedges and veteran oak pollards.</i></li> <li>• <i>Small farmsteads and halls (with associated ponds and parkland).</i></li> <li>• <i>Minor roads and narrow lanes which run down the valley sides to crossing points.</i></li> <li>• <i>Sense of remoteness and tranquillity away from road network.</i></li> <li>• <i>The attractive small town of Dedham.</i></li> </ul> <p>Sub Area A7a Key Characteristics</p> <ul style="list-style-type: none"> <li>• <i>Steep-sided narrow, intimate valley containing a small southern tributary of the River Stour.</i></li> <li>• <i>Small woodland groves and farmsteads on the valley sides.</i></li> <li>• <i>Pasture fields on lower valley slopes where tributary meets the main river Stour.</i></li> </ul> <p>Sub Area A7b Key Characteristics</p> <ul style="list-style-type: none"> <li>• <i>Intimate, tranquil, relatively steep-sided river valley which is narrow in places and has the narrow meandering Black Brook running through the floodplain.</i></li> <li>• <i>Damp pasture and willows.</i></li> <li>• <i>Dominant electricity lines running along the valley floor.</i></li> <li>• <i>Small farmsteads.</i></li> <li>• <i>Mixture of woodland and plantation types, including cricket bat plantations and pine on sandy soils.</i></li> </ul> <p>Sub Area A7c Key Characteristics</p> <ul style="list-style-type: none"> <li>• <i>Narrow, steep-sided valley to the east of Boxted and west of Boxted Cross containing a tributary of the River Stour.</i></li> <li>• <i>Large patches of mixed woodland (the majority of which is ancient) on the valleysides.</i></li> <li>• <i>Network of public footpaths crossing the valley and running along the valley floor.</i></li> </ul>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
	Rochfords Farmland Plateau	<ul style="list-style-type: none"> <li>• <i>Mixture of medium and large rolling arable fields interspersed with small woodland patches.</i></li> <li>• <i>Fields enclosed by gappy hedges, with occasional mature trees within field boundaries.</i></li> <li>• <i>Landscape feels more open and exposed in places than the adjacent Great Horkesley farmland plateau to the west.</i></li> <li>• <i>Large weatherboarded vernacular barns (for example at Fordham).</i></li> <li>• <i>Settlement pattern consists of villages with varying forms, small hamlets and scattered farmsteads.</i></li> </ul>
	Great Horkesley Farmland Plateau	<ul style="list-style-type: none"> <li>• <i>Small to medium scale arable fields with concentrations of mature trees at field boundaries.</i></li> <li>• <i>Interesting field pattern consisting of small, regular fields to the south of Boxted and also to the east of Great Horkesley.</i></li> <li>• <i>Orchards in close proximity to Great Horkesley.</i></li> <li>• <i>Farmland plateau crossed in a north-south direction by two straight roads, which connect with Colchester's northern settlement fringe. Linear settlement pattern extends from the layout of these roads.</i></li> <li>• <i>A network of narrow lanes (sometimes sunken), which are lined by trees and hedges connect the remainder of the character area with the two main north south roads.</i></li> <li>• <i>Hedgerows are diverse and well managed/ clipped in most places.</i></li> </ul>
	Colne River Valley Slopes	<ul style="list-style-type: none"> <li>• <i>Relatively steep v-shaped valley slopes facilitate attractive and open views across and along the River corridor.</i></li> <li>• <i>Principal road network consisting of narrow tree-lined (sometimes sunken) lanes traversing the valley sides to the north and south.</i></li> <li>• <i>A mosaic of medium to large-sized irregular and regular, predominantly arable fields with medium hedgerows containing semi-mature/ mature hedgerow trees.</i></li> <li>• <i>Some larger semi-enclosed arable fields to the west of Wakes Colne; and concentrations of smaller fields with intact hedge boundaries adjacent to settlements.</i></li> <li>• <i>Settlement pattern consists of small linear village settlements such as Wakes Colne and Eight Ash</i></li> </ul>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<i>Green, adjacent to the north-south roads, which cross the River Valley; small hamlets and farmsteads.</i>
	Colne River Valley Floor	<ul style="list-style-type: none"> <li>• <i>Floodplain of the Colne River – relatively narrow in the upper reaches of the river valley and broader as the River moves eastwards towards Colchester and the Colne estuary.</i></li> <li>• <i>Meandering River Colne is narrow in comparison with the broad spread of the floodplain across which the river flows.</i></li> <li>• <i>Colne River is bridged by several roads and lanes, which connect the north and south valley slopes and facilitate views along the river corridor to the east and west.</i></li> <li>• <i>Floodplain corridor sprinkled with mills and weirs.</i></li> <li>• <i>Striking landmark viaduct crossing the river corridor at Chappel.</i></li> </ul>
	Great Tey Farmland Plateau	<ul style="list-style-type: none"> <li>• <i>Gently sloping farmland plateau consisting of a mixture of medium to large-scale enclosed, predominantly arable fields.</i></li> <li>• <i>Linear belts and small patches of predominantly deciduous woodland.</i></li> <li>• <i>Small nucleated settlements and scattered farmsteads.</i></li> <li>• <i>Comprehensive network of footpaths and winding lanes.</i></li> <li>• <i>Peaceful and tranquil atmosphere.</i></li> </ul>
	Easthorpe Farmland Plateau	<ul style="list-style-type: none"> <li>• <i>Raised farmland plateau, dissected by the wooded Roman River valley in the east.</i></li> <li>• <i>A mixture of small, medium and large irregular, predominantly arable fields.</i></li> <li>• <i>Small patches of deciduous woodland and several ponds/ reservoirs.</i></li> <li>• <i>Area crossed by a network of narrow, sometimes winding lanes.</i></li> <li>• <i>Airfield, surrounded by large open fields has a dominant influence on the landscape character in the south of the area.</i></li> <li>• <i>Settlement pattern consists of small villages and hamlets with scattered farmsteads amongst predominantly arable agricultural land.</i></li> </ul>



Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
	Wooded Roman River Valley	<ul style="list-style-type: none"> <li>• <i>Relatively steep and wooded slopes of narrow v-shaped Roman River valley (tributary of the Colne River).</i></li> <li>• <i>Large areas of deciduous and coniferous (mixed) woodland on the valley slopes (e.g. Donyland Wood, Friday Wood and Chest Wood).</i></li> <li>• <i>Small patches of ancient woodland on the valley sides.</i></li> <li>• <i>Large regular fields on northern valley slopes with a concentration of smaller irregular fields at High Park Corner.</i></li> <li>• <i>Several areas of historic parkland, often associated with halls, overlooking the valley floor.</i></li> <li>• <i>Views across and within the valley restricted by large woodland areas.</i></li> </ul>
	Southern Colchester Farmland Plateau	<ul style="list-style-type: none"> <li>• <i>An area of sloping farmland plateau (with a mixture of small, medium and large predominantly arable fields) bordered by Colchester settlement fringes to the north and the wooded Roman River Valley to the south.</i></li> <li>• <i>Influence of the military (East Donyland military training area and Middlewick Rifle Ranges) – disturbs tranquillity whilst firing practice is taking place.</i></li> <li>• <i>Several large patches of woodland extend from the northern slopes of the Roman River valley, onto the plateau.</i></li> <li>• <i>Several small lakes and ponds, within disused sand and gravel works.</i></li> <li>• <i>Character area provides physical and visual separation between Colchester urban area and the Roman River Valley.</i></li> <li>• <i>Fragmented and sometimes chaotic landscape structure with numerous unrelated land uses.</i></li> </ul>
	Pyefleet Drained Estuarine Marshes	<ul style="list-style-type: none"> <li>• <i>Intricate network of meandering drainage ditches.</i></li> <li>• <i>Area of predominantly ungrazed marshland which is utilised for firing ranges; · Sense of remoteness, tranquillity.</i></li> <li>• <i>Open, undeveloped and generally inaccessible.</i></li> <li>• <i>Lack of tree cover and settlement pattern.</i></li> </ul>
<i>Essex Landscape Character Assessment (2003)</i>		
	Gosfield Wooded Farmland	<ul style="list-style-type: none"> <li>• <i>Flat to gently undulating landform.</i></li> </ul>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• <i>Strong pattern of large and small woods, including distinctive ancient limewoods.</i></li> <li>• <i>Irregular medium size arable fields, bounded by thick hedgerows with mature hedgerow trees.</i></li> <li>• <i>Enclosed character.</i></li> <li>• <i>Many small farmsteads, occasional hamlets and villages.</i></li> </ul>
	Central Essex Farmland	<ul style="list-style-type: none"> <li>• <i>Irregular field pattern of mainly medium size arable fields, marked by sinuous hedgerows and ditches.</i></li> <li>• <i>Many small woods and copses provide structure and edges in the landscape.</i></li> <li>• <i>Scattered settlement pattern, with frequent small hamlets, typically with greens and ponds. A concentration of isolated moated farmsteads.</i></li> <li>• <i>Network of narrow, winding lanes.</i></li> <li>• <i>Mostly tranquil character away from major roads and Stansted Airport.</i></li> </ul>
	Black Water and Brain Valley	<ul style="list-style-type: none"> <li>• <i>Shallow valleys.</i></li> <li>• <i>Predominantly arable farmland with well hedged medium to large fields.</i></li> <li>• <i>The Brain and the Upper Blackwater Valleys are narrow with undulating valleysides.</i></li> <li>• <i>The Lower Chelmer, and the Blackwater near Maldon, have wide flat valley floors, and gentle valleysides.</i></li> <li>• <i>Extensive linear poplar and willow plantations are a distinctive feature.</i></li> </ul>
	Chelmer Valley	<ul style="list-style-type: none"> <li>• <i>Narrow valley, with a restricted valley bottom.</i></li> <li>• <i>Dense riverside trees.</i></li> <li>• <i>Arable valleysides with a fairly open character.</i></li> <li>• <i>Small linear settlements occupy the upper valleysides or straggle down to a few bridging points.</i></li> <li>• <i>Historic watermills and Second World War pillboxes are distinctive features.</i></li> <li>• <i>Mostly tranquil character.</i></li> </ul>
	South Colchester Farmlands	<ul style="list-style-type: none"> <li>• <i>Mix of small regular pasture and large arable fields.</i></li> <li>• <i>Dense woodland in the Roman River valley.</i></li> <li>• <i>Enclosed, intimate character in the north, more open in the south.</i></li> </ul>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• <i>Complex settlement pattern of nucleated and linear villages/hamlets, and farmsteads along dispersed lanes.</i></li> <li>• <i>Distinctive elongated large waterbody of Abberton Reservoir within a shallow valley.</i></li> </ul>
	Brentwood Hills	<ul style="list-style-type: none"> <li>• <i>Gently to strongly undulating hills/ridges.</i></li> <li>• <i>Semi enclosed character due to presence of numerous small woods, large interlocking blocks of woodland and frequent hedgerow trees.</i></li> <li>• <i>Patchwork of small irregular pasture and arable fields, opening out to medium to large regular arable fields in the centre of the area.</i></li> <li>• <i>Dense linear settlement pattern along major south west to north east road/rail routes.</i></li> </ul>
	South Essex Coastal Towns	<ul style="list-style-type: none"> <li>• <i>Large areas of dense urban development.</i></li> <li>• <i>Strongly rolling hills with steep south and west facing escarpments covered by open grassland or a mix of small woods, pastures and commons.</i></li> <li>• <i>Extensive flat coastal grazing marshes in the south adjacent to the Thames Estuary.</i></li> <li>• <i>Large blocks of woodland in the centre of the area.</i></li> <li>• <i>Narrow bands and broader areas of gently undulating arable farmland, with a remnant hedgerow pattern, separating some of the towns.</i></li> <li>• <i>Particularly complex network of major transportation routes.</i></li> <li>• <i>Pylon routes visually dominate farmland in the A130 corridor.</i></li> </ul>
<i>Landscape Character Assessment of Basildon Borough (2014)</i>		
Lowland Settled Claylands		<ul style="list-style-type: none"> <li>• <i>Relatively flat, settled agricultural landscape often associated with coastal fringe areas. Small fields and plots create a relatively enclosed landscape with limited long distance views. Dispersed settlements are scattered throughout the zone.</i></li> </ul>
Wooded Farmlands		<ul style="list-style-type: none"> <li>• <i>A gently undulating, elevated arable landscape with scattered blocks of woodland. Small ribbon developments or isolated farmhouses. The elevated land allows some open long distance views, where not contained by woodland.</i></li> </ul>
Wooded Hills and Ridges		<ul style="list-style-type: none"> <li>• <i>Sloping and undulating landscape providing enclosure and variation in texture and scale. Prominent hills and ridges. Large parts of the land are</i></li> </ul>

<b>Landscape Character Type (LCT)</b>	<b>Landscape Character Area (LCA)</b>	<b>Key Characteristics</b>
		<i>covered in woodland with more open clearings of pasture and arable farmland.</i>
Sloping Farmland		<ul style="list-style-type: none"> <li>• <i>A sloping and undulating arable landscape, very open in character allowing long distant views over farmland. Some localised ribbon development and scattered farm buildings.</i></li> </ul>
Lowland Farmlands		<ul style="list-style-type: none"> <li>• <i>Low lying landscape crossed in parts by major river corridors. Intensely farmed agricultural land that is in close proximity to well developed, densely populated settlements. Intrusive modern buildings may be a feature.</i></li> </ul>
<i>Thurrock Landscape Capacity Study (2005)</i>		
	Rolling Farmland/Wooded Hills	<ul style="list-style-type: none"> <li>• <i>Gently to strongly undulating low hills/ridges.</i></li> <li>• <i>Large scale arable farmland and grazing.</i></li> <li>• <i>Strong woodland structure.</i></li> <li>• <i>Mature established hedges.</i></li> <li>• <i>Isolated distinctive historic villages.</i></li> </ul>
	Langdon Hills Rolling Farmland	<ul style="list-style-type: none"> <li>• <i>Small scale steep, rounded sand and gravel hills.</i></li> <li>• <i>Sense of elevation and intimacy.</i></li> <li>• <i>Woodland is a strong, unifying element.</i></li> <li>• <i>Irregularly shaped fields on higher slopes adjacent to woodland.</i></li> <li>• <i>Horse grazing within the lower slopes in the north east of the character area.</i></li> <li>• <i>Rough texture.</i></li> <li>• <i>Absence of detracting vertical features.</i></li> </ul>
	Fobbing Ridge Rolling Farmland / Wooded Hills	<ul style="list-style-type: none"> <li>• <i>Gently undulating farmland.</i></li> <li>• <i>Wide scarp slope.</i></li> <li>• <i>Extensive views to the south and east.</i></li> <li>• <i>Visual clutter of pylons and power lines.</i></li> <li>• <i>Large rectilinear fields.</i></li> <li>• <i>Clipped and/or gappy hedges.</i></li> <li>• <i>Landmark buildings within the historic cores of Fobbingham and Corringham.</i></li> </ul>
	Sticking Hill Rolling Farmland / Wooded Hills	<ul style="list-style-type: none"> <li>• <i>Area of gently undulating terrain.</i></li> <li>• <i>Arable and pasture farmland.</i></li> <li>• <i>Sparse pattern of settlement with a few individual farmsteads mainly located close to existing rural roads.</i></li> </ul>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• <i>Important nucleated historic settlements of Horndon on the Hill and Orsett.</i></li> <li>• <i>Mature hedgerows in places.</i></li> <li>• <i>Woodland clumps in the southern half of the area.</i></li> <li>• <i>Tranquil rural character.</i></li> </ul>
	Bulphan Fenland	<ul style="list-style-type: none"> <li>• <i>Area of low relief.</i></li> <li>• <i>Level arable and pasture landscape.</i></li> <li>• <i>Sparse settlement consisting mostly of scattered farmsteads.</i></li> <li>• <i>Straight, causewayed roads arranged in a grid pattern.</i></li> <li>• <i>Clipped and gappy hedges.</i></li> <li>• <i>Some clumps of woodland.</i></li> <li>• <i>Network of drainage ditches.</i></li> <li>• <i>Open, exposed landscape.</i></li> <li>• <i>Rural character.</i></li> <li>• <i>Sense of tranquility due to absence of major roads and built development.</i></li> <li>• <i>Absence of vertical structures.</i></li> </ul>
	White Crofts/ Orsett Heath Urban Fringe	<ul style="list-style-type: none"> <li>• <i>Gently undulating encapsulated urban fringe farmland.</i></li> <li>• <i>Large fields with weak enclosure pattern.</i></li> <li>• <i>Abrupt urban edges.</i></li> <li>• <i>Noise and visual intrusion from roads.</i></li> <li>• <i>Visual intrusion from pylons and power lines.</i></li> <li>• <i>Remnant hedgerow lined lanes.</i></li> </ul>
	Grays/ Chadwell St Mary Urban Area	<ul style="list-style-type: none"> <li>• <i>Grays and Chadwell St Mary are both nucleated settlements, which are divided from each other by the A1089 road corridor and settled within a network of arterial and local roads. 1970's housing.</i></li> <li>• <i>Settlement layout of Chadwell St Mary is concentrated on the crossroads of Brentwood Road and Linford Road, with the church as a focal point at this location. Grays spreads from the A13 corridor (in the north) to the shores of the River Thames (in the south) and contains several suburban housing areas ranging from the 1950's to modern style. There are also pockets of Victorian housing and the large new housing development at Chafford Hundred is also located to the north of the Urban Area.</i></li> </ul>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• <i>The town centre is focused around a central High Street and 1950's shopping precinct containing shops, civic offices the museum.</i></li> <li>• <i>There are several areas of greenspace within Grays, some of which are comprised of disused pits and workings.</i></li> <li>• <i>There are several areas of greenspace within Grays including Hangmans Wood and Deneholes SSSI and disused pits, (including Lion Pit SSSI, Grays Chalks Pit SSSI and the county wildlife sites Warren Gorge and Sand Martin Cliff), that support both geological and wildlife interest.</i></li> </ul>
	Corringham/ Stanford-le-Hope Urban Area	<ul style="list-style-type: none"> <li>• <i>Corringham and Stanford le-Hope have an elevated location and are physically separated by the A1014.</i></li> <li>• <i>The layout of Stanford le-Hope is based around two main shopping streets (Kings Street and Victoria Road), which contain a variety of local shops. Corringham has an older village core, which contains mainly weather-boarded houses and a Norman church with an extensive churchyard. There is also a modern precinct shopping centre within Corringham.</i></li> <li>• <i>Housing development within both settlements is comprised of a range of housing ages and styles ranging from Victorian to modern.</i></li> <li>• <i>There is a significant distribution of publicly accessible open greenspace surrounding the southern edges of Stanford le-Hope and Corringham also has several well-distributed areas of open greenspace.</i></li> </ul>
	Tilbury and Docks Urban Area	<ul style="list-style-type: none"> <li>• <i>Tilbury is a nucleated settlement, which, although located in close proximity to the docks, is separated from the main waterfront industry by a main railway line.</i></li> <li>• <i>The docks, part of the Port of London, were built in the 1880's and contain large commercial warehouses and distinctive vertical cranes. From within the docks, there are substantial cross-river views. Housing development within Tilbury is predominantly post-war and includes some tower blocks and flat-roofed housing blocks.</i></li> <li>• <i>Adjacent to the docks, a large industrial and commercial area serves Tilbury and contains large warehouses and ASDA supermarket.</i></li> <li>• <i>There are several areas of publicly accessible greenspace within Tilbury, distributed within housing</i></li> </ul>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<p>areas and to the northeast of the settlement (Karting Stadium).</p> <ul style="list-style-type: none"> <li>• The southern boundary is adjacent to Vange and Fobbing Marshes SSSI.</li> </ul>
	Linford/ Buckingham Hill Urban Fringe	<ul style="list-style-type: none"> <li>• Elevated, broad rounded ridge.</li> <li>• Urban/rural fringe character.</li> <li>• Multiple land uses including mineral extraction and industrial land uses.</li> <li>• Extensive views to the south.</li> <li>• Concentration of woodland around the Durox site.</li> <li>• Rough pasture on the crest of the ridge.</li> <li>• Dispersed settlement pattern of farmsteads.</li> </ul>
	West Tibuary Urban Fringe	<ul style="list-style-type: none"> <li>• Gently undulating farmland.</li> <li>• Large, open fields.</li> <li>• Absence of hedgerows and woodland cover.</li> <li>• Harsh urban edges.</li> <li>• Visual intrusion of pylons and power lines.</li> <li>• Concentration of settlement in the east of the area.</li> <li>• Dispersed farmsteads.</li> <li>• Network of minor roads and lanes.</li> <li>• County Wildlife Sites, e.g. Broom Hill.</li> </ul>
	Corringham / Stanford-le-Hope Urban	<ul style="list-style-type: none"> <li>• Corringham and Stanford le-Hope have an elevated location and are physically separated by the A1014.</li> <li>• The layout of Stanford le-Hope is based around two main shopping streets (Kings Street and Victoria Road), which contain a variety of local shops. Corringham has an older village core, which contains mainly weather-boarded houses and a Norman church with an extensive churchyard. There is also a modern precinct shopping centre within Corringham.</li> <li>• Housing development within both settlements is comprised of a range of housing ages and styles ranging from Victorian to modern.</li> <li>• There is a significant distribution of publicly accessible open greenspace surrounding the southern edges of Stanford le-Hope and Corringham also has several well-distributed areas of open greenspace.</li> </ul>
	Fobbing Marshes	<ul style="list-style-type: none"> <li>• Level, low lying and exposed.</li> <li>• Large scale landscape.</li> </ul>

Landscape Character Type (LCT)	Landscape Character Area (LCA)	Key Characteristics
		<ul style="list-style-type: none"> <li>• Extensive areas of grazing marsh enclosed by post and wire fences.</li> <li>• Absence of settlement and roads.</li> <li>• Sense of wildness and remoteness.</li> <li>• Network of winding ditches.</li> <li>• Wide sweeping views dominated by sky.</li> <li>• Confusion of vertical structures to the south of the character area.</li> <li>• Vange and Fobbing Marshes SSSI.</li> </ul>
	Mucking Marshes	<ul style="list-style-type: none"> <li>• Low lying, level landscape.</li> <li>• Large scale landscape.</li> <li>• Sparse settlement and absence of roads.</li> <li>• Disturbed land restored to rough grassland.</li> <li>• Absence of hedgerows.</li> <li>• Long distance views inland to Buckingham Hill and Langdon Hills.</li> </ul>
	Mucking Flats and Marshes	<ul style="list-style-type: none"> <li>• Low lying, level landscape.</li> <li>• Horizontal landform.</li> <li>• Sense of exposure and wildness.</li> <li>• Complex pattern of small inlets, ditches and creeks.</li> <li>• Long distance views to prominent natural and man made features.</li> <li>• Strong tidal influence.</li> </ul>
	Tilbury Marshes	<ul style="list-style-type: none"> <li>• Low lying, level landscape.</li> <li>• Horizontal landform.</li> <li>• Large scale landscape.</li> <li>• Network of linear ditches.</li> <li>• Southern skyline of dock cranes, chimneys, pylons and power lines.</li> <li>• Close proximity of residential areas.</li> </ul>



# Appendix H – Preliminary Viewpoints

This appendix lists the preliminary viewpoints for discussion and agreement with Natural England, AONBs and local planning authorities and should be read in conjunction with Figure 13.2 Visual Receptors. It is reasonable to assume that as the Project design evolves, additional viewpoints may be required to inform the landscape and visual assessment. In the event that additional viewpoints are considered necessary these would be discussed and agreed with the applicable consultees.

**Table H1 – Preliminary viewpoints**

<b>VP Number</b>	<b>VP Name</b>	<b>X</b>	<b>Y</b>	<b>Reason for inclusion</b>
1	Hickling Lane, public footpath/byway	621640	301681	Represents views experienced by recreational receptors on footpath/byway in vicinity of Norwich Main Substation
2	Public footpath, south-eastern edge of Mulbarton	619935	299859	Represents views experienced by recreational receptors on footpath and residents at south-eastern edge of Mulbarton
3	Public footpath, Flordon Common	617685	297497	Represents views experienced by recreational receptors on footpath at Flordon Common
4	Forncett St Peter	616386	292843	Residents, road users on Aslacton Road, receptors in adjacent churchyard, receptors on adjacent footpath
5	B1134, Gissing Common	614721	287754	Road users on B1134 and recreational receptors at Gissing Common/public footpath
6	B1077, near Shelfanger	610968	284698	Road users on B1077, between Winfarthing and Shelfanger, recreational receptors on nearby footpaths (including Back Lane)
7	Wortham Ling Car Park	608848	279812	Recreational receptors at Wortham Ling
8	Mellis	609910	274627	Residents in Mellis, recreational receptors using footpath, road users on Mellis Road, railway users
9	Mid-Suffolk Footpath between Thwaite and Mendlesham	611078	266933	Recreational receptors on the Mid-Suffolk Footpath

<b>VP Number</b>	<b>VP Name</b>	<b>X</b>	<b>Y</b>	<b>Reason for inclusion</b>
10	Eastern edge of Stowmarket, A1120 overbridge	606676	258307	Residents at eastern edge of Stowmarket, recreational receptors accessing path network around Creeting St Peter, road users on Creeting Road East
11	Barking Tye	606603	252289	Residents in Barking Tye, recreational receptors on public footpaths/village green, road users on B1078
12	Bullen Lane Substation, Bridleway	610062	246104	Receptors on bridleway/footpath adjacent to substation
13	A1214/public footpath	613238	243320	Recreational receptors using footpath, road users on A1214, residents at western edge of Chantry/Ipswich
14	NCN 1/Woodlands Road/public footpath	606677	241257	Recreational receptors on NCN1 and adjacent public footpath, road users, nearby residential receptors
15	Public footpath near Hill Farm, Suffolk Coast and Heaths AONB	608789	236398	Recreational receptors in western extent of Suffolk Coast and Heaths AONB, residential receptors at nearby farmsteads
16	A12/Woodgates Road	607410	236627	Road users on A12/Woodgates Road, nearby residential receptors
17	Snow Hill Lane/Bradick's Hill	601793	236597	Recreational receptors on footpath
18	Stratford St Mary	604160	234111	Recreational receptors on footpath, residents and road users along western edge of Stratford St Mary
19	B1029 northern edge of Ardleigh	605133	229865	Road users on B1029, recreational receptors using footpath, residents at northern edge of Ardleigh

<b>VP Number</b>	<b>VP Name</b>	<b>X</b>	<b>Y</b>	<b>Reason for inclusion</b>
20	A12/Severalls Lane	600652	229238	Road users on Severalls Lane/A12, residents at northern edge of Colchester
21	School Road, west of Little Horkesley	595702	232083	Road users, recreational receptors on Stour Valley Path
22	Cook's Hall Road, Essex Way	595054	227492	Recreational receptors on Essex Way
23	Marks Tey Train Station	591651	223971	Receptors at train station, residents in Marks Tey, road users on adjacent A12, A120
24	Public footpath, west of Kelvedon	585706	219027	Recreational receptors on footpath, residents at western edge of Kelvedon, receptors on railway
25	A120 layby, Stockstreet Farm	582723	222646	Road users on A120, recreational receptors at Stockstreet Farm Barn (events venue)
26	Fairstead	577100	216741	Recreational receptors on public footpath/Essex Way/NCN16, residential receptors in Fairstead
27	Great Leighs	572747	216910	Recreational receptors on footpath, residents at south-eastern edge of Great Leighs, road users on Main Road
28	Public footpath, A130	571474	213247	Road users on A130, recreational receptors on footpath
29	A1060	564224	209831	Road users on A1060, recreational receptors on public footpath
30	Chelmsford western edge, public footpath	568238	208483	Residents at western edge of Chelmsford, recreational receptors on public footpath and adjacent Centenary Circle
31	A414/Margaretting Road, public footpath	567477	205440	Road users on A414/Margaretting Road, recreational receptors on public

<b>VP Number</b>	<b>VP Name</b>	<b>X</b>	<b>Y</b>	<b>Reason for inclusion</b>
				footpath, residents at southern edge of Writtle
32	St Peter's Way, east of Millgreen Common	564503	201777	Recreational receptors at Millgreen Common, recreational receptors on St Peter's Way
33	Ingatestone	565250	199366	Residents at eastern edge of Ingatestone, recreational receptors on footpath, receptors travelling on railway
34	Hutton, Church Lane	563684	194567	Road users on Church Lane, recreational receptors on public footpath, residents at eastern edge of Hutton
35	Tye Common	566644	193984	Residents at western edge of Tye Common/Billericay, road users on Tye Common Road
36	Pigeon Mount	562432	189712	Recreational receptors at Pigeon Mount, Thorndon Country Park
37	Langdon Hills, Basildon	567790	186861	Recreational receptors on public footpath network in Langdon Hills
38	A13 overbridge, west of Stanford-le-Hope	566846	181897	Road users on A13. Recreational receptors on footpath
39	Chadwell St Mary	565156	179760	Residents at eastern edge of Chadwell St Mary, road users on Brentwood Road, recreational receptors on footpath
40	East Tilbury	567424	179095	Residents at the western edge of East Tilbury
41	Tilbury	565330	176333	Residents at the eastern edge of Tilbury, road users on Fort Road, receptors travelling on the railway

# Appendix I – Landscape and Visual Impact Assessment Methodology

## Introduction

This appendix sets out the detailed methodology to be used for the Project Landscape and Visual Impact Assessment.

Landscape and visual assessments are separate, although linked, processes. The assessment therefore considers the potential effects on:

- Landscape as a resource in its own right (caused by changes to the constituent elements of the landscape, its specific aesthetic or perceptual qualities and the character of the landscape)  
Views and visual amenity as experienced by people

Whilst landscape and visual effects are linked, the assessment would deal with landscape and visual effects separately.

### Guidance

The methodology has been developed primarily in accordance with the principles contained within the GLVIA3<sup>37</sup>.

The methodology for the production of accompanying visualisations would be based on current good practice guidance as set out by the Landscape Institute (LI)<sup>38</sup> and NatureScot<sup>39</sup>.

### Scope of the assessment

The assessment considers physical changes to the landscape as well as changes in landscape character. It also considers changes to areas designated for their scenic or landscape qualities, and the visual impacts of a project on publicly available views as perceived by people. In other words, in terms of visual impacts, the focus is on public views and public visual amenity. All potentially significant landscape and visual effects are examined, including those relating to construction and operation of the Project.

Where based on professional judgement it is established that significant effects are unlikely to occur, the assessment of potential effects on some receptors may be 'scoped out'. For an EIA development this is usually agreed at scoping stage, or through the iterative design of the project through the EIA process. Effects assessed in full and effects scoped out are detailed in Table 13.4.

## Assessment methodology

### Methodological overview

The key steps in the methodology for assessing landscape and visual effects are as follows:

- The landscape of the study area is analysed, and landscape receptors identified, informed by desk study and field survey

The area over which the Project would potentially be visible is established through the creation of an initial Zone of Theoretical Visibility (ZTV) plan<sup>40</sup>

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<sup>37</sup> The Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition

<sup>38</sup> Landscape Institute (2019) Technical Guidance Note 06/19 Visual Representation of Development Proposals

<sup>39</sup> Scottish Natural Heritage (2017) Visual Representation of Wind Farms – Version 2.2

<sup>40</sup> A ZTV indicates areas from where a development is theoretically visible, but they cannot show what it would look like, nor indicate the nature or magnitude of landscape or visual impacts

- The visual baseline is recorded in terms of the different receptors (groups of people) who may experience views of the development (informed by the initial ZTV) and the nature of their existing views and visual amenity

Potential assessment viewpoints are selected, as advocated by GLVIA3 to represent a range of different receptors and views, in consultation with statutory consultees including Natural England and LPAs:

*“**Representative viewpoints**, selected to represent the experience of different types of visual receptor, where larger numbers of viewpoints cannot all be included individually and where the significant effects are unlikely to differ – for example, certain points may be chosen to represent the views of users of particular public footpaths and bridleways;*

- ***Specific viewpoints**, chosen because they are key and sometimes promoted viewpoints within the landscape, including for example specific local visitor attractions, viewpoints in areas of particularly noteworthy visual and/or recreational amenity such as landscapes with statutory landscape designations, or viewpoints with particular cultural landscape associations; and*

***Illustrative viewpoints**, chosen specifically to demonstrate a particular effect or specific issues, which might, for example, be the restricted visibility at certain locations” (GLVIA3, Para 6.19, Page 109)*

- Likely significant effects on both the landscape as a resource and visual receptors are identified

The level (and significance) of landscape and visual effects are judged with reference to the nature of the receptor (commonly referred to as the sensitivity of the receptor), which considers both susceptibility and value, and the nature of the effect (commonly referred to as the magnitude of effect), which considers a combination of judgements including size/scale, geographical extent, duration and reversibility

## Description of effects

As required by the EIA Regulations, the assessment must also identify the effects as either being beneficial (or positive), adverse (or negative) or neutral.

The landscape and visual effects (**beneficial, adverse or neutral**) are determined in relation to the degree to which the project fits with the existing landscape character or views, and the contribution to the landscape or views that a project makes. With regard to electricity transmission infrastructure an assessment is required to take an objective approach. Therefore, to address the ‘maximum case effect’ situation, potential landscape and visual effects relating to the introduction of the above ground electricity transmission infrastructure are generally assumed to be adverse (negative).

## Method for assessing landscape effects

As outlined in GLVIA3 ‘*An assessment of landscape effects deals with the effects of change and development on landscape as a resource.*’ (GLVIA3, Para 5.1, Page 70). Changes may affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.

An assessment of landscape effects requires consideration of the nature of landscape receptors (sensitivity of receptor) and the nature of the effect on those receptors (magnitude of effect). GLVIA3 states that the nature of landscape receptors, commonly referred to as their sensitivity,



should be assessed in terms of the susceptibility of the receptor to the type of change proposed, and the value attached to the receptor. The nature of the effect on each landscape receptor, commonly referred to as its magnitude, should be assessed in terms of size and scale of effect, geographical extent, duration and reversibility.

These aspects are considered together, to form a judgement regarding the overall significance of landscape effects (GLVIA3, Figure 5.1 Page 71). The paragraphs that follow set out the methodology used to evaluate sensitivity and magnitude.

The East of England landscape typology, which covers the entire area of the Project in Norfolk, Suffolk, and Essex, would be used as the principal baseline characterisation and the landscape types would then be grouped into, identified and described, project specific landscape character areas. This approach has been advocated by stakeholders to ensure a consistency in approach so that that landscape effects across the whole project can be clearly understood in relation to one another. The project specific landscape character areas would also take cognisance of the various local landscape studies as well as national character areas.

### Sensitivity of landscape receptors

In accordance with GLVIA3 the sensitivity of a landscape receptor to change is based on weighing up professional judgements regarding susceptibility and value (GLVIA3, Para 5.39, Page 88).

### Susceptibility of Landscape Receptors

Susceptibility is defined by GLVIA3 as “*the ability of the landscape receptor (whether it be the overall character or quality/condition of a particular type or area, or an individual element and/or feature, or a particular aesthetic and perceptual aspect) to accommodate the proposed development without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies*” (GLVIA3 paragraph 5.40).

A series of criteria are used to evaluate the susceptibility of Landscape Character Types (LCTs) and Landscape Character Areas (LCAs) to electricity transmission infrastructure as set out in Table I1. Aspects of these criteria are drawn from a range of published sources relating to electricity transmission infrastructure, including the Holford Rules<sup>41</sup>, The Horlock Rules<sup>42</sup> and GLVIA3.

Table I1 - Aspects influencing susceptibility of landscape receptors to electricity transmission infrastructure

<b>Aspects Influencing Susceptibility of Landscape Receptors to Electricity Transmission Infrastructure</b>			
<b>Criteria</b>	<b>Aspects indicating greater susceptibility to electricity transmission infrastructure</b>	<b>↔</b>	<b>Aspects indicating reduced susceptibility to electricity transmission infrastructure</b>
<b>Scale</b>	Smaller scale	<b>↔</b>	Larger scale
<b>Topography and landform</b>	Presence of strong topographical variety or distinctive landform features	<b>↔</b>	Undulating and valley landscapes which offer opportunities for screening and

<sup>41</sup> The Holford Rules: Guidelines for the Routeing of New High Voltage Overhead Transmission Lines (with National Grid Company plc (NGC) 1992 and Scottish Hydro-Electric Transmission plc (SHETL) 2003 Notes)

<sup>42</sup> The Horlock Rules: NGC Substations and the Environment: Guidelines on Siting and Design (2006)

<b>Aspects Influencing Susceptibility of Landscape Receptors to Electricity Transmission Infrastructure</b>			
<b>Criteria</b>	<b>Aspects indicating greater susceptibility to electricity transmission infrastructure</b>	<b>↔</b>	<b>Aspects indicating reduced susceptibility to electricity transmission infrastructure</b>
	Absence of strong topographical variety, featureless, convex or flat with little opportunity for screening and backclothing of electricity transmission infrastructure		backclothing of electricity transmission infrastructure
<b>Landcover, pattern and complexity</b>	Limited woodland/forestry cover to help reduce views of electricity transmission infrastructure (e.g. providing screening or backclothing of infrastructure) Complex Rugged and irregular	<b>↔</b>	Extensive areas of woodland/forestry cover to reduce views of electricity transmission infrastructure (e.g. providing screening or backclothing of infrastructure) Simple Regular or uniform
<b>Settlement and man-made influence</b>	Absence of modern development Presence of small scale, historic or vernacular settlement	<b>↔</b>	Presence of contemporary structures e.g. utility, infrastructure or industrial elements
<b>Ridges and Skylines</b>	Distinctive, undeveloped skylines Skylines that are highly visible over large areas or exert a large influence on landscape character Skylines with important historic landmarks	<b>↔</b>	Non-prominent/screened skylines Presence of existing modern man-made features (e.g. other electricity transmission infrastructure, telecommunications masts or wind turbines)
<b>Inter-visibility with adjacent landscapes</b>	Strong inter-visibility with sensitive landscapes Forms an important part of a view from sensitive viewpoints Visually open	<b>↔</b>	Little inter-visibility with adjacent sensitive landscapes or viewpoints Visually enclosed
<b>Perceptual aspects</b>	Remote from visible or audible signs of human activity and development	<b>↔</b>	Close to visible or audible signs of human activity and development

Published landscape capacity or sensitivity studies (where they exist) would be reviewed to inform the evaluation of susceptibility, in addition to field work undertaken across the study area. This review would include an evaluation as to the relevance of the publication to the assessment being undertaken (e.g. consideration of the purpose and scope of the published studies and whether they are still deemed to be current/up to date). Landscape susceptibility is recorded as **high**, **medium** or **low**.

## Value of landscape receptors

The European Landscape Convention advocates that all landscape is of value, whether it is the subject of defined landscape designation or not: “*The landscape is important as a component of the environment and of people’s surroundings in both town and country and whether it is ordinary landscape or outstanding landscape.*”<sup>43</sup> The value of a landscape receptor is recognised as being a key contributing factor to the sensitivity of landscape receptors.

The value of landscape receptors is determined with reference to:

- Review of relevant designations and the level of policy importance that they signify (such as landscapes designated at international, national or local level)

Application of criteria that indicate value (such as scenic quality, rarity, recreational value, representativeness, conservation interests, perceptual aspects and artistic associations) as described in GLVIA3, paragraphs 5.44 - 5.47

Internationally and nationally designated landscapes would generally indicate landscape of higher value whereas those without formal designation (such as a widespread or common landscape type without high scenic quality) are likely to be of lower value, bearing in mind that all landscapes are valued at some level. There is however variation across both designated and undesignated areas, and so judgements regarding value would also be informed by field work.

Landscape value is described as being **high**, **medium** or **low**, as set out in Table I2.

Table I2 - Value of landscape receptors

<b>Value of Landscape Receptors</b>	
<b>High</b>	Landscapes with high scenic quality, high conservation interest, recreational value, important cultural associations or a high degree of rarity. Areas or features designated at a national level e.g. National Parks or Areas of Outstanding Natural Beauty (AONB) or key features of these with national policy level protection.
<b>Medium</b>	Landscapes potentially designated at a regional or local level e.g. Special Landscape Areas (SLAs) or similar, or areas which in part may be designated in relation to their scenic quality or distinctiveness e.g. Forest Parks or Conservation Areas.
<b>Low</b>	Landscape of poor condition and intactness with limited aesthetic qualities, or of character that is widespread. Areas or features that are not formally designated.

<sup>43</sup> Council of Europe, (2000). The European Landscape Convention – Council of Europe Treaty Series No. 176.

## Sensitivity of landscape receptors

The sensitivity of a landscape receptor to change is defined as **high**, **medium** or **low** and is based on weighing up professional judgements regarding susceptibility and value, as set out in Table I3.

Table I3: Sensitivity of Landscape Receptors

<b>Sensitivity of Landscape Receptors</b>			
	<b>Higher</b>	↔	<b>Lower</b>
<b>Susceptibility</b>	Attributes that make up the character of the landscape offer very limited opportunities for the accommodation of change without key characteristics being fundamentally altered by electricity transmission infrastructure, leading to a different landscape character.	↔	Attributes that make up the character of the landscape are resilient to being changed by electricity transmission infrastructure.
<b>Value</b>	Landscapes with high scenic quality, high conservation interest, recreational value, important cultural associations or a high degree of rarity. Areas or features designated at a national level e.g. National Parks or AONBs or key features of these with national policy level protection.	↔	Landscape of poor condition and intactness, with limited aesthetic qualities, or of character that is widespread. Areas or features that are not formally designated.

## Magnitude of landscape effect

The overall judgement of magnitude of a landscape effect is based on combining professional judgements on size and scale, geographical extent, duration and reversibility. Further information on the criteria is provided in the paragraphs that follow.

### Size and Scale of Effect

For landscape elements/features this depends on the extent of existing landscape elements that would be lost or changed, the proportion of the total extent that this represents, and the contribution of that element to the character of the landscape.

In terms of landscape character, this reflects the degree to which the character of the landscape would change as a result of removal or addition of landscape components, and how the changes would affect key characteristics.

The size and scale of the effect is described as being **large**, **medium**, **small**, or **barely perceptible**.

## Geographical extent of effect

The geographical extent over which the landscape effect would arise is described as being **large** (widespread or scale of the landscape character type, affecting several landscape types or character areas), **medium** (more immediate surroundings) or **small** (localised, for example at a site level).

## Duration of effect

GLVIA3 states at paragraph 5.51 on page 91 that ‘Duration can usually be simply judged on a scale such as short term, medium term or long term.’ For the purposes of the assessment, duration would be determined in relation to the phases of the Project, as follows:

- **Short-term** effects are those that are envisaged to occur during construction plus one year reinstatement (up to 2032) , e.g. construction activities  
**Medium-term** effects are those that are envisaged to occur 2-15 years post construction (2033 to 2048) post c whilst any embedded or additional mitigation planting begins to mature.
- **Long-term** effects are those which occur during the operational phase beyond 15 years post construction (2049 onwards). These take into account the benefits of the maturation of any embedded or additional mitigation planting. (generally lasting 15 - 40 years<sup>44</sup>)

## Reversibility of effect

In accordance with the principles contained within GLVIA3, reversibility is reported as **reversible**, **partially reversible** or **irreversible** (i.e. permanent), and is related to whether the change can be reversed at the end of the phase of development under consideration (i.e. at the end of construction or at the end of the operational lifespan of the project).

Judgements on the magnitude of landscape effect (nature of landscape effect) are recorded as **high**, **medium** or **low** and are guided by Table I4, based on combining professional judgements on size and scale, geographical extent, duration and reversibility.

Table I4 - Magnitude of landscape effect

Magnitude of Landscape Effect			
	Higher	↔	Lower
<b>Size/Scale</b>	Extensive loss of landscape features and/or elements, and/or change in, or loss of key landscape characteristics, and/or creation of new key landscape characteristics	↔	Limited loss of landscape features and/or elements, and/or change in or loss of some secondary landscape characteristics
<b>Geographical Extent</b>	Change in landscape features and/or character extending considerably beyond the immediate site and potentially	↔	Change in landscape features and/or character extending contained within or local to the immediate site and affecting

<sup>44</sup> Based on the predicted lifespan of the proposed infrastructure

<b>Magnitude of Landscape Effect</b>			
	affecting multiple landscape character types/areas		only a small part of the landscape character type/area
<b>Duration</b>	Changes experienced for a period of around five years or more	↔	Changes experienced for a shorter period of up to five years
<b>Reversibility</b>	Change to features, elements or character which cannot be undone or are only partly reversible after a long period	↔	A temporary landscape change which is largely reversible following the completion of construction, or decommissioning of the development

### **Judging levels of landscape effect and significance**

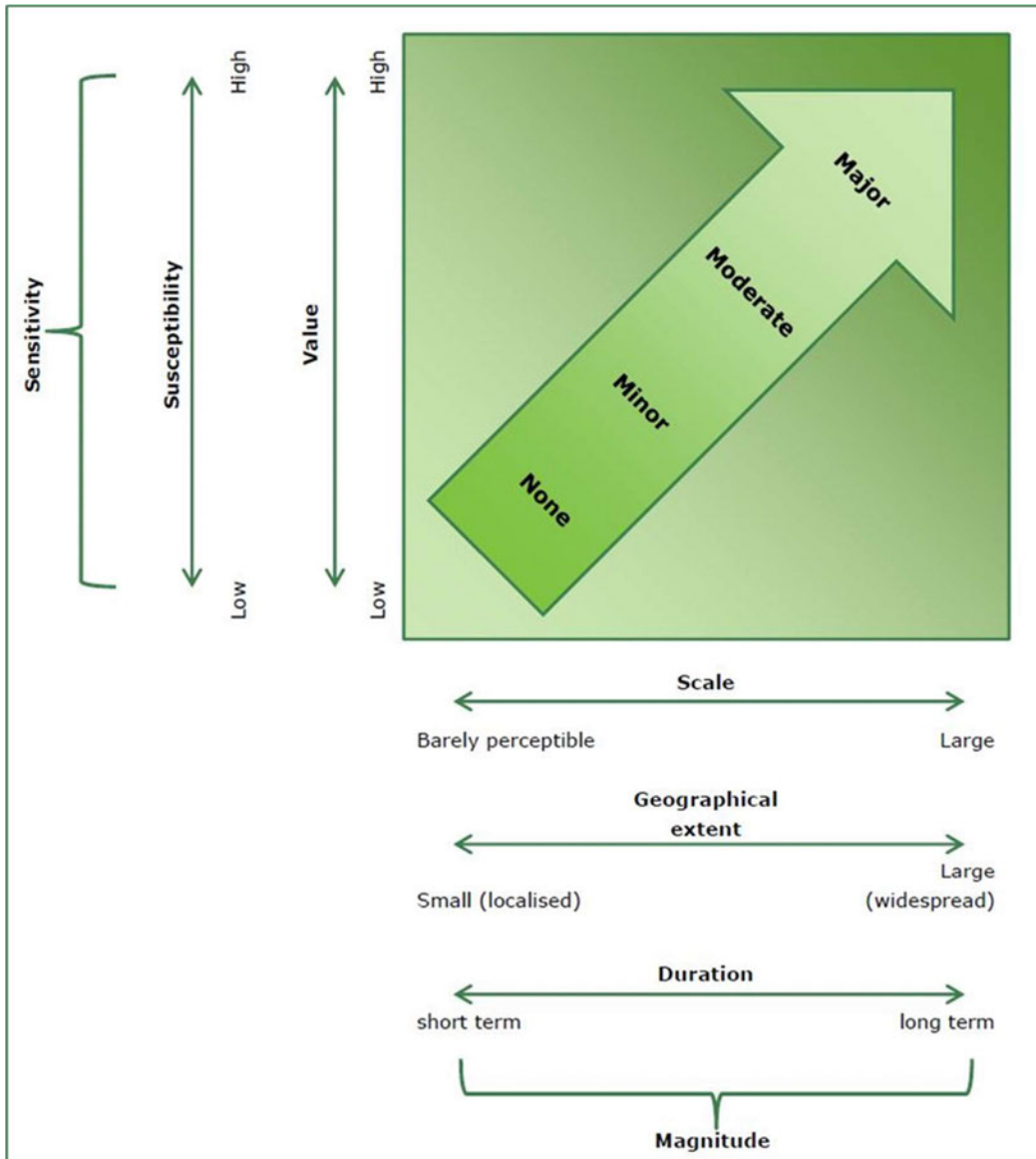
The final step in the assessment requires the judgements of sensitivity and magnitude of effect to be combined to make an informed professional assessment on the significance of each landscape effect (GLVIA3, Figure 5.1, Page 71).

There may be a complex relationship between the value attached to a landscape and the susceptibility of the landscape to a specific change. Therefore, the rationale for judgements on the sensitivity of landscape receptors needs to be clearly set out for each receptor. It should be noted that whilst landscape designations at an international or national level are likely to be accorded the highest value, it does not necessarily follow that such landscapes all have a high susceptibility to all types of change, and conversely, undesignated landscapes may also have high value and susceptibility to change (GLVIA3, Page 90).

This determination requires the application of professional judgement and experience to take on board the many different variables which need to be considered, and which are given different weight according to site-specific and location-specific considerations in every instance. Judgements are made on a case by case basis, guided by the principles set out in **Diagram 1** and the example descriptions/definitions detailed in Table 13.3. A rigid matrix-type approach, which does not take on board professional judgement and experience, and where the level of effect is defined simply based on the level of sensitivity (nature of receptor) combined with the magnitude of change (nature of effect), is not used. As such, the conclusion on the level of effect is not always the same for similar receptors or determined through a formulaic process as that is not considered appropriate for landscape and visual impact assessment.

Although a numerical or formal weighting system is not applied, consideration of the relative importance of each aspect is made to inform the overall decision as to the likely effect. Levels of effect are identified as **none**, **minor**, **moderate** or **major** as set out in Table 13.3, where moderate and major effects are considered significant in the context of the EIA Regulations.

Diagram 1: Judging levels of effect – Landscape or Visual



## Method for assessing visual effects

### Significance of Visual Effects

As outlined in GLVIA3 “An assessment of visual effects deals with the effects of change and development on views available to people and their visual amenity” (GLVIA3, Para 6.1, Page 98). Changes in views may be experienced by people at different locations within the study area including from static locations (normally assessed using representative viewpoints) and whilst moving through the landscape (normally referred to as sequential views, e.g. from roads and walking routes).

Visual receptors are individuals or groups of people who may be affected by changes in views and visual amenity. They are usually grouped by their occupation or activity (e.g. residents, motorists, recreational users, tourists visiting a specific location or area) and the extent to which their attention is focused on the view (GLVIA3, Paras. 6.31 – 6.32, Page 113).

GLVIA3 states that the sensitivity of visual receptors should be assessed in terms of the susceptibility of the receptor to change in views and/or visual amenity and the value attached to

particular views. The magnitude of effect should be assessed in terms of the size and scale, geographical extent, duration and reversibility of the effect.

These aspects are considered together, to form a judgement regarding the overall significance of visual effect (GLVIA3, Figure 6.1 Page 99). The paragraphs that follow set out the methodology used to evaluate sensitivity and magnitude.

### Sensitivity of visual receptors

In accordance with GLVIA3 the sensitivity of a landscape receptor to change is based on weighing up professional judgements regarding susceptibility and value (GLVIA3, Para 6.31, Page 113).

### Susceptibility of visual receptors

The susceptibility of visual receptors to changes in views/visual amenity is a function of the occupation or activity of people experiencing the view and the extent to which their attention is focused on views (GLVIA 3, para 6.32). This is recorded as **high**, **medium** or **low** informed by Table I5.

Table I5 - Susceptibility of visual receptors

Susceptibility of Visual Receptors		
Higher	↔	Lower
<p>Viewers whose attention or interest is focussed on their surroundings, including:</p> <ul style="list-style-type: none"> <li>• Settlements where views contribute to the landscape setting enjoyed by residents;</li> <li>• People engaged in outdoor recreation (including users of cycle routes, footpaths and public rights of way whose interest is likely to be focused on the landscape);</li> <li>• Visitors to heritage assets or other attractions where views of surroundings are an important contributor to experience;</li> <li>• Visitors to formal or promoted stopping places on scenic or tourist routes.</li> </ul>	<ul style="list-style-type: none"> <li>• People travelling in vehicles on scenic routes and tourist routes, where attention is focused on the surrounding landscape, but is transitory;</li> <li>• People at their place of work whose attention is focused on the surroundings and where setting is important to the quality of working life.</li> </ul>	<ul style="list-style-type: none"> <li>• People travelling more rapidly on more major roads, rail or transport routes (not recognised as scenic routes);</li> <li>• People engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape;</li> <li>• People at their place of work whose attention is not on their surroundings (and where setting is not important to the quality of working life).</li> </ul>



## Value of view or visual amenity

GLVIA3 also requires evaluation of the value attached to the view or visual amenity and relates this to planning designations and cultural associations (GLVIA3, Para. 6.37, Page 114).

Recognition of the value of a view is determined with reference to:

- Planning designations specific to views  
Whether it is recorded as important in relation to designated landscapes (such as views specifically mentioned in the special qualities of an AONB)
- Whether it is recorded as important in relation to heritage assets (such as designed views recorded in citations of Gardens and Designed Landscapes (GDL) or views recorded as of importance in Conservation Area Appraisals)

The value attached to views by visitors, for example through appearances in guidebooks or on tourist maps, provision of facilities for their enjoyment and references to them in literature and art

A designated viewpoint or scenic route advertised on maps and in tourist information, or which is a significant destination in its own right, is likely to indicate a view of higher value. High value views may also be recognised in relation to the special qualities of a designated landscape or heritage asset, or it may be a view familiar from photographs or paintings.

Views experienced from viewpoints or routes not recognised formally or advertised in tourist information, or which are not provided with interpretation or, in some cases, formal access, are likely to be of lower value.

Judgements on the value of views or visual amenity are described as being **high**, **medium** or **low**, as set out in Table I6.

Table I6 - Value of views and visual amenity

Value of Views and Visual Amenity	
High	Views may be recorded in management plans, guidebooks, and/or which are likely to be experienced by large numbers of people. Views may be associated with internationally or nationally designated landscapes; designed views recorded in citations for Gardens and Designed Landscapes (GDLs)/Scheduled Monuments etc.
Medium	Views may be associated with regionally or locally designated landscapes; designed views recorded in citations for historic parks, gardens designated at a regional or local level, or documented in local planning policy (e.g. landmark hills/views, promoted viewpoints).
Low	Views which are not documented or protected but may be valued at a local level. Views which are more incidental, and less likely to be associated with somewhere people travel to or stop, or which may be experienced by smaller numbers of people.

## Sensitivity of visual receptors

The sensitivity of a visual receptor to change is defined as **high**, **medium** or **low** and is based on weighing up professional judgements regarding susceptibility and value, and each of their component considerations, as set out in Table 17.

Table 17 - Sensitivity of visual receptors

Sensitivity of Visual Receptors			
	Higher	↔	Lower
Susceptibility	Viewers whose attention or interest is focused on their surroundings, including settlements / individual residential receptors/ people engaged in outdoor recreation/ visitors to heritage assets or other attractions where views of surrounding area an important contributor.	↔	People whose attention is not on their surroundings (and where setting is not important to the quality of life) such as commuters/ people engaged in outdoor sports/ people at their place of work.
Value	Views may be recorded in management plans, guidebooks, and/or which are likely to be experienced by large numbers of people. Views may be associated with internationally or nationally designated landscapes; designed views recorded in citations for Gardens and Designed Landscapes (GDLs)/Scheduled Monuments etc.	↔	Views which are not documented or protected. Views which are more incidental, and less likely to be associated with somewhere people travel to or stop, or which may be experienced by smaller numbers of people.

### Magnitude of visual effect

The overall judgement of magnitude of visual effect (nature of visual effect) is based on weighing up professional judgements on size and scale, geographical extent, duration and reversibility. Further information on the criteria is provided in the paragraphs that follow.

### Size and scale

The size and scale of a visual change depends on:

- The scale of the change in the view with respect to the loss or addition of features in the view and changes in its composition, including the proportion of the view occupied by the project  
The degree of contrast or integration of any new features or changes in the landscape with the existing or remaining landscape elements and characteristics in terms of form, scale and mass, line, height, colour and texture
- The nature of the view of the project, in terms of the relative amount of time over which it would be experienced and whether views would be full, partial or glimpsed

All changes are assumed to be during winter, representing a 'maximum case effect' scenario with minimal screening by deciduous vegetation and trees. Wireframes and ZTVs would be prepared to illustrate potential visual effects and would initially be calculated on the basis of a 'Bare Earth' Digital Terrain Model (DTM) and therefore demonstrate the maximum extent of visibility possible, in the absence of buildings, woodland, vegetation or other surface features which may otherwise screen or filter views of the project.

In this assessment size/scale of visual change is described as being **large, medium, small** or **barely perceptible**.

### Geographical extent

The geographical extent of a visual change records the extent of the area over which the changes would be visible e.g. whether this is a unique viewpoint from where the proposed electricity transmission infrastructure can be glimpsed, or whether it represents a larger area from which similar views are gained. Geographical extent is described as being **large** (widespread), **medium** or **small** (localised).

### Duration

The duration of visual effects would be reported as **short-term, medium-term** or **long-term**, as defined for the duration of landscape effects (see above).

### Reversibility

Reversibility would be reported as **irreversible** (i.e. permanent), **partially reversible** or **reversible**, and is related to whether the visual change can be reversed at the end of the phase of development under consideration (i.e. at the end of construction or at the end of the operational lifespan of the development). Operational visual effects associated with the proposed overhead transmission lines would be considered to be reversible.

For the purposes of the assessment all visual effects associated with substation infrastructure (e.g. all infrastructure such as terminal towers, gantries and ancillary substation componentry contained within existing or extended substation compounds) would be deemed to be irreversible due to the operational lifetime of the infrastructure and long-term network requirements.

Judgements on the magnitude of visual effect would be recorded as **high, medium, low** or **barely perceptible** guided by Table I8, based on combining professional judgements on size and scale, geographical extent, duration and reversibility.

Table I8 - Magnitude of visual effects

Magnitude of Visual Effects			
	Higher	↔	Lower
Size/Scale	A large visual change resulting from the project as the most notable aspect of the view, perhaps as a result of the development being in close proximity, or because a substantial part of the view is affected, or because the development introduces a new focal point and/or provides contrast with the	↔	A small or some visual change resulting from the project as a minor or generally unnoticed aspect of the view, perhaps as a result of the development being in the distance, or because only a small part of the view is affected, and/or because the development does not introduces a new focal point or is in contrast with the existing view and/ does

<b>Magnitude of Visual Effects</b>			
	<b>Higher</b>	↔	<b>Lower</b>
	existing view and/or changes the scenic qualities of the view.		not change the scenic qualities of the view.
Geographical Extent	The assessment location is clearly representative of similar visual effects over an extensive geographic area.	↔	The assessment location clearly represents a small geographic area.
Duration	Visual change experienced over around five years or more.	↔	Visual change experienced over a short period of up to five years.
Reversibility	A permanent visual change which is not reversible or only partially reversible following decommissioning of the project.	↔	A temporary visual change which is largely reversible following the completion of construction or decommissioning of the project.

### Judging the level of visual effect and significance

As for landscape effects, the final step in the assessment requires the judgements on sensitivity of visual receptor and magnitude of visual effect to be combined to make an informed professional assessment on the significance of each visual effect.

The evaluations of the individual aspects set out above (susceptibility, value, size and scale, geographical extent, duration and reversibility) are considered together to provide an overall profile of each identified visual effect. An overview is then taken of the distribution of judgements for each aspect to make an informed professional assessment of the overall level of effect, drawing on good practice guidance provided in GLVIA3.

The sensitivity of visual receptors may involve a complex relationship between a visual receptor's (e.g. person's) susceptibility to change and the value attached to a view. Therefore, the rationale for judgements of sensitivity is clearly set out for each receptor in relation to both its susceptibility to the type of change proposed, and its value.

A rigid matrix-type approach, where the level of visual effect is defined simply based on the level of sensitivity combined with the magnitude of effect is not used. This is because the conclusion on the level of effect is not always the same for similar receptors or determined through such a formulaic process as that is not considered appropriate for landscape and visual impact assessment. Although a numerical or formal weighting system is not applied (as discussed above), consideration of the relative importance of each aspect is made to feed into the overall decision. Levels of visual effect are identified as **none**, **minor**, **moderate** or **major**, where moderate and major visual effects are considered significant in the context of the EIA Regulations.

This determination requires the application of professional judgement and experience to take on board the many different variables which need to be considered, and which are given different weight according to site-specific and location-specific considerations in every instance. As such, the conclusion on the level of effect is not always the same for similar receptors. Judgements are made on a case by case basis, guided by the principles illustrated in **Diagram 1**, and the example descriptions/definitions detailed in Table I9.

Table I9 - Level and significance of visual effects

<b>Level and Significance of Visual Effects</b>	<b>Description/Definition</b>
Major	<p>The project would result in an obvious change in view, likely affecting a visual receptor with a moderate or high susceptibility to that type of change.</p> <p>This level of effect may also occur when a medium scale of effect acts on a nationally valued view and/ or a high susceptibility receptor.</p> <p>The effect is likely to be long-term and affect a relatively large area or relatively large number of people.</p>
Moderate	<p>The project would result in a noticeable change in a view, likely affecting a viewer with a moderate susceptibility to that type of change and/ or locally valued view.</p> <p>This level of effect may also occur when a smaller scale of change acts on a higher susceptibility receptor or affects a large number of people, or a larger scale of effect acting on a lower susceptibility receptor or affecting fewer people.</p> <p>This level of effect may also occur when a large scale of effect occurs over a relatively short period or over a small area/ affects few people.</p>
Minor	<p>The development would result in a small change in view over a long-term duration, likely affecting a smaller geographic extent and/ or fewer people.</p> <p>This level of effect may also occur when a larger scale of effect is of short-term duration or is confined in its geographical extent.</p>
None	<p>The development would not result in a noticeable (barely perceptible) change in views.</p>

# Appendix J – Arboriculture Strategy

# Arboricultural Scoping, Surveying and Reporting Strategy

## Introduction

This document outlines the scope and methodology for the Arboricultural assessment for the East Anglia Green Overhead Lines (hereafter referred to as the 'Project') Development Consent Order (DCO) application. This would form part of the Landscape and Visual Assessment within the Environmental Statement (ES).

This document has been prepared to set out the scope and methodology for the Arboricultural assessment of the Project with the aim of agreeing with the following consultees:

- Natural England
- Environment Agency
- Norfolk County Council
- Suffolk County Council
- Essex County Council
- South Norfolk Council
- Mid Suffolk District Council
- Babergh District Council
- Colchester Borough Council
- Tendring District Council
- Braintree District Council
- Chelmsford City Council
- Basildon Borough Council
- Brentwood Borough Council
- Thurrock Borough Council

This document is based on the Project's design at the time of writing and frozen for non-statutory consultation and is the starting point for technical assessment. The methodology has been devised to remain appropriate for later stages of design and refinement.

Throughout the design process the Project would seek to satisfy the requirements of the 'mitigation hierarchy' with regards to impacts on arboricultural features, through adopting the following approach:

- Where reasonably practical avoid impacts to ancient woodland, ancient and veteran trees
- Where reasonably practical avoid impacts to notable trees
- Seek to limit the impacts on retained trees through suitable mitigation
- Where practicable minimise the number of trees identified to be removed

## Project background

The Project is being developed by National Grid and comprises a reinforcement of the electricity transmission system in the East of England. The Project would facilitate the transfer of power

from the East Anglia region to the rest of the Main Interconnected Transmission System (MITS) thereby enabling the connection of offshore wind generation and bi-directional transfer.

Further details of the Project are provided in Chapter 2: Description of the Project.

## **Arboricultural Survey Strategy**

### **Purpose of the arboricultural survey strategy**

The purpose of this Arboricultural Survey Strategy is to set out the approach for identifying and recording arboricultural features that may be lost or impacted upon by the Project.

The intention is to allow for a proportionate and appropriate approach to tree data collection. The principles of British Standard 5837 2012: Trees in relation to design, demolition, and construction – Recommendations, would be followed with information collected to provide guidance to designers and inform tree protection during the construction phase.

### **Approach to survey and data collection**

#### **Study area**

This document is based upon the information presented at non-statutory consultation. However, the arboricultural study area that would be used to inform the ES would comprise the proposed Order Limits and a 15m buffer zone either side of the proposed Order Limits.

#### **Desk study**

A desk study would be undertaken which would use data publicly accessible on the internet including Woodland Trust's Ancient Tree Inventory, MAGIC and local authority records. This desk study would record trees of interest including:

- Ancient, veteran and notable trees
- Ancient woodland
- Traditional orchards
- Tree Preservation Orders (TPO)
- Conservation areas

Using LiDAR data a canopy map would be created for the study area. This would represent a baseline of all tree canopies and guide walkover surveyors.

#### **Walkover survey**

A walkover arboricultural survey would be undertaken to capture data for trees falling into the following categories:

- Woodlands
- Potential veteran/ancient trees
- TPO trees
- Noteworthy trees and groups. Noteworthy trees are defined as Category A and B trees as set out in Table 1 of BS 5837:2012

This approach ensures a pragmatic approach to data collection with priority given to high and moderate quality arboricultural features.



The data that would be captured for surveyed arboricultural features would follow the principles of BS 5837, information to be collected in the walkover survey includes:

- Sequential reference number
- Species (listed as common name)
- Height (to nearest metre)
- Stem diameter (measured at 1.5m in height), for groups and woodlands the largest diameter would be recorded
- Crown spread (largest spread to the nearest metre)
- Life stage (early-mature, mature, over-mature, veteran, ancient)
- General observations
- Category, typically either A or B

Where a topographical survey is not available the tree canopy information would be based on aerial imagery and hand held GPS devices (i.e. mobile phone) to record the location of individual trees, groups of trees and woodlands. The surveyor would collectively record trees as a group where they form a cohesive arboricultural feature either aerodynamically, visually, or culturally. Trees of particular merit such as veteran trees within groups would (where possible) be surveyed as individuals.

Linear collections of trees which form hedges would be recorded as a linear group. This survey is not a hedgerow assessment, however, the findings of these surveys may be used to inform the ecology and biodiversity assessment.

The walkover survey would focus on high and moderate quality arboricultural features (A and B grade as per BS5837:2012). Spatial positioning for remaining trees would be provided using readily available LiDAR data.

### **Root Protection Areas (RPAs)**

In open ground areas the risk to tree roots from excavation activities are increased e.g. Ground compaction and soil stripping. BS5837: 2012 provides a maximum root protection area of 15m for any given tree feature.

To provide appropriate protection measures for ancient and veteran trees, this strategy would where reasonably practicable adopt the standing advice (from Natural England and the Forestry Commission) for calculating buffer zones, *“For ancient or veteran trees (including those on the woodland boundary), the buffer zone should be at least 15 times larger than the diameter of the tree. The buffer zone should be 5 metres from the edge of the tree’s canopy if that area is larger than 15 times the tree’s diameter. This will create a minimum root protection area.”*

## **Arboricultural Constraints Reporting**

### **Reporting**

Following the completion of the walkover arboricultural survey the data would be used to produce a baseline arboricultural survey schedule and a tree constraints plan developed within GIS.

The GIS based model would comprise of all surveyed arboricultural features from the walkover survey and shown as follows:

- Individual trees – tree stem location based on either topographic survey, LiDAR, aerial imagery or GPS, canopy extents illustrated as a circle using the largest recorded crown spread measurement and an RPA as a circular area
- Tree groups, woodlands and hedgerows – a polygon shape representing the extent of the tree stems plotted whilst in the field. The RPA buffer applied to the polygon based on the largest tree stem diameter recorded for that feature

### **Ancient and Veteran Trees**

Trees either verified (via the Woodland Trust's Ancient Tree Inventory) or unrecorded (based on surveyor initial assessment) would be reported with a buffer zone equal to 15 x stem diameter or 5m beyond the canopy spread, whichever is the greater.

All surveyor assessed ancient/veteran trees should undergo further bespoke assessment using an industry accepted assessment methodology (such as 'Raven') or verified via the Woodland Trust's Ancient Tree Inventory program.

### **High and Moderate Quality Trees**

High and moderate quality trees (A and B grade) would be reported with RPAs equal to 12 x stem diameter and canopy extents illustrated as a circle using the largest recorded spread measurement.

### **Low Quality Trees**

Low quality arboricultural features would be plotted based on remote sensing data and an arbitrary root protection buffer of 5m applied to the feature.

### **Hedgerows**

The dominant woody species would be recorded for hedgerows and RPAs calculated (using the largest stem size) from the centre line of the arboricultural feature.

Where the biodiversity discipline identifies hedgerows with ancient characteristics, a detailed arboricultural assessment would be considered.

## **Arboricultural Impact Reporting**

### **Arboricultural Impact Assessment**

Following design freeze the impact of the Project would be assessed against the baseline arboricultural constraints. The impacts would be reported in an Arboricultural Impact Assessment (AIA) report as an appendix to the Landscape and Visual ES Chapter.

The AIA would consider the direct impact of the Project and the impact of access for construction on arboricultural features.

Ancient and veteran trees, and ancient woodlands are regarded as irreplaceable habitat in the National Planning Policy Framework.

The loss of Category A and B trees would be regarded as high and moderate impacts.

LiDAR data capturing other arboricultural features would be reported as low impacts.

The AIA would set out mitigation measures to reduce the impact on retained arboricultural features. Mitigation measures would feed into the outline Construction Code of Practice (submitted with the DCO application).

# Appendix K - Broad agreement of District Level Licencing

24th August 2022

By email



[REDACTED]  
National Grid

Natural England  
Foss House  
Kings Pool  
1-2 Peasholme Green  
York  
YO1 7PX

Dear [REDACTED]

**East Anglia Energy Enablement (Green).**

We are writing to you in relation to the use of District level Licensing (DLL) for the East Anglia Green (EAG) scheme.

As you are aware, the preferred route option is split between two DLL operational areas; the Natural England (NE)-led schemes in Norfolk & Suffolk, and Essex.

As previously discussed, due to the early stages of the EAG scheme, accurate DLL Impact Assessments and official DLL documentation cannot yet be provided until a preferred route alignment is confirmed. This letter is intended to offer assurance that DLL can be relied upon as a licensing option at this early stage.

Please see below summaries on a number of aspects which are pertinent at this stage:

*1. Scheme Availability*

The scoping corridor for the EAG scheme is wholly covered by active DLL schemes in Norfolk & Suffolk, and Essex. As these DLL schemes have launched and are operational now, they will be available at the point at which the formal DLL process is ready to be followed for each DLL scheme and EAG scheme group should have confidence to be considering them as licensing options at this early stage.

*2. Surveying for GCN*

The DLL scheme removes the requirement on the developer to carry out surveys for GCN. Instead, NE's species distribution modelling can be relied upon in accordance with the DLL landscape-scale approach in determining impacts and compensation. This can therefore reduce cost and uncertainty for the developer.

*3. Environmental Impact Assessment (EIA)*

DLL is a strategic approach which aims to shift investment away from the time and cost of surveys and mitigation and instead invest this in providing upfront, compensatory habitat, placed in the best locations to maximise benefit to the species, with the outcomes being carefully monitored. Due to this new approach, it is Natural England's opinion that where DLL is used, GCN can be scoped out of detailed assessment in the Environmental Statement. This advice is due to be updated soon on the Planning Inspectorate's portal, and we will keep you updated in this regard.

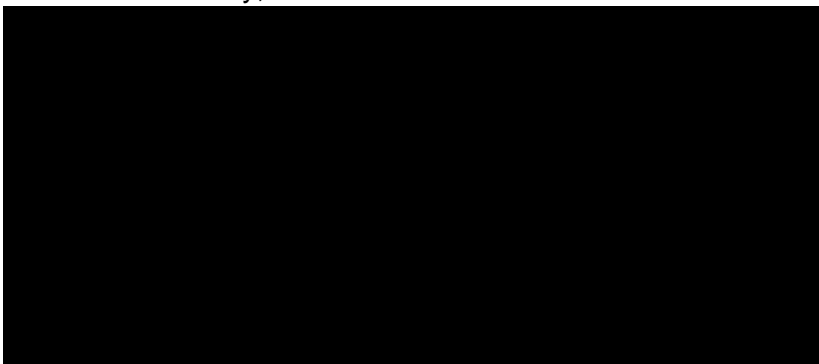
#### 4. Indicative timescales

Scheme Milestones	Timescale	DLL steps
Developing route alignment options	2022-2024	Internal commitment to the DLL route. No requirement for GCN surveys during the 2023 survey season. National Grid to stay in touch with Natural England as the alignment options develop, in order to fine-tune the likely costs and habitat requirements.
Choosing preferred Route alignment	2023-2024	Once route alignment has been finalised, Natural England will do a final assessment of impacts to GCN and issue the Impact Assessment Conservation Payment Certificate (IACPC) offering entry into the DLL scheme. This would set out the Conservation Payment required for GCN. Please note that a proportion of this payment will be required upfront at this stage. This documentation can then be used to demonstrate due regard for GCN for the purposes of obtaining the relevant Consent.
Securing Development Consent	2024-2026	Natural England to deliver the necessary habitat via Habitat Delivery Bodies during this period (funded by the first stage payment), whilst Consent is being secured.
Construction Begins	2026-2027	Once the DCO has been obtained, National Grid can apply for a licence to legally commence activities which would impact GCN. The requirement for the licence being issued is that the remaining Conservation Payment has been paid and all habitat secured.

#### 5. Habitat Delivery

Under DLL, the responsibility of delivering compensatory habitat for GCN (and future monitoring and maintaining) sits with the DLL operator, in this case Natural England. From current experience, habitat for similar large-scale developments can be commissioned and delivered within a single financial year. Therefore, Natural England is extremely comfortable that there is sufficient time between the point of issuing formal documentation in 2023 and the point the licence is required in 2026/2027, so that there is no risk of a delay to construction timings.

Yours faithfully,



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