The Great Grid Upgrade

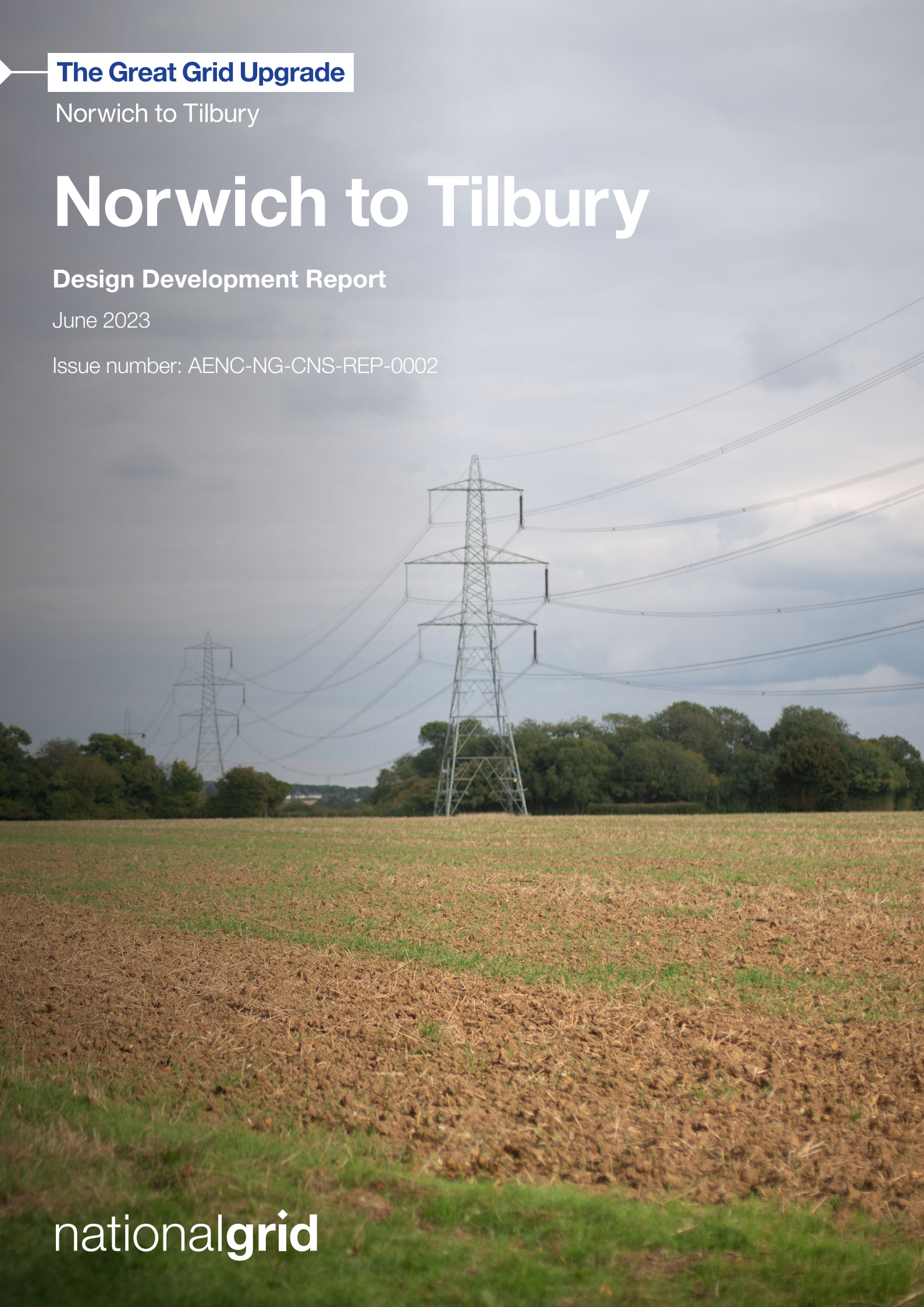
Norwich to Tilbury

Norwich to Tilbury

Design Development Report

June 2023

Issue number: AENC-NG-CNS-REP-0002



nationalgrid

Contents

Abbreviations

AC	Alternating Current
AONB	Area of Outstanding Natural Beauty
CDM	Construction (Design and Management) Regulations (CDM)
CPRSS	Corridor Preliminary Routeing and Siting Study
CRoW	Countryside and Right of Way Act
CSE	Cable Sealing End
CWS	County Wildlife Site
DCO	Development Consent Order
DNO	Distribution Network Operators
EACN	East Anglia Connection Node
EIA	Environmental Impact Assessment
EMF	Electric and Magnetic fields
ESO	Electricity System Operator
EWP	Energy White Paper
FES	Future Energy Scenarios
GIL	Gas Insulated Line
GW	Gigawatt
HDD	Horizontal Directional Drilling
HVDC	High Voltage Direct Current
kV	Kilovolt
km	Kilometre
LTC	Lower Thames Crossing
LWS	Local Wildlife Site
MITS	Main Interconnected Transmission System
NEA	North East Anglia
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
NOA	Network Options Assessment
NPS	National Policy Statement

NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OCSS	Offshore Co-ordination Support Scheme
OFFSET	Offshore Electricity Grid Task Force
OTNR	Offshore Transmission Network Review
OHL	Overhead Lines
PRoW	Public Right of Way
SAC	Special Area of Conservation
SEA	South East Anglia
SOBR	Strategic Options Backcheck and Review
SQSS	Security and Quality of Supply Standard
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
WHS	World Heritage Site
µT	Microteslas

Executive summary

National Grid Electricity Transmission (hereafter referred to as National Grid) is developing proposals to reinforce the high voltage power network in East Anglia. Norwich to Tilbury, previously known as the East Anglia Green Energy Enablement (GREEN) Project (hereafter known as the 'Project') will support the UK's net zero target through the connection in East Anglia of new low carbon energy generation, and by reinforcing the local transmission network.

In spring 2022, a non-statutory public consultation was held for a period of eight weeks, between 21 April 2022 and 16 June 2022. This consultation introduced the project, explained how National Grid had developed its proposals, and sought the views of the public and stakeholders.

With a preferred route corridor selected, we then produced a graduated swathe, which was presented at our 2022 consultation. This indicated where an alignment had good potential to be routed, with darker shaded areas where we considered an alignment is more likely to be located than those areas in the lighter parts of the swathe based on the information available to us at that time – this was to aid the consultation which was to follow and which would ultimately aid the iterative development of our proposed project. This was indicative and subject to further assessment work, and the feedback we received at consultation. The choice of technology and other routing matters also remained open to further consideration.

The feedback received during the 2022 non-statutory consultation has been carefully reviewed and considered, alongside ongoing environmental and engineering studies. We have also backchecked and reviewed our previous studies.

No final decision as to the means of reinforcement has been made and any relevant decision to be made will be the subject of reconsideration and back-checking through the process of developing the reinforcement project.

Our current draft proposals for the reinforcement Project as presently indicated and subject to consultation comprise:

- a new 400 kV electricity transmission connection of approximately 183 km overall length from Norwich Main substation to Tilbury Substation via Bramford Substation comprising:
    - approximately 158 km of new overhead line (OHL) supported on approximately 520 steel lattice pylons;
    - approximately 25 km of underground 400kV cabling, in 4 sections including around 19 km through and in the vicinity of the Dedham Vale Area of Outstanding Natural Beauty (AONB);
- new Cable Sealing End (CSE) compounds to connect the OHLs to the underground cables; and
- a new 400 kV East Anglia Connection Node (EACN) substation, on the Tendring Peninsula.

As a result of the feedback and ongoing studies, our current draft proposals go outside the consultation corridor in a small number of locations. In summary these changes to the consultation corridor are:

- an alternative corridor diverting from the crossing of the A1066 to pass to the east of Wortham Ling;
- an alternative corridor diverting to the east at the south of Offton, then paralleling the existing 132 kilovolt (kV) overhead line route to the east of Flowton and connecting into Bramford Substation;
- an alternative corridor to connect the proposed underground cable route through the Area of Outstanding Natural Beauty (AONB) to the proposed Cable Sealing End (CSE) compound to the south of Notley Enterprise Park;
- an alternative corridor further east of Ingatestone; and
- an amendment to the corridor to the west of Writtle

The current preferred draft alignment has been developed within the amended. consultation corridor.

Further consideration of feedback and ongoing environmental and engineering studies have resulted in our current proposed preferred draft alignment being outside the graduated swathe in a number of places. Our current draft proposals include;

- proposal to locate our current preferred draft alignment to the south of Bramford Substation to facilitate an alignment to the east of the preferred corridor;
- proposal to continue the underground cable through the AONB to the East Anglia Connection Node (EACN) substation;
- proposal to adopt underground cable technology in the vicinity of Great Horkesley for a distance of around 5.3 km;
- proposal to route the draft alignment to the eastern edge of the preferred corridor to reduce interaction with the Dunton Garden Village development proposal;
- proposal to adopt underground cable technology from the north of the Lower Thames Crossing (LTC) proposals within the western corridor through into Tilbury Substation;
- proposal to locate the preferred draft alignment to the north of Fairstead (beyond the graduated swathe); and
- proposal to route the preferred draft alignment to pass to the east of Bushey Wood (beyond the graduated swathe) to increase distance from properties on Woodhall Hill.

For the purposes of this initial assessment at this early stage in the project's evolution, the preferred draft alignment as presented in this Design Development Report reflects the use of standard lattice pylons. The use of other pylon designs is still under consideration. If an overhead line route is progressed as part of the Proposals, the use of other pylon designs will be subject to further assessments and consultation.

These assessments will include visual impacts and mitigation, environmental ecological and socio-economic considerations, construction and lifetime maintenance effects. Different designs in use in the UK include:

- Standard lattice;
- Low height lattice
- T-pylons

The findings from the assessments will be presented at the next stage of public consultation.

If progressed with significant elements of overhead line, then it is likely the Project would be classified as a Nationally Significant Infrastructure Project (NSIP), and we would need to obtain 'development consent' under statutory procedures set by Government. Prior to any such application being submitted National Grid will undertake further statutory consultation. National Grid currently expects to submit an application for consent for the Project in 2025.

1 Introduction

1.1 Overview

1.1.1 National Grid Electricity Transmission (NGET) referred to as National Grid within this 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 National Grid is working to build a cleaner, fairer, and more affordable energy system that serves everyone, powering the future of our homes, transport, and industry. The Project would support the UK's net zero target through the connection in East Anglia of new low carbon energy generation, and by reinforcing the local transmission network.

1.1.5 It is National Grid that is developing plans for Norwich to Tilbury, previously known as the East Anglia Green Energy Enablement (GREEN) Project (hereafter known as the 'Project').

1.1.6 The Project is a proposal by National Grid to reinforce the high voltage power network in East Anglia. The reinforcement is needed because the existing transmission network, even with current upgrading, will not have sufficient capacity for the new energy that is expected to connect to the network over the next ten years and beyond. Completion of the Project, together with other new reinforcements across the country will meet this future energy transmission demand.

1.1.7 The Project proposes to reinforce the transmission network between the existing substations at Norwich Main in Norfolk, Bramford in Suffolk, Tilbury in Essex as well as connecting new offshore wind generation.

1.1.8 If progressed with significant elements of overhead line then Norwich to Tilbury would be classified as a Nationally Significant Infrastructure Project (NSIP) and we would need to obtain 'development consent' under statutory procedures set by Government. NSIPs are projects of certain types, over a certain size, which are considered by the Government to be of national importance, hence permission to build them needs to be given at a national level, by the Secretary of State (SoS). Instead of applying to the local authority for planning permission, the developer must apply to the Planning Inspectorate for a different permission called a Development Consent Order (DCO).

1.1.9 If an NSIP, National Grid would need to submit an application for development consent to the Planning Inspectorate. If accepted the examining authority would be appointed (consisting of one or more examining inspectors) who after a period of public examination would make their recommendation to the Secretary of State for Energy Security and Net Zero, who in turn would decide on whether development consent should be granted for the Project. The timescale between acceptance of the submission and a decision is approximately 18 months.

1.2 Background to the Project

The need for the Project

1.2.1 Great Britain already has 8.5 gigawatts (GW) of offshore wind energy in operation, and another 1.9 GW under construction. The Government's Energy White Paper (EWP) (December 2020) outlines a plan to increase energy from offshore wind to 40 GW by 2030 (with this Government target being increased in April 2022 to 50 GW) and this Project would support in achieving this target.

1.2.2 New connections for new offshore wind and nuclear power generation projects and for interconnectors into East Anglia are expected to continue in addition to the current contracted position. These new connections are being constructed or are expected to connect into substations at Necton, Norwich Main, Bramford, Friston and Sizewell. Additionally, agreements are in place with two offshore wind farm projects based on their connections into a new East Anglia Connection Node (EACN) substation. National Grid has a duty to facilitate new connections and maintain a safe National Electricity Transmission System (NETS) and has considered the capability of the existing network to support such connections. This assessment considered various published Future Energy Scenarios (FES) (a range of scenarios which seek to address the uncertainty that exists over such an extended planning horizon) to consider network capability relative to the expected connection requirements.

1.2.3 East Anglia's 400 kV electricity transmission network was built in the 1960s. It was built to supply regional demand, centred around Norwich and Ipswich. With the growth in new energy generation from offshore wind, nuclear power and interconnection with other countries, there will be more electricity connected in East Anglia than the network can currently accommodate.

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 The Project could also connect new offshore wind farms off the Essex coast to the electricity transmission network and a European interconnector. Two offshore wind farms, the North Falls Offshore Wind Farm and Five Estuaries Offshore Wind Farm, and the Tarchon Energy interconnector (from Germany) are currently in development. If consented, they are expected to be operational by the end of the decade.

1.2.6 As part of project development National Grid establishes the need for a project in more detail and identifies a preferred strategic proposal to meet requirements. This can include multiple potential start, intermediate and end points. Options are narrowed down and the best performing are identified. Alternative strategic options for delivering the preferred solution are developed and appraised to identify a preferred strategic proposal.

1.2.7 In 2022, as part of the wider Network Planning Process, National Grid carried out an initial assessment of the strategic options available to meet the needs case set out above. This drew on the economic analysis of the ESO in the NOA process.

1.2.8 This assessment identified a range of combinations of circuit options covering both East Anglia and the South East. For each of these combinations of options we undertook an appraisal of deliverability, considered the system benefit that the reinforcement provided, considered environmental and socioeconomic factors and considered the cost benefit analysis completed by National Grid Electricity System Operator (ESO)

1.2.9 Further detail on National Grid's approach to consenting and each of the potential strategic options are provided in the Corridor and Preliminary Routeing and Siting Study (CPRSS), published in April 2022 to inform the non-statutory consultation. The CPRSS explains why, at the early pre-statutory stage of consultation, the offshore strategic options were not being progressed for now.

1.2.10 This assessment identified a range of combinations of circuit options covering both East Anglia and the South East. For each of these combinations of options we undertook an appraisal of deliverability, considered the system benefit that the reinforcement provided, considered environmental and socioeconomic factors and considered the cost benefit analysis completed by National Grid Electricity System Operator (ESO)

1.2.11 The current preferred strategic option that best meets National Grid obligations under Section 9 of the Electricity Act 1989 and aligned with the NPS (EN-1 and EN-5) is the onshore overhead line option between Norwich Main and Bramford Substations, and overhead line (with underground section) from Bramford Substation, via a new EACN substation to Tilbury Substation.

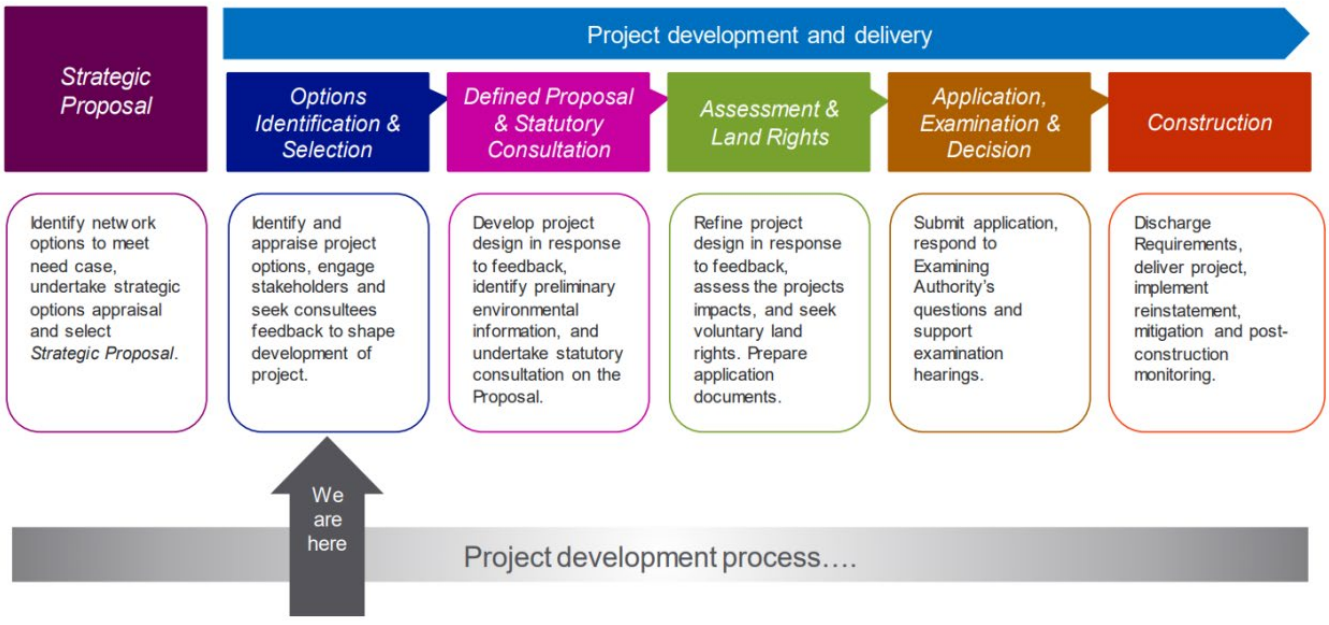
1.2.12 In arriving at this preferred onshore strategic option, National Grid looked at different onshore connection locations between either Norwich Main or Necton Substations and Bramford Substation or a new substation in the Twinstead area, location options for a new substation to connect the two offshore windfarm customers, and options for Dedham Vale AONB. Details of these options and the rationale for the decisions made in concluding the preferred strategic option subject to the non-statutory consultation and set out in Section 1.3 are provided in the CPRSS.

1.2.13 National Grid continues to backcheck and review its proposals (see Chapter 4 of this report). As no final decision has been made, and as options will be reconsidered and backchecked throughout the process having regard to consultation responses and other relevant information, none of the conclusions should be seen as final.

National Grid Approach

1.2.14 National Grid has adopted a structured approach to project development and consenting (see Figure 1.1).

Figure 1.1 – National Grids consenting process (Our Approach to Consenting (National Grid, 2022)



1.2.15 To date National Grid has identified a Strategic Proposal and has undertaken 'Options Identification and Selection'.

1.2.16 'Backcheck' and periodic update is undertaken to respond to new information and in order to ensure that the outcome of each stage remains valid. This report provides information on the back check and review of the Strategic Proposal and the Options Identification and Selection (as previously published in the Corridor and Preliminary Routeing and Siting Study (CPRSS)[1] as well as information on the evolution of the Project since the non-statutory consultation undertaken between April and June 2022.

Project Description

1.2.17 The Project would comprise a 400 Kilovolt (kV) electricity transmission connection over a distance of approximately 183Kilometres (km).

1.2.18 Our current draft proposals for the Project as presently indicated, and subject to consultation, comprise:

- a new 400 kV electricity transmission connection of approximately 183 km overall length from Norwich Main substation to Tilbury Substation via Bramford Substation comprising:
  - approximately 158 km of new overhead line (OHL) supported on approximately 520 steel lattice pylons some of which would be steel lattice gantries
  - approximately 25 km of underground 400kV cabling, in 4 sections including around 19 km through and in the vicinity of the Dedham Vale Area of Outstanding Natural Beauty (AONB)
- six new Cable Sealing End (CSE) compounds to connect the OHLs to the underground cables;
- a new 400 kV East Anglia Connection Node (EACN) substation, with a new permanent access, on the Tendring Peninsula connected as part of the new transmission line between Bramford and Tilbury Substations;
- works at the existing Norwich Main, Bramford and Tilbury Substations to connect and support operation of the new transmission line; and
- temporary works associated with construction of the Project.

1.2.19 In addition, third party utilities diversions and / or modifications may also be required to facilitate the construction of the Project.

1.2.20 As well as the permanent infrastructure, land would also be required temporarily 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.

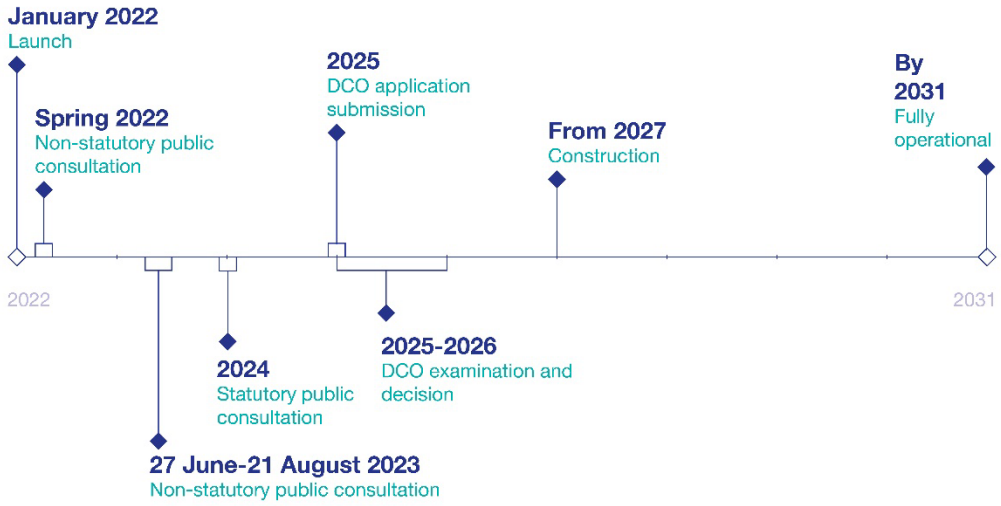
[1] https://www.nationalgrid.com/electricity-transmission/document/142461/download

1.2.21 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 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 for the Project.

Project Timeline

1.2.22 Non-statutory consultation took place between April and June 2022. A further non-statutory consultation is being undertaken between June and August 2023 to provide information on how the Project has developed in response to feedback from the 2022 non-statutory consultation and further environmental and engineering studies.

1.2.23 An indication of the Project timelines through to operation is provided below.



1.3 Purpose of this document

1.3.1 The purpose of this report is to describe how the Project has evolved since the non-statutory consultation undertaken between April and June 2022 in response to feedback to that consultation and further environmental and engineering studies. Further back check and reviews of the Project will be undertaken in response to feedback to the 2023 non statutory consultation and ongoing studies as the Project continues to evolve.

1.3.2 The document is structured as follows:

- Chapter 2 – provides an overview of the legislation and national policy relevant to the Project;
- Chapter 3 – provides an overview of the 2022 non-statutory consultation;
- Chapter 4 – outlines the back check of the previous routeing and siting studies undertaken by National Grid;
- Chapter 5 – sets out the response to feedback on the consultation corridor, and the proposed changes to the corridor presented at the 2022 consultation;
- Chapter 6 – describes the 2023 preferred draft alignment which has been developed; and
- Chapter 7 – sets out the next steps that will be undertaken prior to the submission of an application for a Development Consent Order.

2 Legislation and National Policy Context

2.1 Introduction

2.1.1 This chapter sets out a summary of legislation and national policy relevant to the Project.

2.2 Planning Act 2008

2.2.1 The Planning Act 2008 introduced a new consenting procedure for NSIPs. Under Section 14(1)(b) and Section 16 of the Planning Act of the Planning Act 2008 and the Planning Act (Electric Lines) Order 2013 a project that involves the installation of an electric line above ground of more than 2km, which will operate at 400 kV in England is an NSIP.

2.2.2 For an NSIP the grant of development consent is required by the making of a DCO under the Planning Act 2008.

2.2.3 Only a proposed new above ground electricity line would be an NSIP by virtue of the definitions in the Planning Act. Other development, such as underground cables, may be granted development consent as associated development within the meaning of section 115 of the Planning Act.

2.2.4 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.

2.3 Electricity Act 1989

2.3.1 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".*

2.3.2 Under Licence Condition C8 (Requirement to offer terms) of the Transmission Licence Standard Conditions (OFGEM, 2022), NGET ESO 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; and
- 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.

2.4 National planning policy

2.4.1 In deciding an application for development consent Section 104 of the Planning Act 2008 requires the Secretary of State to determine the application in accordance with any relevant National Policy Statement (NPS). The NPSs relevant to this project are the Overarching National Policy Statement for Energy (EN-1) and the National Policy Statement for Electricity Networks Infrastructure (EN-5).

2.4.2 Updated draft NPSs were issued for consultation in September 2021 and March 2023. Both the September 2021 and March 2023 consultation documents confirm that the current suite of NPS remain relevant government policy, have effect for the purposes of the Planning Act 2008, and continue to provide a proper basis on which applications can be prepared, the Planning Inspectorate can examine, and the Secretary of State can make decisions on, applications for development consent. The Secretary of State has decided that for any application accepted for examination before designation of the amendments to the NPSs, the original suite of NPSs should have effect. The amended NPSs will, therefore only have effect in relation to those applications for development consent accepted for examination after the designation of those amendments.'

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

2.4.3 National Policy Statement (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.

2.4.4 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*".

2.4.5 EN-1 '*sets out guidance on generic impacts of any of the types of energy infrastructure covered by the energy NPS*' 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.

Draft Overarching National Policy Statement for Energy (EN-1) (2021) (March 2023)

2.4.6 The draft replacement EN-1 does not fundamentally alter the consenting regime for electricity networks, but is capable of being important and relevant consideration, in the context of Section 104 of the Panning Act 2008.

2.4.7 National Grid draws out the following high level points in respect of the draft replacement EN-1:

- the introduction of the commitment to net zero emissions by 2050;
- the need for onshore reinforcement works is recognised as substantial and specific mention is made of the need for substantial reinforcement in East Anglia;
- recognition that it can take longer to construct onshore reinforcements than the completion of the offshore wind farms for which they are being built; and
- recognition of the urgent need for new electricity infrastructure."

2.4.8 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 132 kV 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.

2.4.9 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.

2.4.10 The draft NPS has been consulted on and is considered a material consideration for the Project. When finalised it would supersede the current EN-1.

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

2.4.11 NPS EN-5 specifically relates to electricity networks.

2.4.12 Paragraph 1.1.1 recognises that '*The new electricity generating infrastructure that the UK needs to move to a low carbon economy while maintaining security of supply will be heavily dependent on the availability of a fit for purpose and robust electricity network. That network will need to be able to support a more complex system of supply and demand than currently and cope with generation occurring in more diverse locations*'.

2.4.13 Paragraph 2.2 2 notes that '*The general location of electricity network projects is often determined by the location, or anticipated location, of a particular generating station and the existing network infrastructure taking electricity to centres of energy use. This gives a locationally specific beginning and end to a line'*.

2.4.14 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...*"

2.4.15 Paragraph 2.8.2 states that '*the 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*'. Paragraph 2.8.4 goes on to address undergrounding stating 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*."

2.4.16 Paragraph 2.8.5 recognises the importance of the guidelines provided in the Holford Rules[2] for the routeing of new overhead lines…*'the Holford Rules, were originally set out in 1959 by Lord Holford, and are intended as a common sense approach to the routeing of new overhead lines. These guidelines were reviewed and updated by the industry in the 1990s and should be followed by developers when designing their proposals*.

2.4.17 Paragraph 2.8.7 of the existing NPS EN-5 makes clear *'that the Holford Rules, and any updates, form the basis for the approach to routeing new overhead lines'*. The Holford Rules state that routeing of high voltage overhead transmission lines should where possible adhere to the following;

- 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;
- 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;

[2] Holford Rules and Supplementary Notes can be found at https://www.nationalgrid.com/sites/default/files/documents/13795-The%20Holford%20Rules.pdf

- 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.

Draft National Policy Statement for Electricity Networks Infrastructure (EN-5) (March 2023)

2.4.18 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.

2.4.19 The draft NPS reiterates the use of the Holford Rules for routeing new overhead lines setting out that …*'they should be embodied in the applicants' proposals for new overhead lines*' (Paragraph 2.9.16).

2.4.20 Paragraph 2.9.18 refers to the Horlock Rules[3] (guidelines for the design and siting of substations) setting out that '*these principles should be embodied in applicants' proposals for the infrastructure associated with new overhead lines*' (Paragraph 2.9.18).

2.4.21 In summary the Horlock Rules state that:

- in the development of system options including new substations consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements, against the consequential environmental effects, in order to avoid as far as possible adverse effects;
- siting of substations, sealing end compounds and line entries should seek to avoid areas of the highest amenity, cultural or scientific value by the overall planning of the system connections and areas of local amenity value, important existing habitats and landscape features should be protected as far as reasonably practicable;
- siting of substations, extensions and associated proposals should take advantage of the screening provided by landform and existing features and the potential use of site layout and levels;
- proposals should keep visual, noise and other environmental effects to a minimum;
- land use effects of the proposal should be considered when planning the siting of substations or extensions;
- in 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;

[3] https://www.nationalgrid.com/sites/default/files/documents/13796-The%20Horlock%20Rules.pdf

- 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;
- design of access roads, perimeter fencing, earth shaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings;
- 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; and
- 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.

2.4.22 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-routeing, 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*".

2.4.23 The draft NPS has been consulted on and is a material consideration for the Project. When finalised it would supersede the current EN-5.

Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) (2023)

2.4.24 The draft NPS (together with EN-1), if adopted, would provide the primary policy for decisions by the Secretary of State on applications for renewable infrastructure. The draft NPS includes support for the onshore infrastructure required to deliver new offshore wind developments.

2.4.25 Section 3.8 deals with offshore wind.

2.4.26 Para 3.8.1. states that '*as set out in the British Energy Security Strategy, the Government expects that offshore wind …. Will play a significant role in meeting demand and decarbonising the energy system*.'

2.4.27 Para 3.8.8 goes on '*As set out in EN-1, more than half of final energy demand in 2050 could be met by electricity, as transport and heating in particular shift from fossil fuel to electrical technology. The security, reliability, climate change, and cost implications of this requires a focus on renewable and other low carbon sources of electricity*'

2.4.28 Paras 3.8.12 and 3.8.14 then refer to the critical need for onshore network infrastructure to support new offshore wind development…' *Government has concluded that there is a critical national priority (CNP) for the provision of nationally significant new offshore wind development and supporting onshore and offshore network infrastructure and related network reinforcements ("CNP Infrastructure*") and '*Where there are residual non-HRA impacts, of any sort other than those that present an unacceptable risk to, or unacceptable interference with, human health, national defence or navigation, these are unlikely, in all but the most exceptional cases, to outweigh the urgent need for this type of infrastructure and are therefore unlikely to result in an application being refused'* (Para 3.8.14).

2.4.29 Para 3.8.15 states out that '*As a result, the Secretary of State will take as the starting point for decision-making that such infrastructure is to be treated as if it has met any test requiring a clear outweighing of harm, exceptionality, or very special circumstances within EN-1, this NPS or any other planning policy*'.

'*This means that the Secretary of State will take as a starting point that CNP Infrastructure will meet the following, non-exhaustive, list of tests:*

- *where development within a Green Belt requires very special circumstances to justify development;*
- *where development within or near a Site of Special Scientific Interest (SSSI) requires the benefits (including need) of the development in the location proposed to clearly outweigh the harm;*
- *where development affecting irreplaceable habitats requires the benefits (including need) to clearly outweigh the harm. Where development is, exceptionally, necessary in coastal change areas, flood risk areas or where an increase in flood risk elsewhere cannot be avoided or mitigated;*
- *where development in nationally designated landscapes requires exceptional circumstances; and*
- *where substantial harm to or loss of significance to heritage assets should be exceptional or wholly exceptional'* (Para 3.8.16)

2.4.30 The Project in its current form would constitute *CNP Infrastructure* as set out in the draft NPS EN-3.

National Planning Policy Framework (NPPF) (2021)

2.4.31 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 (NPFF))".

2.4.32 While the National Policy Statements remain the prime decision-making documents, the NPPF may require consideration and it is therefore included for completeness.

.

3 Non-Statutory Consultation 2022

3.1 Background

Context

3.1.1 In spring 2022 National Grid held a non-statutory consultation for a period of 8 weeks between 21 April 2022 and 16 June 2022. This consultation introduced the Project, explained how National Grid had developed its proposals and sought the view of the public and stakeholders.

3.1.2 The objectives of the consultation were to:

- introduce and provide an overview of the Project to the public;
- explain the need to build the reinforcement;
- set out the options considered and the preferred corridor and graduated swathe;
- present and explain the preferred corridor and graduated swathe;
- present and explain the preferred substation site;
- seek feedback on the proposals and ensure all stakeholders had the opportunity to provide feedback; and
- outline next steps and programme and how proposals would be developed further.

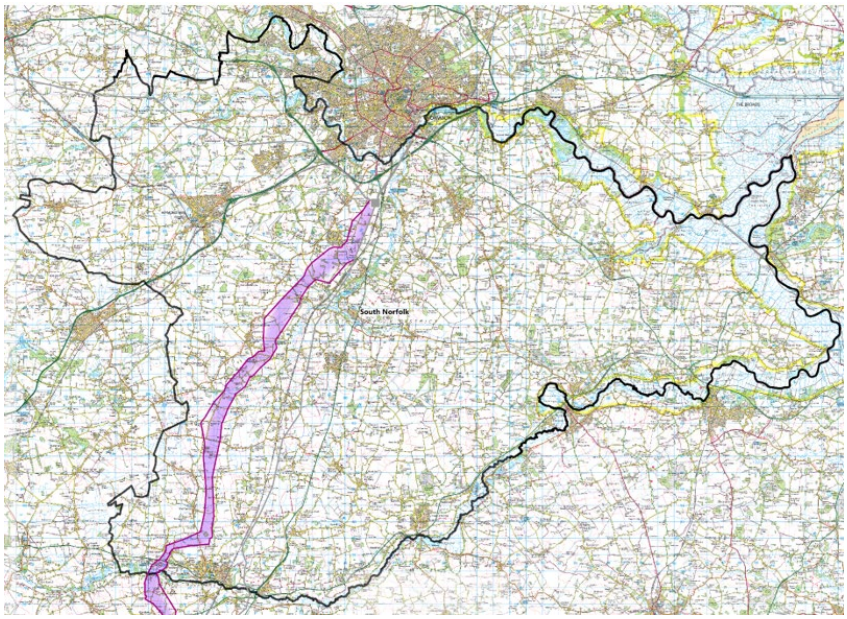
The Consultation Corridor

3.1.3 An overview of the preferred corridor as presented at the 2022 non-statutory consultation, was provided in the 2022 Project Background Document[4] and is set out below.

[4] https://www.nationalgrid.com/electricity-transmission/document/142446/download

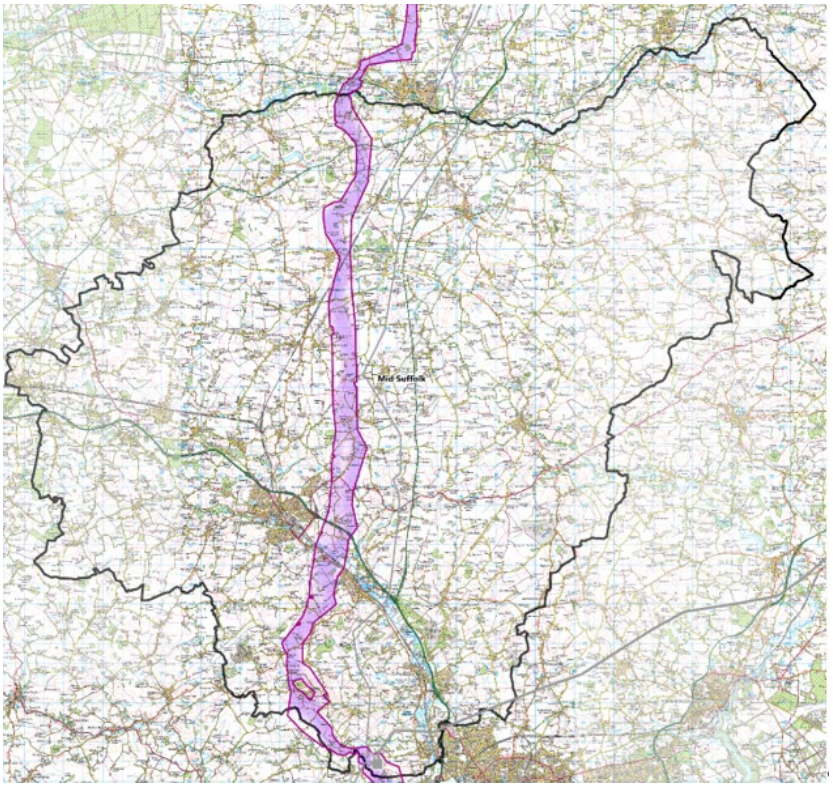
South Norfolk

3.1.4 From Norwich Main the corridor heads south, running past the villages of Mulbarton, Tacolneston and Shelfanger before routeing to the west of Roydon.



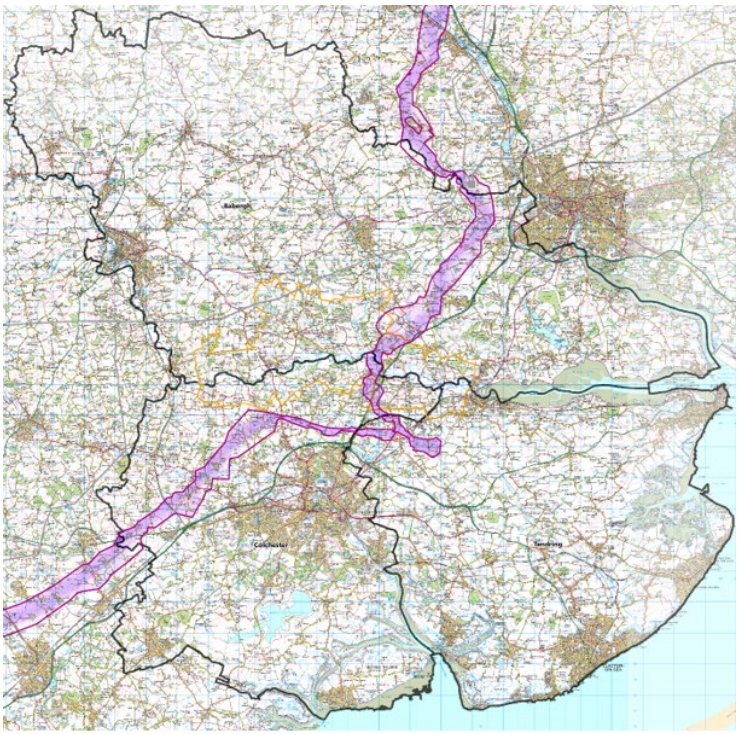
Mid Suffolk (and Babergh North of the Substation)

3.1.5 From the county boundary between South Norfolk and Mid Suffolk, the consultation corridor runs south, passing Mellis and Gislingham and crossing the railway. The consultation corridor then continues south past Stowupland and Needham Market where it crosses back over the railway before it turns eastwards to connect into Bramford Substation.



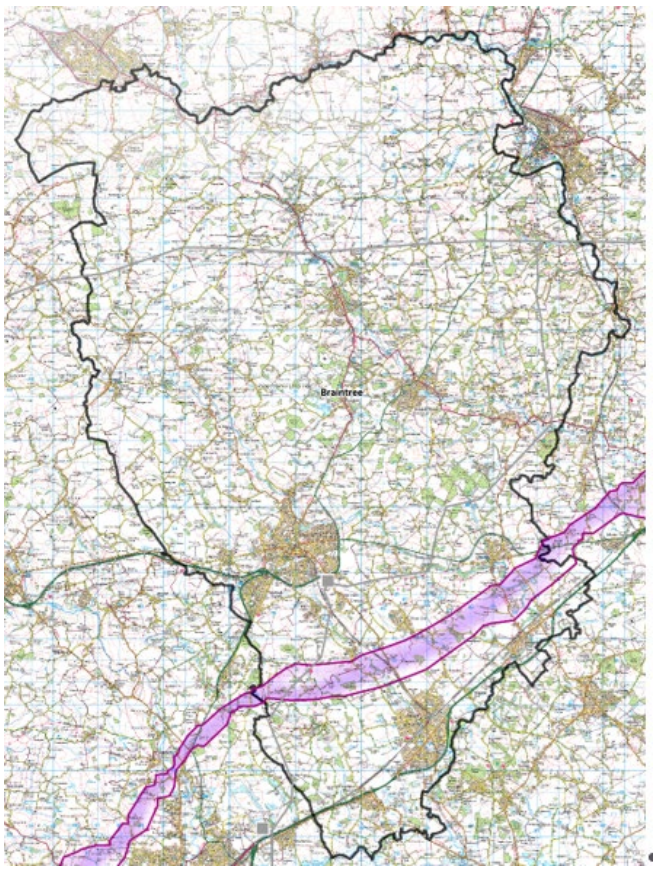
Babergh, Tendring and Colchester

3.1.6 From Bramford Substation the consultation corridor crosses immediately into the district of Babergh. It runs south easterly past Washbrook and Copdock, and East Bergholt to until it crosses the border into the Colchester district briefly, running past Dedham, Langham and crossing the A12. The consultation corridor then moves into the Tendring district turning eastwards into Tendring Peninsula to connect into the site of the East Anglia Connection Node (EACN) substation. The consultation corridor then moves out of the EACN substation site heading west, crossing back over the A12 to continue the route running past West Bergholt and Marks Tey to the south.



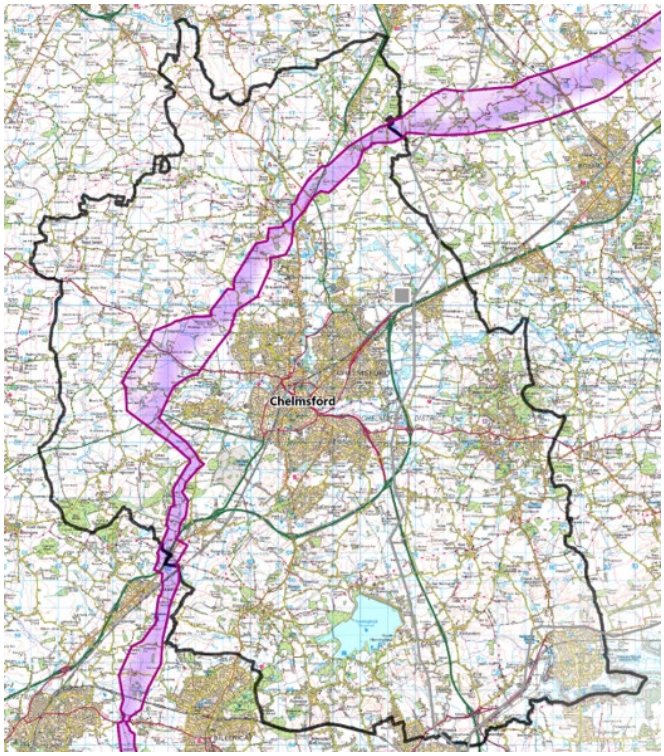
Braintree

3.1.7 After crossing into the Braintree district, the consultation corridor continues south-west parallel to the north of the A12 and railway. Passing Witham to the south and Silver End to the north before crossing the railway again heading south and continuing west towards the Chelmsford district.



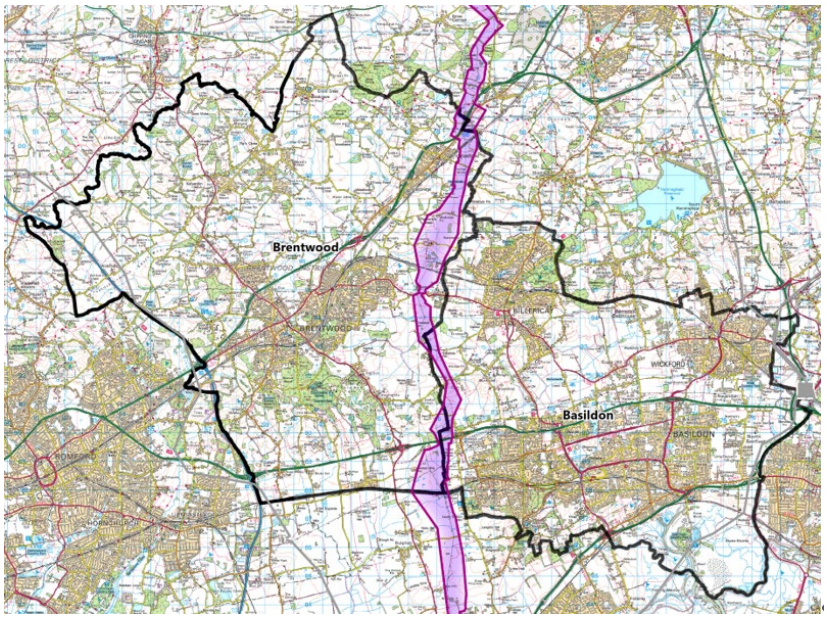
Chelmsford

3.1.8 Having routed into the Chelmsford district in the north-east area, the consultation preferred corridor then travels around the north of Chelmsford and begins to head south on the western side, with Writtle and Chelmsford to the east of the corridor. The consultation corridor continues south passing Margaretting and crossing over the A12 on the Brentwood district border.



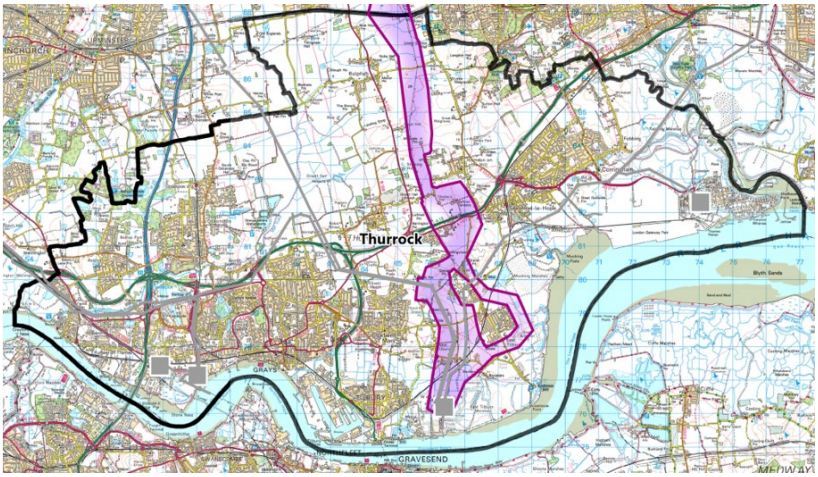
Basildon and Brentwood

3.1.9 Passing Ingatestone to its eastern side, the consultation corridor crosses the A12 and the railway in the north of the Brentwood district. It then travels directly south crossing multiple times between the Basildon and Brentwood districts. Passing Hutton on the west and Billericay on the east. Continuing to then cross the A127 and railway on the border of the Thurrock district.



Thurrock

3.1.10 The consultation corridor continues travelling south passing Bulphan on the west and then Horndon on the Hill on the east. Crossing the A13 it heads towards Linford and East Tilbury where the consultation corridor then splits. Works would be required at Tilbury Substation to connect the new line. This is expected to be within the existing substation boundary.



3.2 Responses to 2022 non- statutory consultation

3.2.1 A total of 3,787 feedback submissions were received during the consultation period from local communities, stakeholders and other consultees. This comprised of paper response forms, online response forms, emails and letters.

3.2.2 Although some feedback was received after the close of consultation, all responses received up to a month after the consultation closing (up to the 16 July 2022) were considered. All feedback where extensions were agreed have also been considered in the reporting process.

3.2.3 Further detailed information on the consultation and the response to feedback is provided in the 2022 Non-Statutory Consultation Feedback Report.

Process

3.2.4 The feedback received during the 2022 non-statutory consultation has been carefully reviewed and considered, alongside ongoing technical work on the engineering design and the environmental impact assessment process.

3.2.5 Feedback that proposed design changes was carefully considered in the context of environmental and socio-economic constraints and opportunities, engineering feasibility and cost, and planning policy considerations.

3.2.6 The process of considering the changes proposed comprised of an initial filter for benefit and feasibility, an assessment incorporating inputs from relevant technical experts, and further stages of additional study if required.

3.2.7 The outcome of the consideration of potential design changes was either that it informed the current draft proposals, or that the change was not considered further following balanced and informed consideration. The current draft proposals will be subject to ongoing review in response to feedback and further engineering and environmental studies.

Key Changes

3.2.8 Feedback responses commented on the location of the consultation corridor and the graduated swathe.

3.2.9 A summary of the key changes identified in response to the 2022 non-statutory consultation, subsequent development of the Project design, and further technical assessment is provided below. Changes to the consultation corridor are referred to as ‘outside the consultation corridor’. Changes to the graduated swathe are referred to as ‘within the consultation corridor’. These changes informed the development of the current preferred draft alignment.

Changes outside the consultation corridor

- alternative corridor diverting from the crossing of the A1066 to pass to the east of Wortham Ling, re-joining the preferred corridor to the south-east of Diss at the crossing of the A143 to reduce effects on heritage assets, business activity and woodland (referred to as ‘East of Wortham Ling’);
- alternative corridor diverting to the east at the south of Offton, then paralleling the existing 132 kV overhead line route to the north and east of Flowton and connecting into Bramford Substation to reduce potential impacts on heritage assets, residential amenity and cumulative effects (referred to as ‘North of Flowton’);

- alternative corridor to connect the underground cable route through the AONB to the proposed CSE compound at the south of Notley Enterprise Park, the overhead line would then pass to the west and north of Notley Enterprise Park to then continue east towards Bramford Substation re-joining the 2022 consultation corridor south-east of Wenham Grange. The CSE compound siting and corridor changes reduce potential impacts on heritage assets, residential amenity and the Dedham Vale AONB (referred to as 'West of Great Wenham'); and
- alternative corridor further east of Ingatestone diverting from the crossing of the A12 to the east of Stock Lane, continuing south passing to the east of the treatment works, re-joining the preferred corridor north of the crossing of Rayleigh Road to reduce potential impacts on heritage assets (referred to as 'Further east of Ingatestone').
- the preferred draft alignment has been straightened slightly west of Writtle and would deviate outside the 2022 consultation corridor (by up to approximately 110 m for a distance of approximately 400 m). This change is referred to as West of Writtle.

3.2.10 Further details on the consideration of changes to the consultation corridor and the changes summarised above, are provided in Section 5.5 of this report.

3.2.11 The above changes to the 2022 consultation corridor have been taken forward and have fed into the development of the 2023 preferred draft alignment (hereafter referred to as the draft alignment). Further backcheck and review of these proposed changes will be undertaken in response to feedback and further environmental and engineering investigations.

Changes within the 2022 consultation corridor

3.2.12 These changes have been considered in the development of the draft alignment which is the subject of the 2023 non-statutory consultation:

- proposal to amend the graduated swathe to the northern half of the preferred corridor broadly parallel with the existing 132 kV overhead line to the north-west of Barking and Barking Tye to reduce potential impacts on residential amenity and flight activities at Wattisham Flying Station;
- proposal to amend the graduated swathe to the south of Bramford Substation to facilitate an alignment to the east of the preferred corridor to reduce potential impacts on residential amenity in Burstall;
- proposal to continue the underground cables through the AONB to the EACN substation. This also allows adjustment of the overhead line (EACN substation to Tilbury) near Ardleigh to increase the separation of the overhead line from the village;
- proposal to adopt underground cable technology in the vicinity of Great Horkesley for a distance of approximately 5.3km from a CSE compound in the east between Horkesley Plantation and Harrow Wood and in the west on land to the west of Crabtree Lane and north of the B1508 to reduce potential impacts on the Dedham Vale AONB;
- proposal to amend the graduated swathe to the south-east of the 2022 consultation corridor at Aldham to avoid the potential oversail of properties and gardens to the north;

- proposal to amend the graduated swathe to facilitate an alignment to the north of Fairstead with a section of underground cables between CSE compounds under the existing 400 kV overhead line;
- proposal to amend the graduated swathe to pass to the east of Bushey Wood to increase distance from properties on Woodhall Hill;
- proposal to restrict the graduated swathe and alignment to the eastern edge of the preferred corridor to reduce interaction with the Dunton Hills Garden Village development proposal; and
- proposal to adopt underground cable technology from the north of the Lower Thames Crossing (LTC) proposals into Tilbury Substation to facilitate construction of LTC and the Project as efficiently as possible and respond to extent of flood storage areas. This change of technology also favoured routeing to the east of both existing overhead lines beneficially reducing the potential for interaction with the proposed development to the east of Chadwell St Mary.

3.2.13 Further details on the changes above, and the further development of the Project design since the 2022 non-statutory consultation, are provided in Section 6.4 of this report. For the purposes of this initial assessment the preferred draft alignment as presented in this document reflects the use of standard lattice pylons and where pylons, underground cables, Cable Sealing End (CSE) compounds (where underground cables join with overhead lines) and the EACN substation might be suitably located. The use of other pylon designs is still under consideration, if an overhead line route is progressed. Backcheck and review of the draft alignment will continue in response to feedback and further environmental and engineering investigations.

4 Backcheck and review

4.1 Context

4.1.1 The development of any project is always evolving and iterating as the knowledge about the project, and the potential areas in which it will be sited, grows and or alters. In addition, previous preliminary assumptions and/or decisions are the subject of constant checking and backchecking as part of the consideration and engagement process. Any description of the assessment and rationale for non-final decisions (particularly at non-statutory stages of a potential project) must be understood in that context.

4.1.2 This chapter provides a backcheck of the previous stages of the Project's development as undertaken in the:

- strategic options appraisal process; and
- Corridor and Preliminary Routeing and Siting Study.

4.2 Strategic Proposal

Background

4.2.1 The need for the Project was identified as critical to take forward in both the 2021 and 2022 editions of the Network Options Assessment (NOA) 2021/22 Report (National Grid ESO, 2022).

4.2.2 A Strategic Options Appraisal was undertaken which established the need case for the Project in more detail and identified a preferred strategic proposal.

4.2.3 At this stage the Project had multiple potential start, intermediate and end points. These options were narrowed down by initial assessment of the general composition of a number of potential reinforcement strategies and the best performing options identified. Alternative strategic options for delivering that preferred reinforcement solution were then developed and appraised to identify the preferred strategic proposal.

4.2.4 Alternative technologies considered 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; and
- Gas Insulated Line (GIL).

4.2.5 The preferred Strategic Proposal included three distinct elements:

- an offshore reinforcement between the south coast and East Anglia (whilst subject to separate study this was identified as between Sizewell and Richborough and referred to as the SEA Link project);
- onshore reinforcement between Tilbury and Grain; and
- onshore reinforcement between Norwich and Tilbury.

4.2.6 The Project covers the terrestrial element between Norwich and Tilbury. It was understood at that stage that the preferred Strategic Proposal would initially comprise steel lattice pylon supported overhead line, with the use of appropriate mitigation including undergrounding, for example through the Dedham Vale Area of Outstanding Natural Beauty (AONB).

Post 2022 Non-Statutory Consultation

Response to the Offshore Electricity Grid Task Force

4.2.7 In response to feedback, including that from the 2022 non-statutory consultation and the Offshore Electricity Grid Task Force (OffSET[5]) regarding a fully offshore HVDC option to deliver the Project, in October 2022 National Grid provided further clarification on the potential for a feasible offshore strategic option to deliver the additional transmission capacity required. The clarification explained why, at this early pre-statutory stage of consultation, the offshore strategic option was not being progressed. This information can be found on the Project website[6].

4.2.8 The response set out how NGET is required to have regard to the National Policy Statements as part of its consideration when it develops proposals to meet transmission needs.

4.2.9 Additional information on capital and lifetime costs was provided on the potentially feasible offshore strategic option to deliver the additional transmission capacity required. This information did not form part of the 2022 non-statutory consultation.

4.2.10 Factors which were considered in determining whether to take an offshore option forward, included, but were not limited to:

- the advice contained in the adopted policy in the NPSs that overhead lines are appropriate technology;
- the potential for mitigation of on-shore options including undergrounding - where justified and feasible; and
- cost and economics - the offshore option would be several billion pounds more expensive than reasonable onshore options.

4.2.11 At that stage a fully offshore HVDC option was not progressed, although it was recognised by NGET that no final decision had been made, and the matter would be reconsidered and backchecked throughout the process, having regard to consultation responses and other relevant information. The outcome of that backcheck is set out below.

[5] A task force set up to represent communities in Suffolk and Essex.

[6] https://www.nationalgrid.com/electricity-transmission/document/146091/download

Offshore Transmission Network Review

4.2.12 The Five Estuaries and North Falls projects are currently engaged in the government-led Offshore Transmission Network Review, which is looking into ways that the offshore network is designed and delivered, consistent with the ambition to deliver net zero emissions by 2050.

4.2.13 Both the Government's recent Energy Security Strategy and Net Zero goals show the importance of bringing 50GW of new offshore renewable generation online by 2030. Following the Project's involvement with the Offshore Transmission Network Review Five Estuaries and North Falls have now identified the potential opportunity to coordinate more closely.

4.2.14 The primary goal of the coordination is to reduce the potential impact of building the onshore connection to the national electricity transmission network for the two projects. Five Estuaries and North Falls are also considering submitting applications for Development Consent Orders that would allow for flexibility to accommodate a coordinated offshore connection at a later date, provided there is greater certainty on the commercial, regulatory and technical environment. The viability of any coordinated connection is dependent on the progress made by the Offshore Transmission Network Review process and associated regulatory and commercial policy changes and the individual offshore connector projects involved.

Offshore Coordination Support Scheme

4.2.15 In April 2022 the Government announced the Offshore Co-ordination Support Scheme (OCSS). The OCSS will provide grant funding to projects that are further developed than those eligible for the HND to explore potential co-ordination options for offshore transmission infrastructure.

4.2.16 Five projects, including North Falls and Five Estuaries offshore wind farms, National Grid Electricity Transmission's Sea Link, and National Grid Ventures' EuroLink and Nautilus have committed to exploring coordinated network designs.

4.2.17 Applications to the OCSS closed on 28 February 2023 and are currently being assessed by Government. The OCSS is set to conclude in summer 2023, with final funding to successful applicants available shortly afterwards. If there is a change to the customer connections at the EACN, Norwich to Tilbury would still be required to reinforce the transmission system boundaries in East Anglia although this current conclusion will be kept under review.

Strategic Options Backcheck

4.2.18 The Norwich to Tilbury Strategic Options Backcheck and Review (SOBR) has been prepared by (NGET) as part of the ongoing strategic options assessment and decision-making process involved in promoting new transmission projects.

4.2.19 The SOBR explains that, without reinforcement, the transmission system in East Anglia will have insufficient capacity to accommodate contracted and predicted growth in generation connecting in the area.

4.2.20 The SOBR has been prepared in accordance with NGET's document 'Our Approach to Consenting', which was published in April 2022. The SOBR appraises the ability of both onshore and offshore options to meet the system need while balancing cost, technical performance and environmental and socio-economic effects. The SOBR backchecks and reviews the conclusions of the April 2022 Corridor and Preliminary Routing and Sitting Study (CPRSS), which was substantively complete at the point the Approach to Consenting was adopted.

4.2.21 Following consideration of options to meet system need the SOBR proposes at the current stage to take forward an interim preference of an onshore combination of:

- overhead line from Norwich Main to Bramford; and
- overhead line from Bramford via a new substation to Tilbury, with undergrounding through the Dedham Vale AONB.

4.2.22 As part of the backcheck and review process, costs are reviewed and updated in accordance with the latest costing information. These may therefore, in some cases, supersede previously published costings.

4.3 Corridor and Preliminary Routeing and Siting Study

Options identification and selection

4.3.1 Following the optioneering process and the identification of the strategic proposal routeing and siting was undertaken, resulting in the identification of a preferred corridor as reported in the Corridor and Preliminary Routeing and Siting Study (CPRSS) (April 2022)[7]. The preferred corridor in the CPRSS, was consulted on at the non-statutory consultation in 2022.

4.3.2 The backcheck of the optioneering process, described above, has concluded that at the current stage the preferred Strategic Proposal which provided the context for the CPRSS remains the same.

4.3.3 The routeing and siting process 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 CPRSS.

4.3.4 A backcheck and review exercise has been undertaken to identify what has and has not changed since the CPRSS was produced, and whether those changes would affect the selection of the preferred corridor and substation location options set out in the CPRSS, and whether the Project would continue to meet its stated objectives.

4.3.5 The back check and review considered whether the changes set out below would have resulted in a different outcome for the CPRSS:

- changes to the legislative context;
- changes to project assumptions and parameters;
- an additional customer connection agreement;
- changes to the baseline; and
- changes proposed in feedback to the 2022 non-statutory consultation.

Legislative Context

4.3.6 National Grid has noted the UK government's nomination, of various areas of the east coast as part of the East Atlantic Flyway UNESCO World Heritage Site (WHS). This would bring together a coastal network of wetlands and protected spaces that include Marine Protected Areas, Ramsar Sites, Special Protection Areas and Special Areas of Conservation.

[7] https://www.nationalgrid.com/electricity-transmission/document/142461/download

4.3.7 National Grid's current assumption is that, if the nomination is successful, then any future management plan, would comprise similar protections to those applying to these designated sites as at present. The existing designations and protections were considered as part of routeing and siting as set out in the CPRSS, and as such it is not considered that the potential WHS designation is inconsistent with or would be undermined by the proposals. National Grid will update its position as further information becomes available.

4.3.8 No other changes to adopted or draft National Planning Policy or relevant legislation have been identified that have implications for the backcheck.

Assumptions and Parameters

4.3.9 The backcheck was based on a number of high-level assumptions and parameters. These have been reviewed and the following concluded:

- the objectives and strategic context of the Project are unchanged and remain valid;
    - the inherent need for the Project to reinforce the National Electricity Transmission System and connect new low carbon generation to meet the government's Net Zero commitments remains with new connections exceeding system capacity;
    - a third customer now has a signed connection agreement to connect into the EACN substation (the potential implications of this change are considered in section 4.3.11 below);
- the approach to Routeing and Siting and the Options Identification and Selection Process continues to be as set out in Chapter 3 of the CPRSS;
- the Offshore Transmission Network Review does not, at this stage, change the requirement for the EACN substation as part of the Project;
    - National Grid notes that funding is only provided to investigate the potential for co-ordination amongst offshore generation developers. It does not guarantee the provision of an alternative to the EACN substation;
    - until such time as studies conclude and connection agreements are modified, National Grid must continue to meet its licence obligations and progress with studies to fulfil the signed agreements for connections at the EACN substation;
    - the customers with signed connection agreements at the EACN substation are currently continuing to progress their projects on the assumption of connecting at the EACN substation;
- an increase in the proposed extent of underground cable in response to feedback and further evaluation is not considered to change previous decision making on the preferred corridor;
    - an increase in the overall length of underground cable is now proposed (see Chapter 5). This can be expected to increase project costs and may potentially be material to decision making as cost is a factor considered. However although overall the cost of additional undergrounding would appear to slightly reduce the cost differential between the Project and offshore alternatives, the Project as amended post the 2022 consultation, would remain at substantially lower cost than offshore alternatives. Additionally it is to be noted that further

study of offshore alternatives would be likely to identify the need for additional mitigation to address effects that further work would be expected to identify;

- an increase in the length of underground cable at Tilbury would be common to alternative onshore corridor connections into Tilbury therefore is not a differentiating factor.
- the short section of underground cable required to cross an existing 400kV overhead line near Fairstead is of a scale that is not considered material. It is likely to be required on alternative onshore corridors therefore is not a differentiating factor;
- the sections of new or extended underground cable sections (from the AONB boundary to the EACN substation and at Great Horkesley) are proposed to address potential environmental effects. Alternative onshore corridors would be likely to give rise to similar, or greater effects and would require equivalent or greater lengths of underground cable as mitigation. As such the preferred corridor remains valid;

- the levels of constraint represented by each category of environmental receptor remain the same as those set out in the CPRSS;
  - there has been no change to the seek to avoid or seek to minimise effects on potential constraints and environmental features as set out in CPRSS.

Confirmation of a third customer

4.3.10 Since November 2022 a further customer connection agreement has been signed to facilitate the connection of a 1400MW interconnector (which will utilise HVDC technology necessitating the siting of a converter station to transform the DC current to the AC current of the NETS) between the UK and Germany. This interconnector is being delivered by Tarchon Energy and connection will be made at the EACN substation.

4.3.11 Consideration has been given as to whether a different EACN substation location would have been taken forward had this third customer connection agreement been signed prior to the CPRSS concluding. The decision making about the EACN substation location and the preference for a site in Zone A however remains valid for the following reasons:

- a third customer connection would increase the effects and costs arising for the customer connections from the coast to the EACN substation. This is however balanced against the effects arising from the two double circuit connections required from the EACN substation to the existing transmission system. A more coastal location than the preferred Zone A would reduce costs arising from the customer connections but increase those arising from the National Grid Infrastructure to Zone A. The additional costs and effects from two overhead line connections would not offset any reduction in effects or costs from customer connections should the EACN substation be located further east and closer to the coast;
- Zone A and its surrounding area are considered to have capacity to accommodate the additional customer infrastructure that would be required, (subject to appropriate siting). Zone A would not have been discounted if the requirement for a larger site to accommodate three customers had been known previously. The need for appropriate siting of converter station infrastructure is common to all locations on the Tendring peninsula and is not therefore a differentiating factor given such sites can be located at a separate location some distance from the EACN.

4.3.12 More detailed consideration of feedback on alternative locations for the EACN substation is provided in Section 5.5 of this document.

Baseline Conditions

4.3.13 The baseline information for those topics covered by the CPRSS has been reviewed to establish if there have been any changes since completion of the CPRSS that may have changed the decision making. Minor non- material changes capable of being dealt with during the development of a detailed alignment development were not considered further. In conclusion.

- biodiversity and historic environment - there have been no material changes to the baseline, i.e. no new designations have been confirmed;
- landscape and views - the new Dedham Vale Area of Outstanding Natural Beauty and Stour Valley Project Area 2021-2026 Management Plan was published in December 2021. This does not materially alter the sensitivities, or the level of protection afforded to the AONB; and
- landscape character; landscape designations; recreational routes; and residential properties - no material changes to the baseline have been identified.

4.3.14 The planning baseline has also been reviewed with respect to planning allocations and planning applications.

4.3.15 There has been no change to the planning allocations baseline, however there have been a number of planning applications for development that would fall within the consultation corridor. One application (in combination with other factors) has influenced the routeing of the 2023 preferred draft alignment outside the graduated swathe near Wortham Ling. Other applications relate to new major developments, wholly or partly within the consultation corridor, for example solar farms and battery energy storage systems. Whilst important considerations for the development of an alignment, none of these applications would have altered the identification of the 2022 consultation corridor as the preferred option.

Consultation Feedback

4.3.16 In addition to the change of technology to underground cables in some locations, informed in part by consultation feedback, by further information that has been gathered or received, and by further assessment, proposed alternatives outside of the 2022 consultation corridor have been identified in four locations, referred to as: East of Wortham Ling, North of Flowton, West of Great Wenham, and Further east of Ingatestone.

4.3.17 These localised changes and the reasons for them are set out in Chapter 5. The proposed changes have been considered as part of the backcheck and review and it has been concluded that they do not invalidate the overall corridor decision making. The changes have been made in response to local factors and to reduce overall environmental effects or to reduce effects that may otherwise have been inconsistent with National Grids duties and relevant planning policy. The changes have no material effect on costs nor introduce effects to other receptors that would undermine previous decision making.

4.3.18 Other feedback is not considered by National Grid to be relevant to validity of the CPRSS as:

- it suggested alternative corridors that related to corridors already been identified and included in the CPRSS, or which had been discounted due to the presence of constraints;
- it was seeking information on detailed matters that would not have altered the identification of corridors and the selection of the 2022 consultation corridor. The level of detail sought will be provided as part of detailed routeing and siting as the Project develops; and
- it identified constraints that respondents felt should have been considered when identifying corridors and selecting the preferred corridor. Examples included taking account of Local Wildlife Sites (LWS), archaeological features and Public Rights of Way (PRoWs). These considerations will be taken into account during detailed routeing and siting and would not have altered the selection of the 2022 consultation corridor as the preferred option.

Conclusions

4.3.19 On the basis of the information set out above it has been concluded that the current preferred Strategic Proposal which provided the context for the CPRSS remains valid and an appropriate basis on which to take the Project forward at this stage.

4.3.20 The changes in cost arising from additional sections of underground cables and the inclusion of the third customer connection (either individually or collectively) do not invalidate the selection of corridor or EACN substation siting previously published in the CPRSS. Localised changes in route, as well as the proposed use of underground cables in some locations, are the outcome of careful and considered project development to reduce effects and ensure that a project is developed in a manner consistent with National Grid's duties and relevant planning policy.

4.3.21 National Grid will continue to backcheck and review its proposals as the Project progresses and will respond to new baseline information, any legislative change and feedback received.

5 Review of the Consultation Corridor

5.1 Introduction

Overview

5.1.1 A number of potential design change were identified from the feedback received from the 2022 non-statutory consultation. Potential changes have been carefully considered in the context of environmental and socio-economic constraints and opportunities, engineering feasibility and cost, and planning policy considerations.

5.1.2 The process of considering design changes comprised of an initial filter for benefit and feasibility, an assessment incorporating inputs from relevant technical experts, and further stages of additional study if required.

5.1.3 The outcome of the consideration of potential design changes was either that a change was included in the Project design, or that the change was not made following balanced and informed consideration.

5.1.4 As summarised in Section 3.2 above, in response to the 2022 non-statutory consultation, development of the Project design and further technical assessment, four areas have been identified where changes are proposed to the 2022 consultation corridor. These are set out in Section 3.2 above. The areas where these changes have been identified are:

- East of Wortham Ling;
- North of Flowton;
- West of Great Wenham;
- Further East of Ingatestone; and
- West of Writtle

5.1.5 Further information on the reasons for and extent of these changes is provided below.

Context

5.1.6 The CPRSS divided the Project into two sections:

- North East Anglia (NEA) connection - Norwich Main Substation to Bramford Substation; and
- South East Anglia (SEA) connection - Bramford Substation to the EACN substation, and from the EACN substation to Tilbury Substation.

5.1.7 This section describes the main factors influencing decision making on proposed changes and alternatives (corridors, graduated swathe areas or technology choice). Consideration of the general comments raised in feedback is structured as follows:

- Whole route feedback;
- NEA wide feedback;
- SEA wide feedback; and
- Consideration of more specific feedback relating to particular locations.

5.1.8 Responses to individual items of feedback are presented in the 2022 Non-Statutory Consultation Feedback Report.

5.2 Whole Route Feedback

5.2.1 A response to providing the connection offshore has been summarised in Section 4.2 of this document.

Routeing to Bradwell and routeing to / from the EACN substation

5.2.2 In summary consultation feedback stated that:

- customers could connect at the Bradwell Nuclear site;
- connection from the EACN substation could be routed to Tilbury via the Bradwell site;
- routeing to the north of Colchester should be avoided; and
- the need for parallel overhead line connections close to the EACN substation should be avoided.

5.2.3 As there is no existing 400 kV overhead connection to the former Bradwell nuclear site routeing via or from Bradwell is not preferred. The overhead line connection previously provided operated at 132 kV and would need to be rebuilt as a 400 kV overhead line.

5.2.4 A connection to Tilbury would be routed at least partly through corridors, presented at the 2022 non-statutory consultation within the CPRSS, less preferred due to potential for effects on the qualifying features associated with Special Protection Area (SPA) designations and constrained by recent and proposed housing development. The EACN substation would also need to have two points of connection to the existing Transmission System to be compliant with system standards (e.g. from Bradwell to Bramford and Bramford to Tilbury) which could not be achieved without significant other works to the National Electricity Transmission System.

Underground cable for the whole route

5.2.5 National Policy Statement EN-5 states that the government considers overhead lines to be appropriate and acceptable in most instances, although it recognises that that there may be, at particularly sensitive locations, potential adverse landscape and visual impacts of an overhead line that make it unacceptable in planning terms.

5.2.6 With much of the corridor outside of such locations the use of underground cables is not considered justified for the whole route and would be inconsistent with national policy.

Close parallel of existing 400 kV overhead line

5.2.7 Close paralleling has the potential to reduce the level of effects that may arise from a new overhead line. However overall close paralleling, for this Project, is considered to lead to greater effects for the reasons outlined below:

- the number of residential properties present in close proximity to the existing 400 kV overhead lines. Close paralleling would result in properties having overhead lines close to both sides;
- locations where the combination of existing physical and environmental features (railway and road infrastructure, commercial and residential property, woodlands and orchards etc) present very substantial challenges to successful parallel routeing; and

- increased environmental effects where the overhead lines would have to converge and diverge.

5.2.8 Although there are some areas where close paralleling may appear beneficial, due to the increased effects on properties with overhead lines on both sides and the increased environmental effects where the new and existing overhead lines would have to converge and diverge it is considered that the introduction of a new route alignment separated from existing 400 kV overhead lines would overall be preferred.

5.2.9 Whilst crossing arrangements, the use of underground cable technology and additional CSE compounds may be able to address constrained locations in isolation, the costs, along with the limitations on the ability to secure the necessary number of outages required for construction mean that this would be less compliant with National Grid's duties and relevant policies.

Close paralleling other infrastructure (roads, rail etc)

5.2.10 Feedback also noted the potential for new overhead line infrastructure to close parallel existing or be constructed with proposed road and rail infrastructure.

5.2.11 Although there are potential benefits of infrastructure being concentrated, i.e., by routeing the Project in close proximity to existing road and rail infrastructure, the benefits would not arise along the entire corridor.

5.2.12 Constraints such as residential properties, hamlets, villages and towns located along and in close proximity to the existing transport infrastructure would result in a new overhead line requiring multiple changes in direction to remain broadly parallel. The combination of existing physical and environmental features (railway and road infrastructure, commercial and residential property, woodlands and orchards) present very substantial challenges to routeing. It is therefore considered that close paralleling new or proposed transport infrastructure would not reduce environmental effects, improve compliance with Holford Rules or be more consistent with the requirement to be economic and efficient.

5.3 NEA Wide Feedback

Close parallel of existing National Grid 400 kV overhead line

5.3.1 The potential to close parallel an existing National Grid overhead line (between Norwich Main and Bramford Substations) to reduce the level of effects that may arise from a new overhead line was mentioned in feedback responses.

5.3.2 This was considered however constraints and features along the route (see para 5.1.15) mean that overall, close paralleling would lead to greater effects and be less compliant with Holford Rules and be less consistent with the requirements to be economic and efficient.

5.3.3 To maintain close parallel in constrained locations it may be necessary to cross the existing overhead line which would then require additional system outages. Although it may be possible to address the various constrained locations in isolation, the costs and environmental effects arising from the additional infrastructure required to achieve close paralleling more extensively or for the whole of this part of the connection, along with the limitations on the ability to secure the necessary number of outages, mean that close paralleling, due to the increased effects outlined above, has not been considered further.

5.4 SEA Wide Feedback

Coastal Corridors

5.4.1 A number of respondents expressed a preference for routes closer to the coast as this would be less impactful on residential properties (both existing and proposed). Although this may be the case in particular locations, as set out in the CPRSS, options closer to the coast (passing to the south-east of Colchester and Chelmsford) would have increased effects on the qualifying features associated with European designated sites (which collectively have also been proposed to be put forward as a World Heritage Site). These options have not been progressed as alternatives without such effects are available.

Close parallel of existing 400 kV overhead line

5.4.2 As noted above, close paralleling has the potential to reduce the level of effects that may arise from a new overhead line.

5.4.3 In respect of the consultation corridor south of Bramford, the potential for close paralleling only occurs for part of the corridor from the vicinity of White Colne (to the south-west of the Dedham Vale AONB) through to Braintree, and from Braintree through to Tilbury (passing the east of Chelmsford).

5.4.4 However, overall close paralleling for this section of the Project, is considered to be less compliant with the Holford Rules and lead to greater effects for the reasons outlined below.

5.4.5 A number of residential properties are present in close proximity to the existing overhead line and close paralleling would result in properties having overhead lines close to both sides. There are also some locations where the combination of existing physical and environmental features (existing overhead line connections, railway and road infrastructure, commercial and residential property, woodlands and orchards etc) present very substantial challenges to routeing. As a result, whilst close paralleling may be beneficial in some areas, overall, the increased environmental effects where the lines have to converge and diverge, and those increased effects on properties with overhead lines to both sides are considered greater than those introduced by a new route separated from the existing overhead line.

5.4.6 As with the NEA section, to maintain close parallel in constrained locations it may be necessary to cross the existing line or use underground cable technology, this would require additional CSE compounds and system outages. Although it may be possible to address the various constrained locations in isolation, the costs and environmental effects arising from the additional infrastructure required to achieve close paralleling more extensively or for the whole of this part of the connection, along with the limitations on the ability to secure the necessary number of outages mean that close paralleling has not been considered further.

5.5 Location Specific Feedback

5.5.1 The feedback on specific areas of the consultation corridor has been grouped into geographical areas rather than the sections set out in the 2022 consultation, in order to more easily describe where potential changes could be made.

5.5.2 A number of factors were considered, including environmental and technical considerations. Only those factors which were differentiators have been described below.

Norwich Main Substation to Hapton

5.5.3 Southwards from Norwich Main Substation, located in South Norfolk District, the consultation corridor[8] is to the west of the existing 400 kV overhead line. A number of alternatives have been considered in response to consultation feedback.

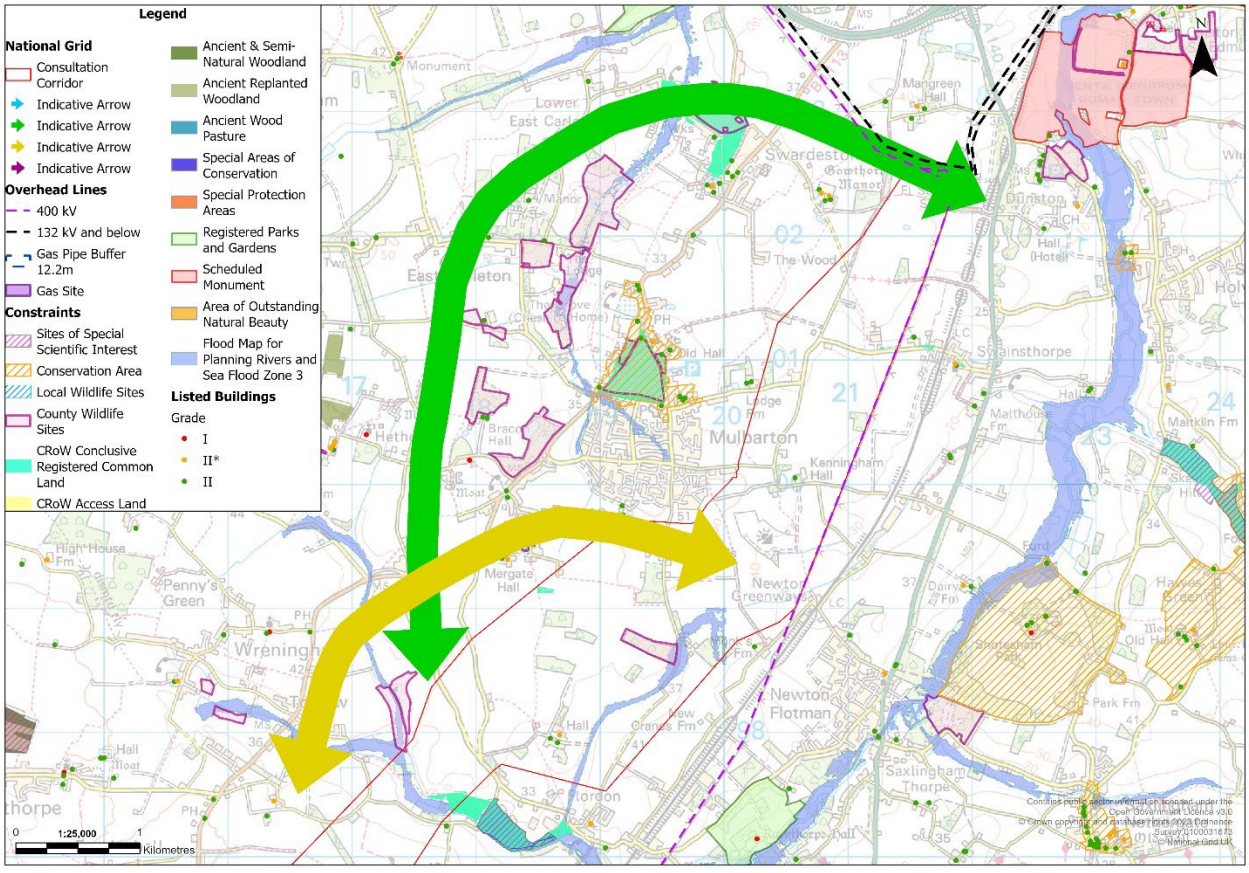
5.5.4 Alternative corridors to the east would be longer (and less compliant with Holford Rule 3) due to the location of residential areas (such as Newton Flotman) and the relatively extensive extent of conservation areas at Shotesham and Shotesham Park.

5.5.5 Routeing to the west of Mulbarton (including alongside the A11) (indicative green route on Figure 5.1) would require a much longer route, (less compliant with Holford Rule 3). This would require initially routeing north-west then south to route around villages such as Swardeston and East Carleton and would not reduce environmental effects.

5.5.6 Existing and proposed solar energy development to the east and south-east of Mulbarton are potential restrictions to routeing, although these could be addressed by detailed routeing of an alignment. It preferable to remain with the consultation corridor than routeing closer to Mulbarton alongside the B1113 (indicative yellow route on Figure 5.1) as proposed by some feedback, reducing effects on a potentially larger number of residential properties. We have also become aware of other proposed energy related development to the south of the substation which will be considered as details emerge, noting that the proposal remains as yet uncertain.

5.5.7 The consultation corridor has therefore remained unchanged in this location.

Figure 5.1 – Indicative alternative routes – Mulbarton



[8] The 'consultation corridor' is the corridor presented in the CPRSS and which was the subject of the non-statutory consultation (April – June 2022)

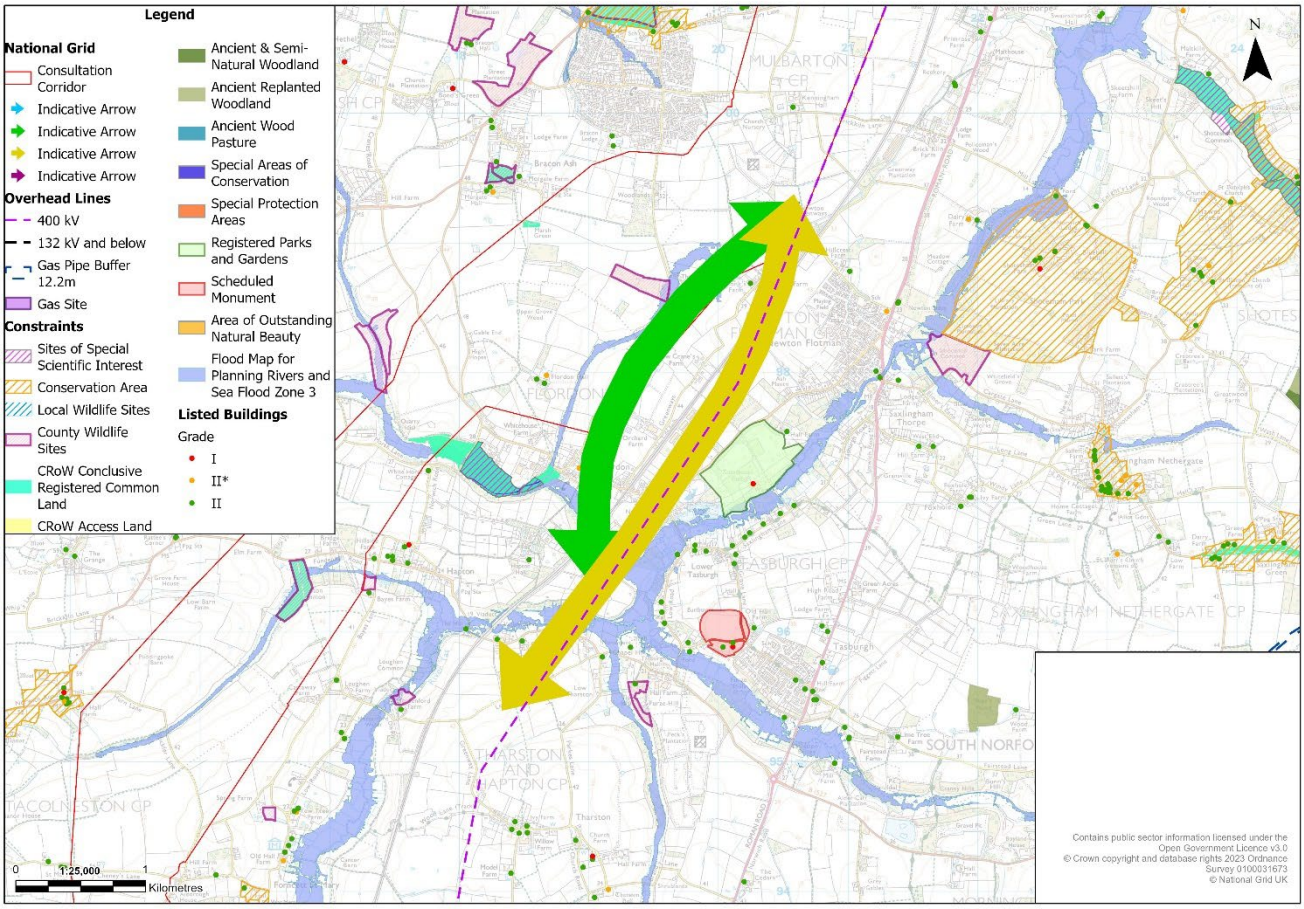
5.5.8 At Flordon, feedback suggested routeing to the east of the consultation corridor closely following the existing overhead line.

5.5.9 Alternative corridors, adjacent to the Rectory (Figure 5.2, indicative green route) or close to the existing overhead line (Figure 5.2, indicative yellow route) were considered and were less preferred due to the close proximity of residential properties, rail infrastructure, commercial buildings, orchards and other woodland. Some sections of underground cables would be required (to cross the existing 400 kV overhead line and railway or navigate through narrow gaps) resulting in additional infrastructure (CSE compounds), requirements for additional system outages, increased Construction (Design and Management) Regulations (CDM) risks, and increased cost.

5.5.10 The alternative routes would lead to greater environmental effects (including on residential amenity and unavoidable loss of woodland) compared with the consultation corridor. The alternatives are therefore less compliant with the Holford Rules particularly in respect of Rules 2 and 5 (see Para 2.4.17) and the Supplementary Notes.

5.5.11 The consultation corridor has therefore remained unchanged in this location, routed to the west of Flordon where it can benefit from using existing woodland to provide some filtering and screening of views.

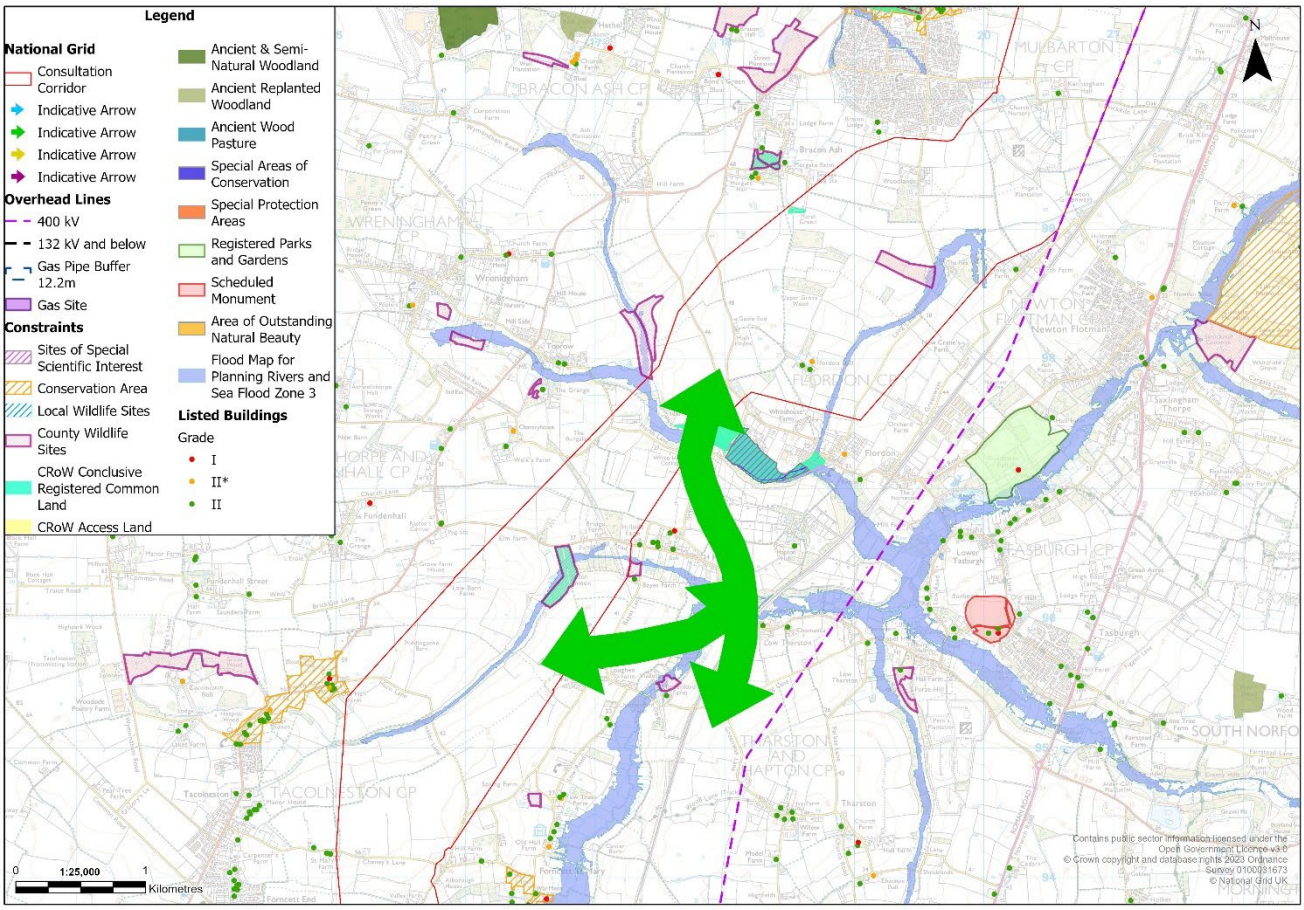
Figure 5.2 – Indicative alternative routes – Flordon



5.5.12 South of Flordon the consultation corridor passes to the west of Flordon Common, avoiding oversail of a SSSI, SAC and CRoW access land, and then to the north-west of Hapton.

5.5.13 An alternative to the east past Hapton would be less direct, with more changes of direction and would be more likely to increase effects on the Grade I Listed Church of St Margaret at Hapton (less compliant with Holford Rules 2 and 3).

Figure 5.3 – Indicative alternative routes – South of Flordon



Hapton to Tibenham Airfield

5.5.14 The consultation corridor then continues southwards along the Tas valley, passing Forncett St Mary and Forncett St Peter to the east, and Tacolneston and Forncett End to the west. This is the most direct route and therefore is more compliant with Holford Rule 3). It benefits to some degree from being relatively lower lying than land to the west (increasing compliance with Holford Rules 4 and 5).

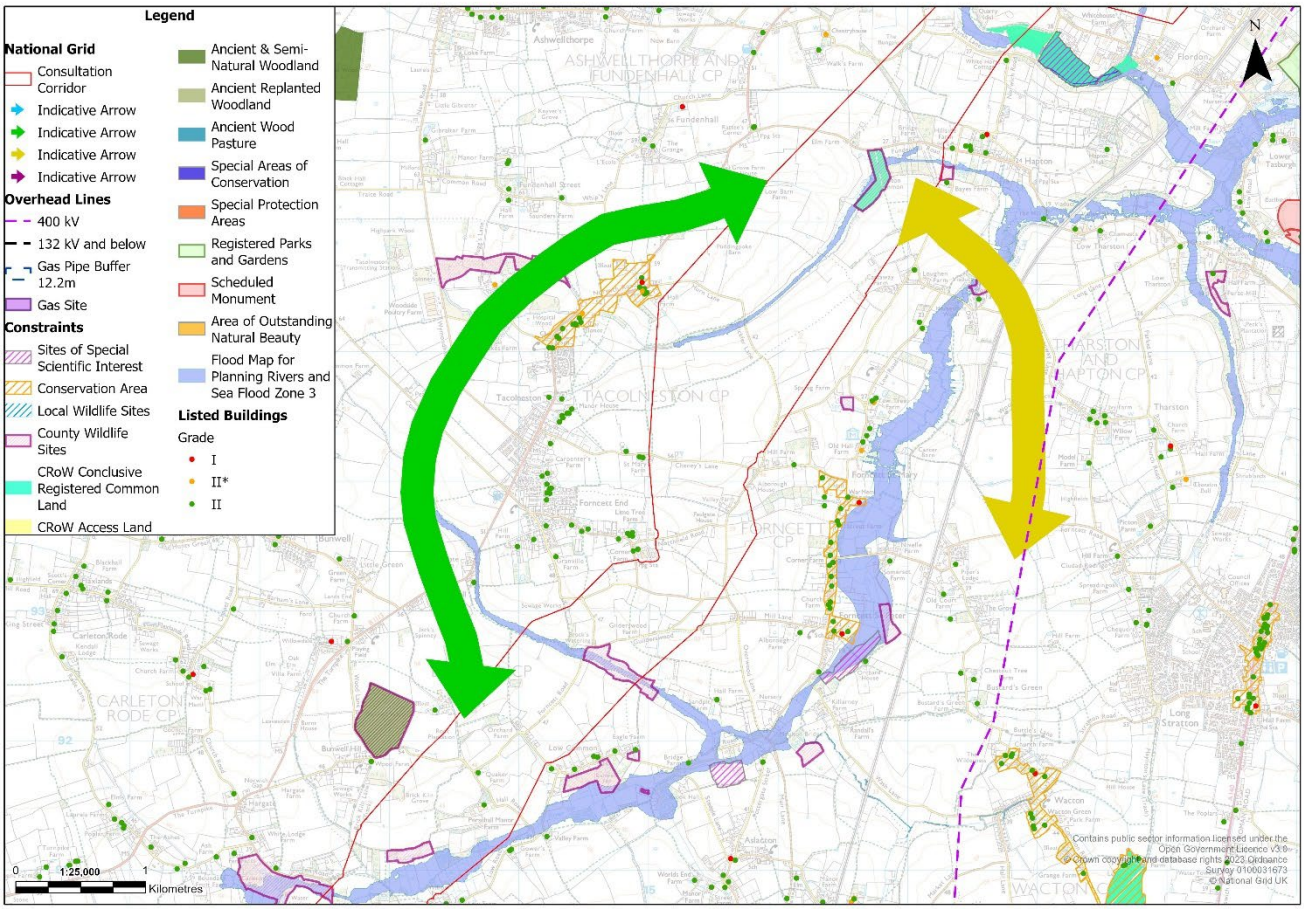
5.5.15 An alternative to the west of Tacolneston (see Figure 5.4 indicative green route) was considered, to align with routeing further to the south where the consultation corridor diverts to the west. The alternative would require a longer corridor (approximately 25% longer) to avoid Tacolneston and its conservation area. The alternative would also result in the loss of woodland at a County Wildlife Site (CWS) (at Tacolneston Hall) and was considered more likely to lead to increased effects on the Grade II* Tacolneston Hall and Grade I Church of All Saints (and be less compliant with Holford Rule 2).

5.5.16 An alternative to the east (see Figure 5.4 indicative yellow route above), crossing to the south of Hapton over Loughen Common would potentially facilitate close paralleling of the existing 400 kV overhead line. However, at a number of locations between Hapton and Diss, there are existing residential and commercial properties. Close paralleling would involve either short diversions such that the properties would have overhead line infrastructure close to each side (reducing compliance with Holford Rule Supplementary

Notes) or would require multiple crossings and/or diversions of the existing overhead line, increasing environmental effects and costs. A number of woodlands are also present, which would result in the unavoidable loss of trees without further diversion. Additionally in a number of locations the route would be closer to, and increase effects on, a number of Grade II listed buildings (less compliant with Holford Rule 2).

5.5.17 Taking the above into account, the consultation corridor was preferred over the alternatives.

Figure 5.4 – Indicative alternative routes – Tacolneston



5.5.18 South from Forncett End the consultation corridor routes to the south west to cross the Tas Valley close to the Diss Road / Fen Road junction in order to avoid the combined constraints of Tibenham Airfield and the villages of Tibenham and Aslacton. The consultation corridor then passes to the west of Low Common, Cargate Common and Tibenham and to the east of Bunwell Hill.

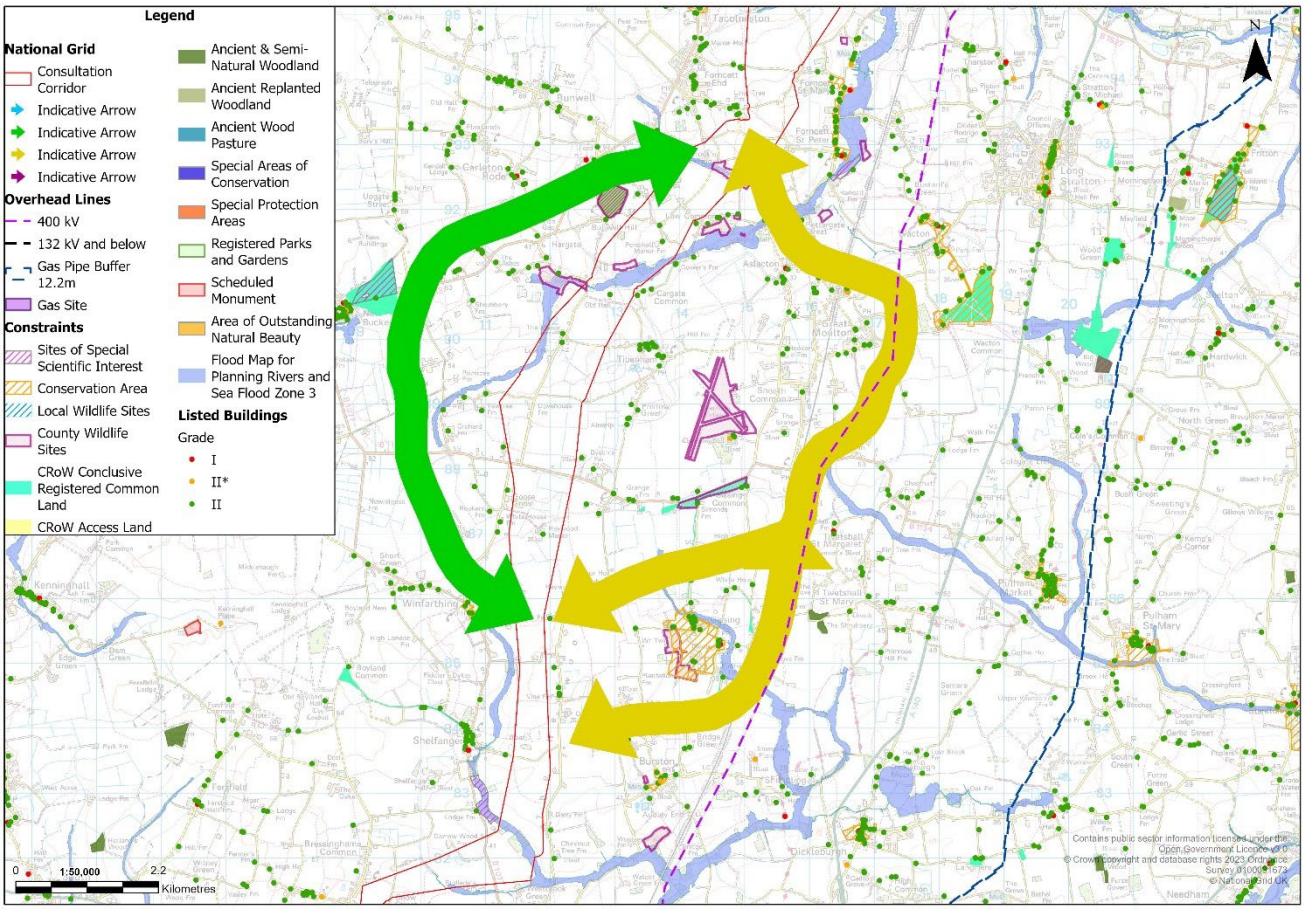
5.5.19 Feedback in this area commented on the potential effects on Tibenham and Priory Airfields and on a nearby electromagnetically sensitive facility.

5.5.20 Routeing to the west (see Figure 5.5 green indicative route) would require a diversion to the north of Bunwell Hill, and north and west of Hargate, passing the east side of New Buckenham and re connecting with the consultation corridor to the north of Winfarthing. This would be longer and less direct (less compliant with Holford Rule 3) would transfer effects from the consultation corridor to other similar receptors and would potentially increase the number of receptors due to the additional length. It would also be likely to increase effects on the Grade I Listed Church of St Michael on Church Road (less compliant with Holford Rule 2).

5.5.21 An alternative to the west would not provide any benefit in respect of the potential effects on the airfields. Priory Airfield is in closest proximity to the east of the consultation corridor however its north south alignment is parallel to the corridor (and would be parallel with any associated overhead line within that corridor) reducing the potential for interaction with aircraft landing and taking off. With detailed routeing of an alignment, the use of additional pylons and consideration of other mitigation, the Project would not be expected to interfere with continued safe flight activities. This will be confirmed and refined through engagement with the site operator.

5.5.22 Tibenham Airfield is at a greater distance from the consultation corridor and is believed to be used mostly by gliders (including towed launch by powered aircraft). It is likely that detailed routeing of an alignment would be able to achieve a separation of approximately 2 km which would not be expected to interfere with continued safe flight activities. This will be confirmed and refined through engagement with the relevant operator.

Figure 5.5 – Indicative alternative routes – Tibenham



5.5.23 In respect of the electromagnetically sensitive facility, an alternative to the west would increase separation, though a review by National Grid's relevant technical experts has advised that no effects on the safety of activities would be expected at 500 m separation.

5.5.24 Calculations show that at 500 m the electric field, which could induce a voltage on conductive objects is reduced to 0.0009 V/m assuming an unperturbed field (i.e. nothing between the overhead line and the facility). However the walls of the facility, together with the intervening trees, bushes, fences etc will screen these fields. Typically, the background field in a home is around 20 V/m, so if an electricity supply is present and tools or appliances are used, the fields already present will be significantly higher than those that an overhead line would produce at this distance.

5.5.25 At a distance of 500 m magnetic fields would have reduced to 0.008 μT (microtesla), which as above if an electricity supply is present will be well below the background field already present. A typical home in the UK has a background field of around 0.05 μT, and many appliances which operate on mains electricity produce many 10's of microtesla when in operation. The magnetic fields from an overhead line will therefore be below expected background field levels.

5.5.26 On this basis, and with detailed routeing of the alignment potentially increasing the separation to around 700 m, the consultation corridor remains preferred.

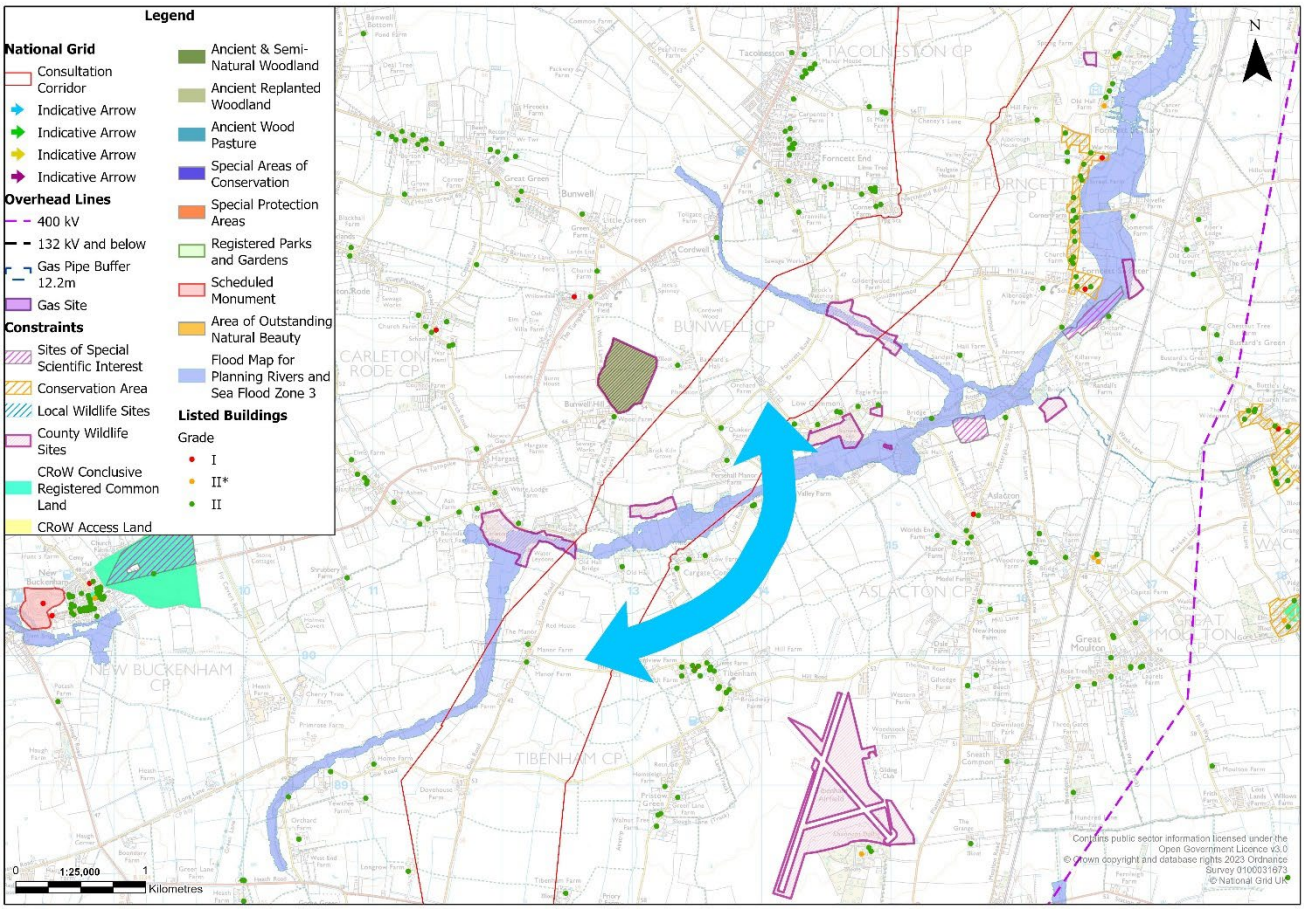
5.5.27 Alternatives to the east (shown yellow on Figure 5.5) close paralleling the existing 400 kV overhead line were also considered. These alternatives would be less direct, longer (by approximately 2.5 km), and would require two crossings of the existing 400 kV overhead line, increasing technical complexity and costs. Due to constraints associated with crossing the existing overhead line in this area, the Aslacton Parish Land SSSI would be expected to be oversailed and some tree removal would be unavoidable (reducing compliance with Holford Rule 2).

5.5.28 Effects would also be transferred from the consultation corridor to other receptors along the alternative route and therefore as no additional benefit would be provided to the airfields or the sensitive facility the alternatives were not preferred over the consultation corridor.

5.5.29 In order to respond to feedback to avoid crossing the smaller field pattern in the Tas Valley an alternative was considered. Passing Cargate Common to the east and south before then passing north of Tibenham (see Figure 5.6 indicative blue route) would allow the crossing of the valley in larger arable fields (in the vicinity of Valley Farm). This alternative was less preferred than the consultation corridor as it would transfer effects to other receptors and would be likely to increase effects on the Grade I Listed Church of All Saints in Tibenham (reducing compliance with Holford Rule 2). It would also be less direct with more and sharper changes of direction and would be closer to Tibenham Airfield, albeit at a direction and distance where, with detailed routeing, overhead line structures would not be expected to interfere with safe flight activities.

5.5.30 The consultation corridor therefore remains unchanged in this location.

Figure 5.6 – Indicative alternative route – Cargate Common, Tas Valley

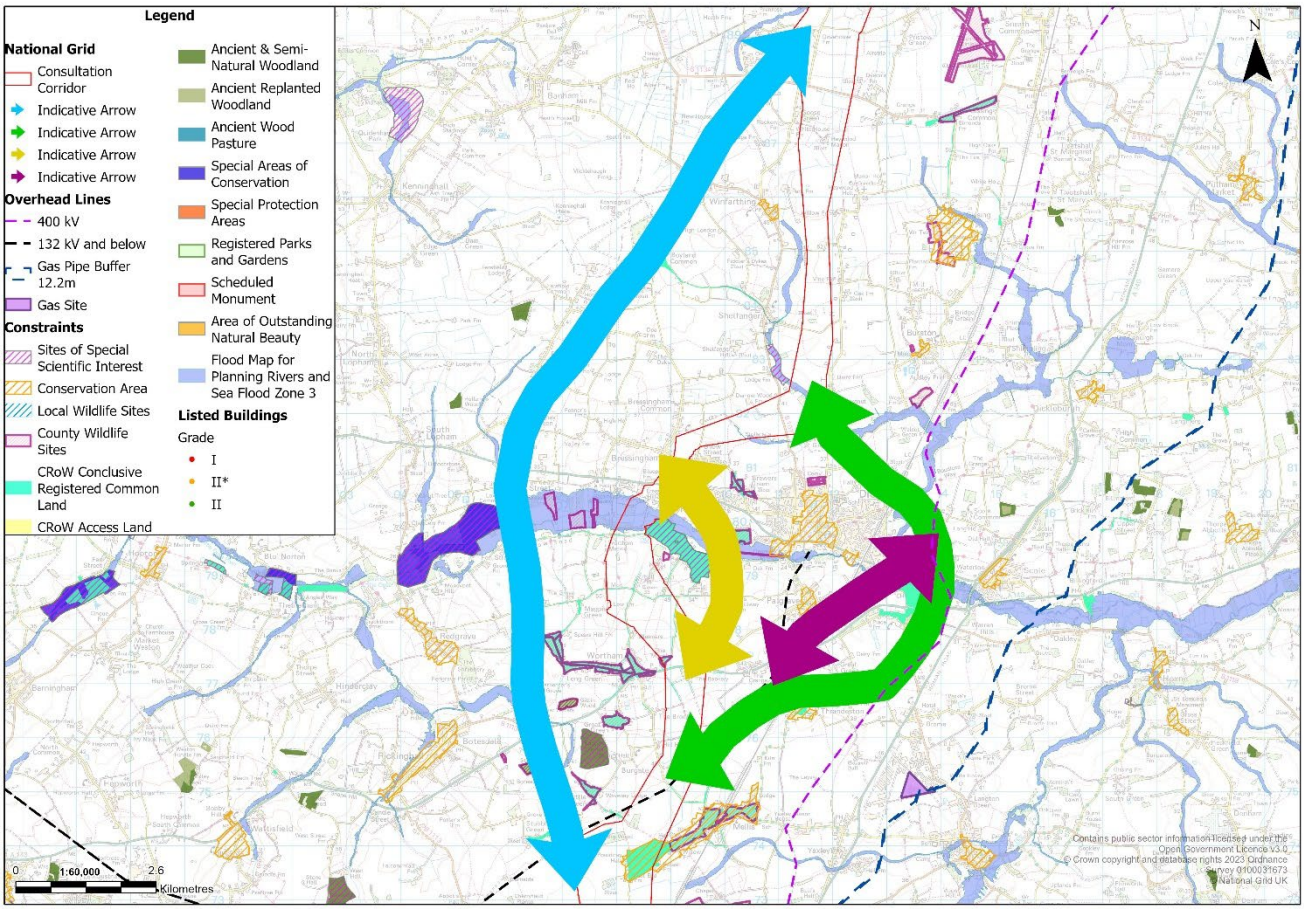


Tibenham Airfield to Mellis

5.5.31 South of Tibenham, routeing is influenced by the need to pass to the east or west of Diss across the Waveney Valley with feedback suggesting alternatives to both sides. The River Waveney forms the boundary between South Norfolk District to the north and Mid Suffolk to the south.

5.5.32 From the shallow valley lying to the east of Winfarthing Road to the east of Winfarthing and Shelfanger it may be possible to cross the Waveney valley to the east of Diss around Stuston Common Golf Course or to the west of Diss either just east of Bressingham Steam Museum and Gardens or in the vicinity of Fen Street, although the presence of residential properties limits opportunities to cross the valley. Feedback in this area suggested a number of alternatives and also suggested the use of underground cable technology.

Figure 5.7 Indicative alternative routes – Diss



5.5.33 To the north of Diss the consultation corridor diverts to the west, south of Shelfanger, then at Bressingham diverts south passing to the west of Diss. The corridor passes between residential areas then crosses the A1066 and passes adjacent to Bressingham Steam Museum and Garden. It then passes to the west of Wortham Ling SSSI, and heads south-west around the Grade I Listed St Marys Church, and to the east of Wortham. Routeing to the west of Wortham would be less direct and less compliant with Holford Rule 3 and was not considered further.

5.5.34 An alternative further to the west (shown blue in Figure 5.7) could divert from the consultation corridor to the west of Goose Green and Short Green (to the east of Fersfield). However, this alternative to the west would cross the Waveney Valley adjacent to the Waveney and Little Ouse SAC and pass through an area adjacent to a SSSI where water meadow type environment is present. Ecological effects would potentially be greater than for the consultation corridor (less compliant with Holford Rule 2) or for alternatives to the east. In addition, further south, a western alternative would transfer effects to receptors similar to those within the consultation corridor. For these reasons this alternative further west of the 2022 consultation corridor was less preferred.

5.5.35 Feedback identified that the consultation corridor would oversail land associated with a recently approved planning application (2021/0612) for a care and wellbeing business and detailed routeing also identified effects near the Grade I Listed Church of St Mary the Virgin to the west of Wortham House.

5.5.36 To respond to this feedback an alternative, still to the west of Diss, crossing the A1066 and then passing to the east of Wortham Ling (shown yellow in Figure 5.7) on slightly lower ground than the consultation corridor has been considered. This would avoid the oversail of the land with planning consent but potentially increases effects on recreational receptors and the main access route to the well-used Wortham Ling (identified as open access land and also designated as a SSSI). The alternative would reduce effects on the Grade I Listed Church of St Mary but transfer the effects to some (lesser) degree to the Grade I Listed St Remegius Church. Effects are however considered to be reduced overall by the relationship of St Remegius Church to the adjacent urban area and by the route passing this on lower ground, albeit close to an undesignated Moat.

5.5.37 Alternatives to the east or further west of Wortham Ling would lead to some effects on trees and woodland though these effects would be expected to be greater on the consultation corridor and less on the alternative east of Wortham Ling.

5.5.38 Overall the alternative to between Diss and Wortham Ling would potentially increase effects on recreational amenity (much depending on routeing and pylon heights), whilst reducing effects on Grade I heritage assets, trees and woodland, on a care and well-being business and would generally be on lower lying ground. Overall this alternative passing to the west of Diss and to the east of Wortham Ling was preferred over the consultation corridor.

5.5.39 Alternative corridors passing from Shelfanger to Wortham around the east side of Diss were also considered (shown green and green then red in Figure 5.7). These would deviate from the consultation corridor in the vicinity of Shelfanger, pass south of Burston and cross the railway line before approaching the existing 400 kV overhead line to the north of the Grade I Listed Church of St Andrew at Frenze. Opportunities diverting from the consultation corridor further north (potentially with greater paralleling of the existing 400 kV overhead line) either to the north or south of Gissing, are restricted by the presence of residential properties and the need to cross the railway line at close to a right angle. Such an alternative would be longer and less direct with sharper changes of direction and would therefore be less compliant with Holford Rule 3. As it is longer this alternative would also incur greater cost and was therefore not preferred over the consultation corridor.

5.5.40 Southwards from the rail crossing, routeing would have to pass to the west of Diss Business Centre due to the location of residential properties. One option (shown red in Figure 5.7) would pass over the western end of Stuston Common Golf Course and common land and then follow the railway line and the existing 132 kV overhead line to the east side of Palgrave. A further option (remaining in the green alternative on Figure 5.7) would cross the golf course at its eastern end and follow the existing 400 kV overhead line for a short distance before deviating westwards to the north of Thrandeston to follow the existing 132 kV overhead line infrastructure from Palgrave.

5.5.41 Alternatives passing to the south of Thrandeston would result in a number of residential properties being positioned between the existing overhead line and the new overhead line, which would be less compliant with the Holford Rule Supplementary Notes and were therefore not considered further.

5.5.42 Overall the eastern corridor options around Diss were less preferred than a western alternative around Diss as they would transfer effects to other receptors (including a Grade I listed church and several residential properties which would be unavoidably positioned between existing and new overhead lines), interact more extensively with areas of peaty ground (adding additional construction challenge) and would also necessitate two crossings of railway lines adding additional cost and technical challenge (and less compliant with CDM regulations which require the designing out of risk were

possible). Routeing in proximity to the golf course would require a complex diversion of the existing 400 kV overhead line to create appropriate space without oversail of residential properties. Eastern corridor options would also be closer to residential properties than an alternative to the west of Diss, reducing compliance with the Holford Supplementary Notes (shown blue on Figure 5.7).

5.5.43 For these reasons a corridor to the west of Diss is preferred over those to the east.

5.5.44 Feedback also proposed crossing the Waveney Valley with underground cables rather than an overhead line. National Grid's duties and obligations include balancing the need to be economic and efficient, which includes keeping costs down in the interests of the bill-paying consumers, with a duty to have regard to preserving amenity, which includes the natural environment, cultural heritage, landscape and visual quality. NPS EN-5 makes it clear that the government considers overhead lines to be appropriate and acceptable in most instances, although it recognises that that there may be, at particularly sensitive locations, potential adverse landscape and visual impacts of an overhead line that make it unacceptable in planning terms. On the basis of assessment completed to date, National Grid do not consider routeing of an overhead line through this area presents to be incompatible with our duties and obligations and therefore an overhead line is proposed in this location. The Project will however continue to be reviewed in response to feedback and as further information becomes available.

Mellis to Mendlesham

5.5.45 South of Diss through to Bramford Substation the consultation corridor is within Mid Suffolk District.

5.5.46 The location of the consultation corridor was influenced by the urban areas of Stowmarket and Needham Market. Routeing to the east of Needham Market, closely parallel to the existing 400 kV overhead line would be very constrained by features which include: the Baylham Roman Site Scheduled Monument; the registered park and garden associated with the Grade I Listed Shrubland Hall; residential properties around Needham Market and Bosmere Hall; the A14 and A140 and associated service area, the existing 400 kV overhead line and former quarry workings.

5.5.47 The most direct route to Bramford would be between Stowmarket and Needham Market (within the consultation corridor), close to the DNO substation which may facilitate opportunities to rationalise the DNO network in this area.

5.5.48 To the west of Stowmarket any alternative corridor would transfer effects to other receptors similar to those along the consultation corridor. It would be less direct (around 4 km to 5 km longer), and therefore less compliant with Holford Rule 3, and would offer no significant benefits. This was therefore not considered further.

5.5.49 A corridor from the west side of Diss towards the A14 between Stowmarket and Needham Market would have to route either east or west of Mellis. The extent of the Mellis conservation area, the location of residential properties at, and between, Mellis and Yaxley and the proximity of the existing overhead line are considerations. Paralleling the existing overhead line to the east would result in residential properties between Mellis and Yaxley being oversailed or properties with new and existing overhead lines to both sides. This has therefore not been taken forward and the consultation corridor to the west of Mellis is still preferred.

5.5.50 To the south the consultation corridor passes between Gislingham and Thornham Park, constrained by the crossing of the railway line (which is elevated on embankment in some places where it would require taller pylons to achieve necessary safety clearances), the presence of residential properties in Gislingham, the location of Ancient Woodland and scattered properties towards Thornham Park. Alternatives to the west would be longer and less direct, and would potentially have to pass west of Gislingham, Finningham and Bacton, given the extent of scattered and ribbon residential development, or would have multiple changes of direction. To the east, close paralleling the existing 400 kV overhead line would require a longer route (with additional effects) and either several residential properties surrounded by the new and existing overhead line or multiple crossings of the existing overhead line (with the associated outages and additional technical risks and environmental effects from additional infrastructure).

5.5.51 As such these alternatives were less preferred than the consultation corridor.

5.5.52 To the west of the consultation corridor an alternative was investigated, from the south of Cotton, routeing between Gipping and Old Newton, and re-joining the consultation corridor to the north of Saxham Street. Residential properties along Saxham Street constrain opportunities to re-join the consultation corridor further south.

5.5.53 This alternative would be a much less direct route than the consultation corridor, would require more and larger changes of direction (less compliant with Holford Rule 3) and would transfer effects to other receptors.

5.5.54 A more localised alternative to the east, to closely parallel the existing 400 kV overhead line, would be less direct requiring more and larger changes of direction and would lead to either a number of properties being between the new and existing overhead line or multiple crossings of the existing overhead line with the requirement for outages and additional technical risks.

5.5.55 Overall, these alternatives are less preferred than the consultation corridor as there are opportunities to develop a direct route within the corridor.

Mendlesham to Needham Market

5.5.56 Feedback in this section requested the use of underground cable technology for the crossing of the River Gipping Valley.

5.5.57 National Grid considers the use of overhead line technology through this area to be consistent with relevant policy and in line with our duties and obligations. An underground solution would require approximately 3 – 4 km of underground cables between two CSE compounds. National Grid have to balance the need to be economic and efficient with its duty to have regard to preserving amenity, which includes the natural environment, cultural heritage, landscape and visual quality.

5.5.58 On balance given the additional costs, technical challenges associated with crossing existing highways, watercourses and railway lines by underground cable technology, and the environmental effects that may arise, underground cable technology is not proposed to be taken forward in this location.

Needham Market to Bramford

5.5.59 Feedback in this section suggested a number of alternatives:

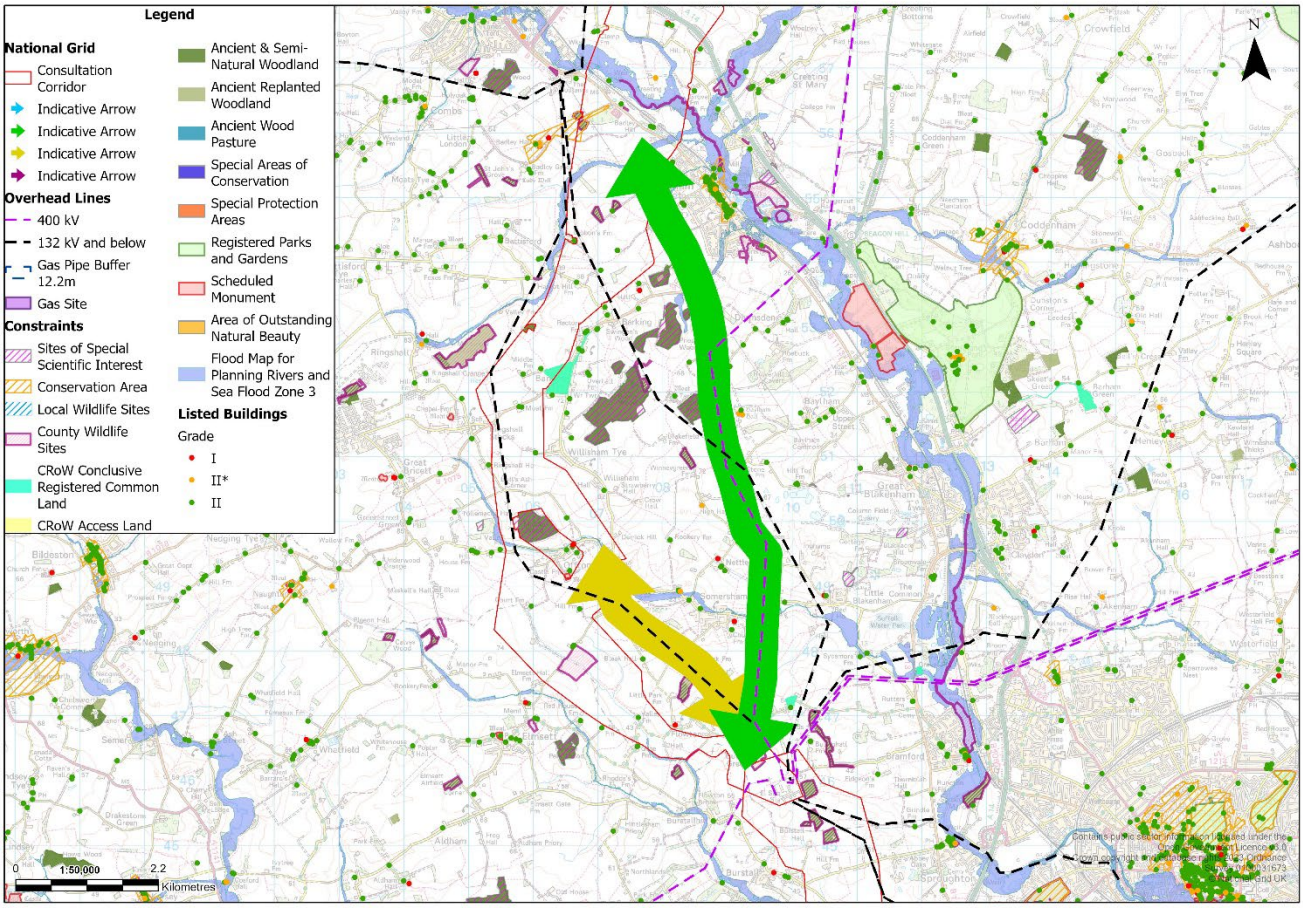
- more closely paralleling existing overhead line infrastructure;
- replacing lower voltage 132 kV overhead lines (to reduce potential cumulative effects); and
- using underground cable technology (to avoid potential cumulative effects).

5.5.60 Respondents also referenced potential effects on various listed buildings and residential properties within villages (such as Barking and Barking Tye). Wattisham Flying Station also requested clarification that the Project would not conflict with the Instrument Landing System and expressed a desire to keep infrastructure in a similar location to the existing 132 kV overhead lines and avoid the introduction of additional corridors of wirescape in the area of their flight activities.

5.5.61 In response to this feedback a number of alternatives to the consultation corridor (which passes to the south of Flowton) were considered:

- passing closer to the south-west of Needham Market to then close parallel the existing 400 kV overhead line into Bramford Substation (shown green in Figure 5.8); and
- passing to the north of Flowton (shown yellow in Figure 5.8).

Figure 5.8 Indicative alternative routes – North of Flowton



5.5.62 An alternative to closely parallel the existing 400 kV overhead line would pass between Needham Market and Barking Woods SSSI (Preistley Wood) to then cross the existing 400 kV overhead line, with a short section of underground cables between CSE compounds, to then close parallel it through to Bramford Substation. Due to the location of existing properties (including a listed building that would unavoidably be between the existing and new overhead lines) and the entry required to the western side of Bramford Substation a further crossing of the existing overhead line would be required. In order to avoid encircling a listed building and to cross back to the west a minimum of a further 3.5 km of underground cables would be required.

5.5.63 Extending the underground cables back to the north of Barking Woods SSSI (Ditch Wood) would avoid the need for two additional CSE compounds and reduce effects on closely positioned properties. This would however extend the length of underground cables required to around 7 km i.e. from the first crossing of the 400 kV overhead line through to the substation.

5.5.64 Taking into consideration National Grid's duties and obligations on balance neither of these alternatives are preferred to options which require either no or shorter underground cable sections.

5.5.65 Around Flowton an alternative from the south of Offton, passing to the north-eastern side of Flowton parallel to or replacing the existing 132 kV overhead line, was considered and is preferred to the consultation corridor. This change is referred to as 'North of Flowton'.

5.5.66 During more detailed design development further assessment and consideration of effects has been given to measures to reduce the potential cumulative effects on Offton Castle Scheduled Monument with the potential to adopt either a relatively western position within the consultation corridor or removal or undergrounding of the existing 132 kV overhead line (see Section 6.4).

5.5.67 The Grade I Listed Church of St Mary (at Flowton) was in close proximity to all potential route alignments within the consultation corridor. Routeing opportunities for an overhead line to the south of Flowton are constrained in proximity to the church and effects may constitute 'substantial harm'[9]. These effects could be avoided by the use of underground cables to the southwest of Flowton for approximately 3.5 km into Bramford Substation. Due to the now confirmed extent of other proposed developments in the vicinity (solar and battery storage), an alternative to the north-east of Flowton, paralleling or potentially removing the existing 132 kV overhead line is feasible and would avoid such effects on the Church of St Mary, reduce the magnitude of change on residential amenity and it is considered likely to be able to be routed as overhead line through to Bramford Substation.

5.5.68 This alternative is preferred over the consultation corridor and the alternative requiring underground cables, as it is more consistent with National Grid's obligations and duties and would have less effects on heritage assets and residential amenity.

[9]Substantial harm is any impact which could cause harm to or loss of the significance of a heritage asset. This is typically attributed to listed buildings, those of historic importance, registered parks and gardens, and World Heritage Sites.

Bramford Substation to CSE compound north of the Dedham Vale AONB

5.5.69 Feedback on this section had to be considered in combination with the feedback on the location of the EACN substation.

5.5.70 After consideration of the feedback, for the reasons as set out below (paras 5.5.85 – 5.5.99), the proposed location for the EACN substation on the Tendring Peninsula is still preferred. In order to follow the geography of the route however consideration of the routeing south of Bramford is considered here.

5.5.71 This section of the consultation corridor starts within Mid Suffolk District in the immediate vicinity of Bramford Substation before crossing into Babergh District. It continues within Babergh to the River Stour which forms the boundary with Colchester District before crossing into Tendring District just beyond the AONB boundary.

5.5.72 Feedback has suggested that other corridors for connection to the EACN substation, as set out in the CPRSS, were preferred. A back check of the CPRSS has been undertaken and the outcome set out in Section 4.3 of this report. The corridor presented at the 2022 consultation is still preferred for the reasons set out in the CPRSS.

5.5.73 Feedback in relation to this section also referred to:

- a preference for the use of underground cable technology from Bramford Substation to the CSE compound;
- the opportunity to follow the alignment of the two existing 132 kV overhead lines from Bramford Substation to the EACN substation;
- the opportunity to follow the A12 more closely;
- the location of the CSE compound, required for the transition to 400 kV underground cable to route through the AONB;
- the potential effects of the Project on the listed buildings at Little Wenham; and
- potential effects on residential properties and listed buildings in Great Wenham and Holton St Mary.

5.5.74 As the consultation corridor between Bramford Substation and a potential CSE compound (to the north of the AONB) is not within a designated area National Grid does not consider the use of underground cable technology to be consistent with its duties and relevant policy framework. The consultation corridor and technology therefore remain preferred.

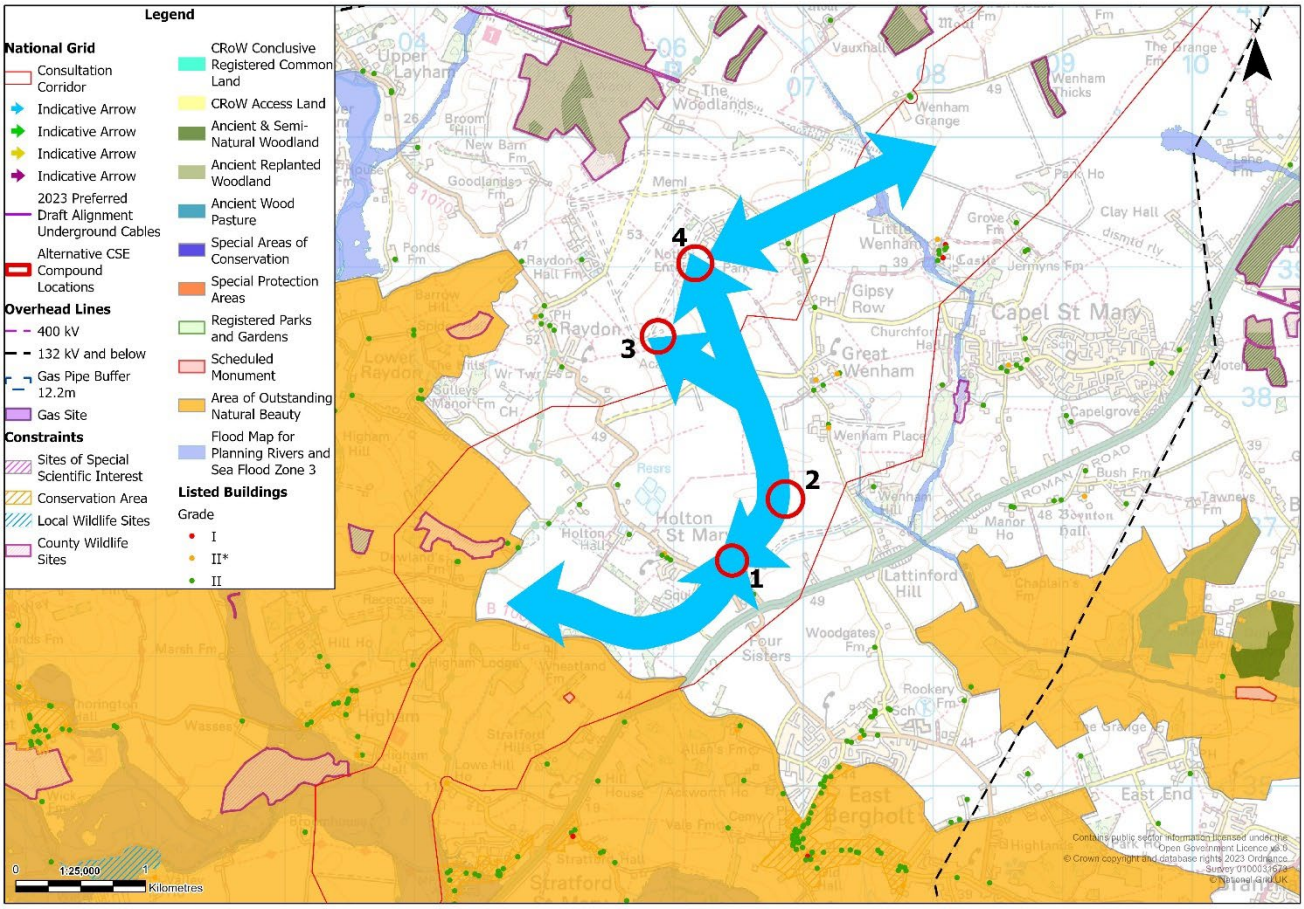
5.5.75 Whilst there may be potential benefits of infrastructure being concentrated geographically there are a number of constraints to utilising the route of, or close paralleling, the existing 132 kV overhead line. The existing overhead line passes very close to residential properties with insufficient space to route a 400 kV overhead line or underground cables. Similarly, there are a number of residential properties (individual properties, hamlets, villages and towns) in close proximity to the A12 which would necessitate multiple diversions of an overhead line. These options were not therefore taken forward and the consultation corridor remains preferred.

5.5.76 Respondents suggested that the CSE compound should be located at least 3 miles (5 km) from the AONB boundary in order to protect the setting of the AONB or located adjacent to Notley Enterprise Park / Raydon Airfield. National Grid prefers to establish an appropriate location for a CSE compound based on site specific circumstances and the potential effects rather than adopting an arbitrary distance. This approach and the outcome is set out below.

5.5.77 The CPRSS did not identify specific locations for the CSE compound. In response to the feedback four sites were identified for consideration (see Figure 5.9):

- Site 1 - east of Holton St Mary alongside the B1070 near Oaks Farm and Four Sisters Farm (within the consultation corridor);
- Site 2 - approximately 500 m to the northeast of Site 1 where existing tree belts could provide some screening (within the consultation corridor);
- Site 3 - at the southern extent of Raydon airfield, to the east of Raydon (outside the consultation corridor); and
- Site 4 - abutting the buildings at the south-western end of the existing Notley Enterprise Park (outside the consultation corridor).

Figure 5.9 for Options CSE Compound Locations and Indicative Routes



5.5.78 Taking into account the potential effects of an overhead line on the AONB and other receptors, and the combined effects of the CSE compound and routeing, Site 4 adjacent to Notley Enterprise Park with an overhead line approaching around the north side of the Enterprise Park was preferred. This also requires an onward alternative corridor for the underground cables passing just to the west of Bacon's Green to the west of Holton St

Mary, thereby avoiding unnecessary diversion for the alignment as it continues south. This is consistent with Holford Rule 1. The CSE compound positioning accords with the Horlock Rules, siting near to other industrial development. It would also allow for the development of an overhead line alignment that would allow continued safe flight activity at the Raydon Wings airstrip, reduce effects on the Grade I listed buildings at Little Wenham and would be greater distance from, or offer additional screening from, residential receptors such as in Little and Great Wenham (increasing compliance with Holford Rules 2, 4 and the supplementary notes). This is preferred to the alternative (shown blue on Figure 5.9) which would require a longer diversion taking the route to the east of Holton St Mary and therefore would be closer to listed buildings at Great and Little Wenham.

5.5.79 The alternative options for the CSE compound were all less preferred for the following reasons:

- two of the sites (Sites 1 and 2) offered the potential for a shorter length (and cost) of underground cables) but would both transfer effects to some degree to other receptors, including at Great Wenham;
- Site 3 was closer to the edge of the AONB in a more open position and would substantially transfer effects from receptors in Great and Little Wenham to receptors in Raydon;
- a connection to Site 1 (near Holton St Mary), if routed via the north of Notley Enterprise Park, would address the effects at Little Wenham and reduce effects at Great Wenham (passing at greater distance to the west) but would increase effects at Holton St Mary. Although there could be opportunities for additional screening this site was less preferred overall because of the transfer of effects; and
- Site 2 (north-west of Holton St Mary) does not offer the shorter underground cable length and if routed via the north of Notley Enterprise Park would result in a less direct alignment with more changes of direction.

5.5.80 In addition, potential alignments within the consultation corridor to Sites 1 and 2 were less preferred due to the potential effects on listed buildings (particularly at Little Wenham) and greater effects on residential amenity compared with Sites 3 and 4 and overhead line to the north of Notley Enterprise Park.

CSE compound north of the AONB to EACN substation

5.5.81 Feedback on the underground cable section through the AONB suggested that the routes should be closer to the coast beyond the AONB boundary or offshore.

5.5.82 Feedback on the overhead line in this section was focussed on addressing the effects of a double overhead line in the vicinity of Ardleigh.

5.5.83 In order to consider the feedback in this section it was necessary to consider the location of and routeing to the EACN substation. The outcome of this overall consideration is set out later in this section.

EACN substation siting and connection technology

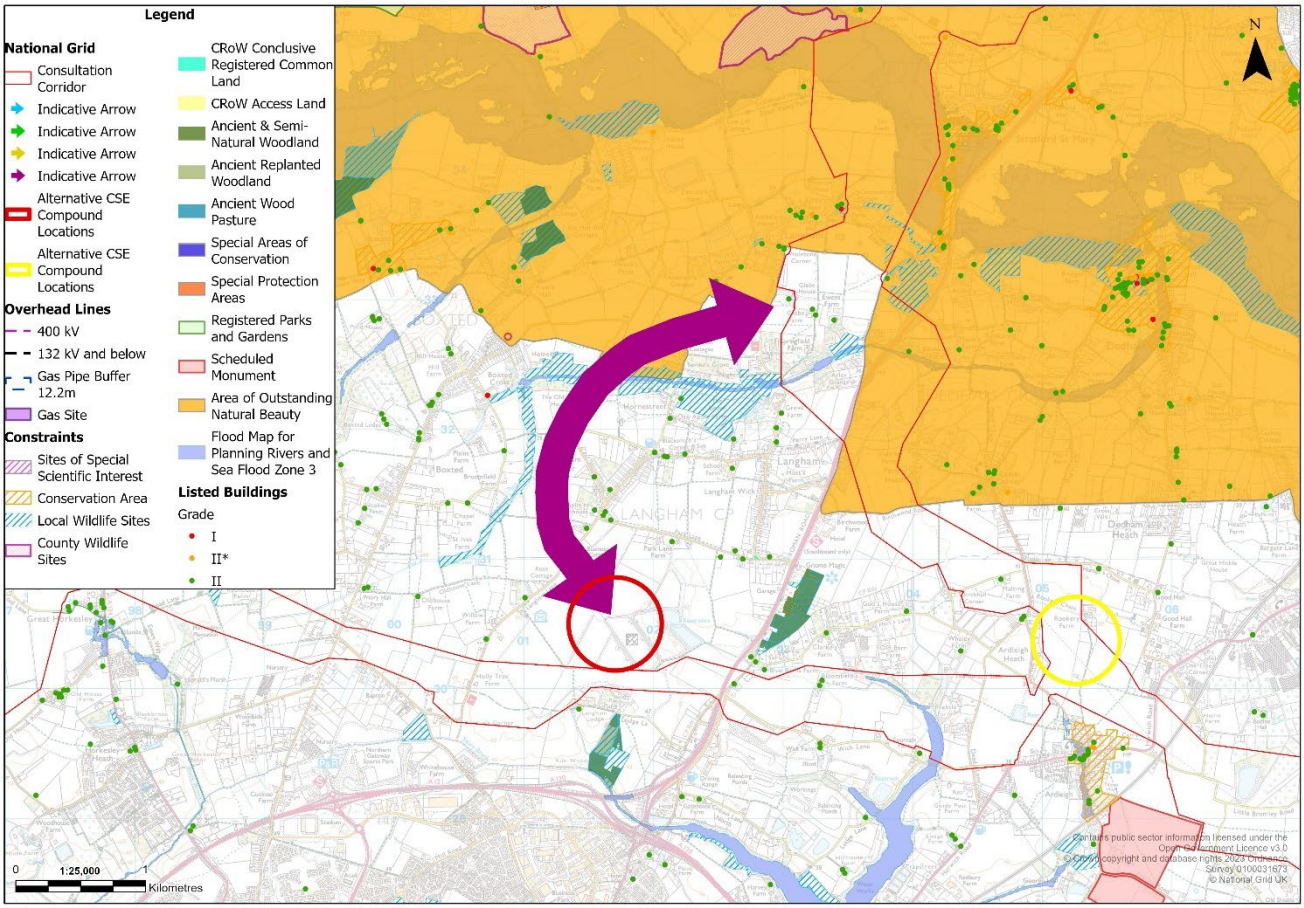
5.5.84 Respondents to the consultation suggested alternative locations would be more appropriate. These included sites beyond the Tendring peninsula (such as at Bradwell) which are less preferred for the reasons as set out in the CPRSS and for Bradwell as set out at paragraphs 5.2.2 to 5.2.4 above.

5.5.85 Two alternative sites in the vicinity of Colchester were proposed by respondents, as a means of removing the need for two overhead lines from the Ardleigh area to the EACN substation. These were:

- immediately to the north of Ardleigh (shown as a yellow circle on Figure 5.10), within Tendring District, where the consultation corridors from Bramford and to Tilbury converge; and
- the former RAF Boxted within Colchester District (also referred to as Old Langham Airfield) (shown as a red circle on Figure 5.10). This site would also require a section of alternative corridor and an indicative route is also shown red on Figure 5.10.

5.5.86 Respondents also suggested the use of industrial land north of Colchester, without naming a specific location. The former RAF Boxted site has been considered as a surrogate for such locations as no other industrial land has been identifiable from the brief feedback response detail received.

Figure 5.10 Indicative alternative EACN substation locations and routes



5.5.87 The alternative to the north of Ardleigh (shown yellow on Figure 5.10) is not of sufficient size to accommodate all the combined substation elements (i.e. National Grid and the customers). It was therefore only considered for the 400 kV EACN substation and further sites would be required for the customers' infrastructure.

5.5.88 The location could accommodate a CSE compound, for the transition from the underground cable section through the AONB to overhead line for the connection through to the EACN substation at Lawford (within Tendring District). From here there would be two overhead lines from Ardleigh to the EACN substation at Lawford. The combination of effects arising from the CSE compound and two overhead lines close to the north of Ardleigh (where views from the conservation area are towards the AONB over an open landscape) is considered to be unlikely to be acceptable in policy terms.

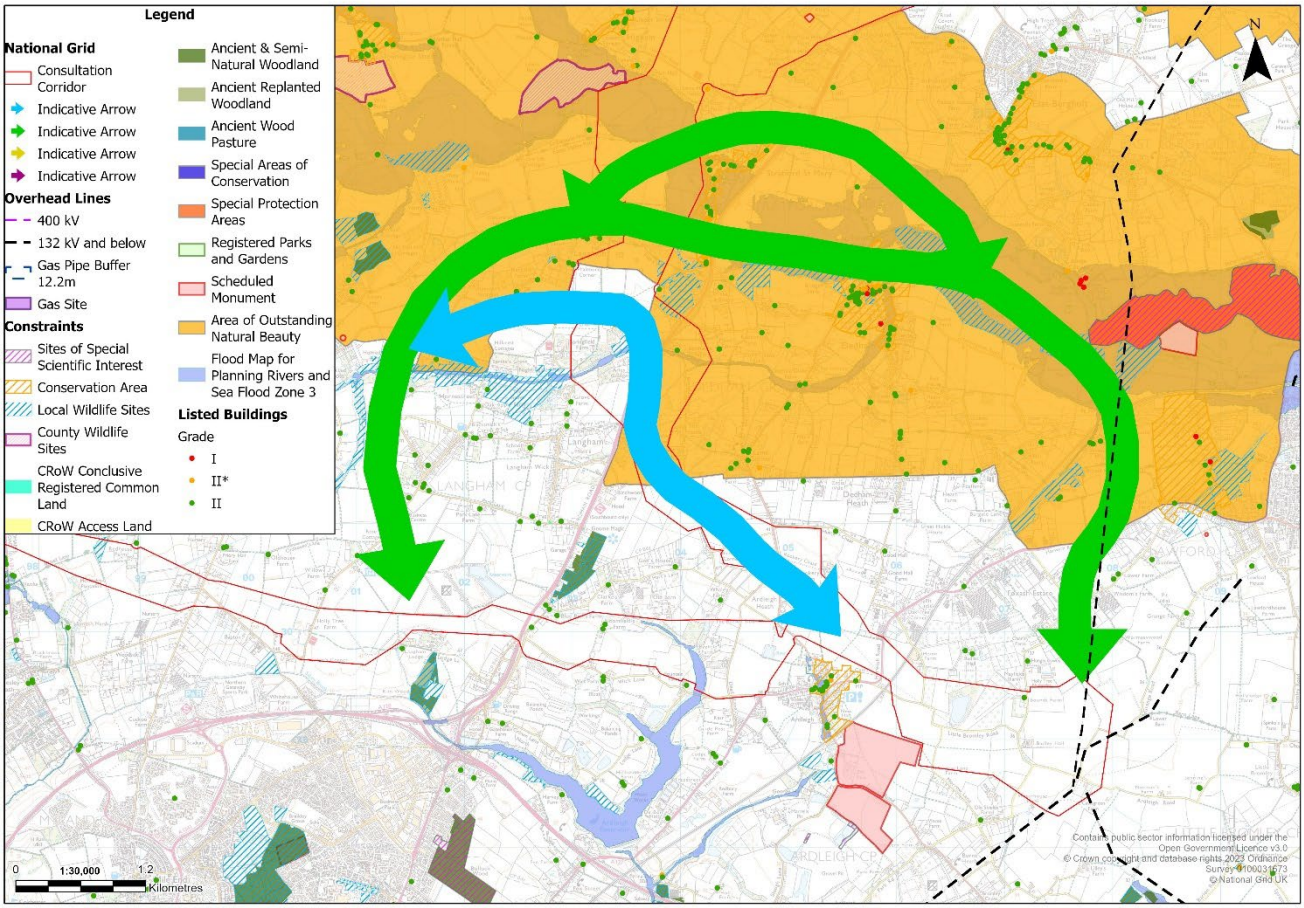
5.5.89 Locating the EACN substation to the north of Ardleigh would avoid the need for the 400 kV overhead lines to continue further east. However, the scale of the substation infrastructure, even without considering the issues associated with customer connections reaching this point, for the reasons set out above mean that this location for the substation has not been taken forward.

5.5.90 The former RAF Boxted site (indicative location shown red on Figure 5.10) has the capacity to accommodate both National Grid and customer substation requirements in close proximity. It would require an alternative corridor from Bramford, with, for comparison purposes, an indicative route between Boxted Cross and Langham Moor. It has been assumed that approximately 2 km of underground cables would extend from the AONB into the substation site. Locating the substation at the former RAF Boxted site would shorten the Project by approximately 8 km but increase each of the three customer connections by between approximately 7 – 15 km depending on the routeing.

5.5.91 Locating the EACN substation at this site would require the customer connections to extended further inland beyond the EACN substation location at Lawford. Indicative corridors are shown on Figure 5.11 including:

- a northern alternative (shown green in Figure 5.11) passing from the EACN substation to the north close to Flatford Mill and following the north side of the River Stour before following a similar corridor to that required for the 400 kV connection south from Bramford; and
- an alternative deviating at Ardleigh to the north of Langham to then merge with the northern corridor and consultation corridor to the west of Langham Moor (yellow then blue then green in Figure 5.11).

Figure 5.11 Indicative alternative routes to EACN



5.5.92 Siting the EACN substation and associated infrastructure at the former RAF Boxted site presents a need for underground cable installation for the customer connections in addition to the potential requirement for a backfeed to the UKPN network at the existing 132 kV Lawford Substation through a combination of these corridors.

5.5.93 The typical width required for each of the 132 kV underground cable connections is approximately 70 m (for open cut installation) increasing to around 140 m where trenchless crossing techniques (non open cut) (for example horizontal directional drill (HDD) technology) are required, such as under railway infrastructure. A connection by HVDC underground cable would be likely to require a narrower corridor (around 40 m) as generally fewer underground cables are needed. However this would similarly be increased where trenchless crossing techniques are required[10] and a converter station positioned on or in proximity to the former RAF Boxted site would also be needed.

5.5.94 The shortest alternative (the connection corridor) between the proposed EACN substation and the former RAF Boxted is constrained in a number of locations:

- at the A12 to the west of Ardleigh –approximately 240 m is available for routeing but this is reduced by a proposed distribution centre, north of Wick Lane, and other developments to the south of Wick Lane (where trenchless crossing would be required);

[10] National Grid underground cable corridor requirements are in the order of 100m to 120m for open cut trenching but widened to between 160m and 200m for trenchless crossings.

- at the B1029 Dedham Road crossing (approximately 100 m available for routeing) and,
- at the A137 Harwich Road and railway crossing where trenchless crossing of both would be required (approximately 100 m and 240 m available for routeing respectively).

5.5.95 The other alternatives are also restricted. The next shortest potential alternative (shown blue on Figure 5.11) using part of the consultation corridor back towards Bramford is also restricted at the A12 (where trenchless crossing would be required), around Springfield Farm and between Langham and Beacon Cross. The longest and more northern alternative (shown green on Figure 5.11) passing Flatford Mill is generally less space restricted but has pinch points, just west of Lawford, and would require a long section of underground cable construction within Flood Zones 2 and 3. The CPRSS also identified a more southern corridor (Section H) routeing to the south of Ardleigh but this is substantially constrained by the road infrastructure at the A12 / A120 junction, commercial and residential properties, and Ardleigh Reservoir. The alternative is therefore not preferred and has not been considered further.

5.5.96 Given the space restrictions at the various crossings it is expected that all corridors would be required for the customer connections and potential 132 kV backfeed supply from the proposed EACN substation location to the former RAF Boxted. This would amount to a total of around 28 km of corridor, accommodating one or more connection, compared to approximately 14 km of corridor required to connect the 400 kV network to the proposed EACN substation. Of the increase in corridor length, around half would be expected to be within the AONB in addition to the length of the consultation corridor already proposed through the AONB.

5.5.97 On balance the use of the former RAF Boxted is less preferred due to the increased extent of underground cables required through the AONB and to the EACN substation, increased environmental effects associated with the greater length of construction corridor and greater number of receptors associated with extent of the customer connections. Construction risks would also increase due to the greater number of crossings of road and rail infrastructure by trenchless crossing and a greater length of corridor within Flood Zones 2 and 3. The preferred location for the EACN substation therefore remains in the vicinity of the existing 132 kV Lawford Substation.

5.5.98 It follows from the above that with no suitable CSE location identified to the north of Ardleigh, and with the EACN substation proposed close to the east of Ardleigh, that underground cable technology would be continued from a CSE compound at Notley Enterprise Park through the AONB and all the way to the proposed EACN substation at Lawford. As such the project is currently being progressed on the basis of there being a single overhead line connection passing the north side of Ardleigh from the EACN substation to Tilbury, with the connection back to the existing Bramford substation as underground cable.

EACN substation to Great Horkesley

5.5.99 Initially within Tendring District the consultation corridor crosses into Colchester District to the west of the A12 west of Ardleigh.

5.5.100 Feedback in this section proposed the use of 400 kV underground cable technology due to potential effects on residential properties and heritage assets at Ardleigh and on the setting of the AONB. Respondents suggested that underground cables should be adopted within 3 miles / 5 km of the AONB boundary. The consultation corridor would have accommodated, for part of this section, a double overhead line.

5.5.101 As set out above it is now proposed to extend the 400 kV underground cables from north of the AONB through to the EACN substation site, resulting in a single overhead line through this section. The use of underground cables for the connection to Tilbury past Ardleigh is therefore considered against the potential effects arising from a single overhead line.

5.5.102 National Grid prefers to establish the need for the use of underground cables and an appropriate location for a CSE based on site specific circumstances and the potential effects rather than adopting an arbitrary distance. This section is not within a designated site and is at a distance such that effects on the setting of the AONB are reduced. As such it is considered that a sensitively routed overhead line would be consistent with National Grids duties and the relevant policy framework.

5.5.103 Respondents also noted a preference for a corridor to follow the A12. However routeing opportunities are limited in this area by the presence of existing development. This would result in a less direct route with more angles and would therefore be less compliant with the Holford Rules than the consultation corridor.

5.5.104 Some respondents expressed a preference for corridor H (along the approximate alignment of the A12 including the crossing of the A134) as described in the CPRSS. The CPRSS has been subject to a backcheck, as set out in Section 4.3 of this report, and corridor H remains less preferred due to the presence of existing, consented or proposed development (residential and commercial).

Great Horkesley to Colne Valley

5.5.105 Feedback on the area around Great Horkesley included the adoption of an alternative around the north and west of the AONB, following the A12 more closely and the use of 400 kV underground cable technology.

5.5.106 Alternative corridors around the AONB would avoid routeing past the north of Colchester. An alternative was considered in the CPRSS. The CPRSS has been subject to a backcheck, as set out in Section 4.3 of this report, and the consultation corridor through the AONB remains preferred.

5.5.107 The majority of respondents suggested that underground cable technology should be used in this location. The potential effects of an overhead line within the consultation corridor in close proximity to the AONB have been considered. Taking into account the potential effects on the AONB and its setting and relevant policy, underground cable is preferred.

5.5.108 CSE compound siting has been guided by the Horlock Rules, and has considered environmental features, residential property and other constraints to routeing and siting. The CSE compounds are proposed to located between Horkesley Plantation and Harrow Wood (to the east), and on land to the west of Crabtree Lane and north of the B1508 (to the west). To the east, the siting of a CSE compound is restricted by a high pressure gas pipeline to the south however the site would benefit from existing screening and backclothing by woodland which could be reinforced. The CSE compound to the west has been positioned where the landform dips into a valley, providing some screening and reducing effects arising from the overhead line as it heads to the south.

5.5.109 Feedback also suggested utilising underground cable technology for the crossing of the Colne Valley, a location that is not within a designated landscape. An overhead line in this location is consistent with relevant policy and in line with National Grid's duties. The additional 3 km to 4 km of underground cables required, and the associated additional costs, would not provide an appropriate balance of the need to be economic and efficient with a duty to have regard to preserving amenity. An underground cable solution has not therefore been taken forward in this location.

Colne Valley to Fairstead

5.5.110 This section starts within Colchester District before crossing into Braintree District at Surrex.

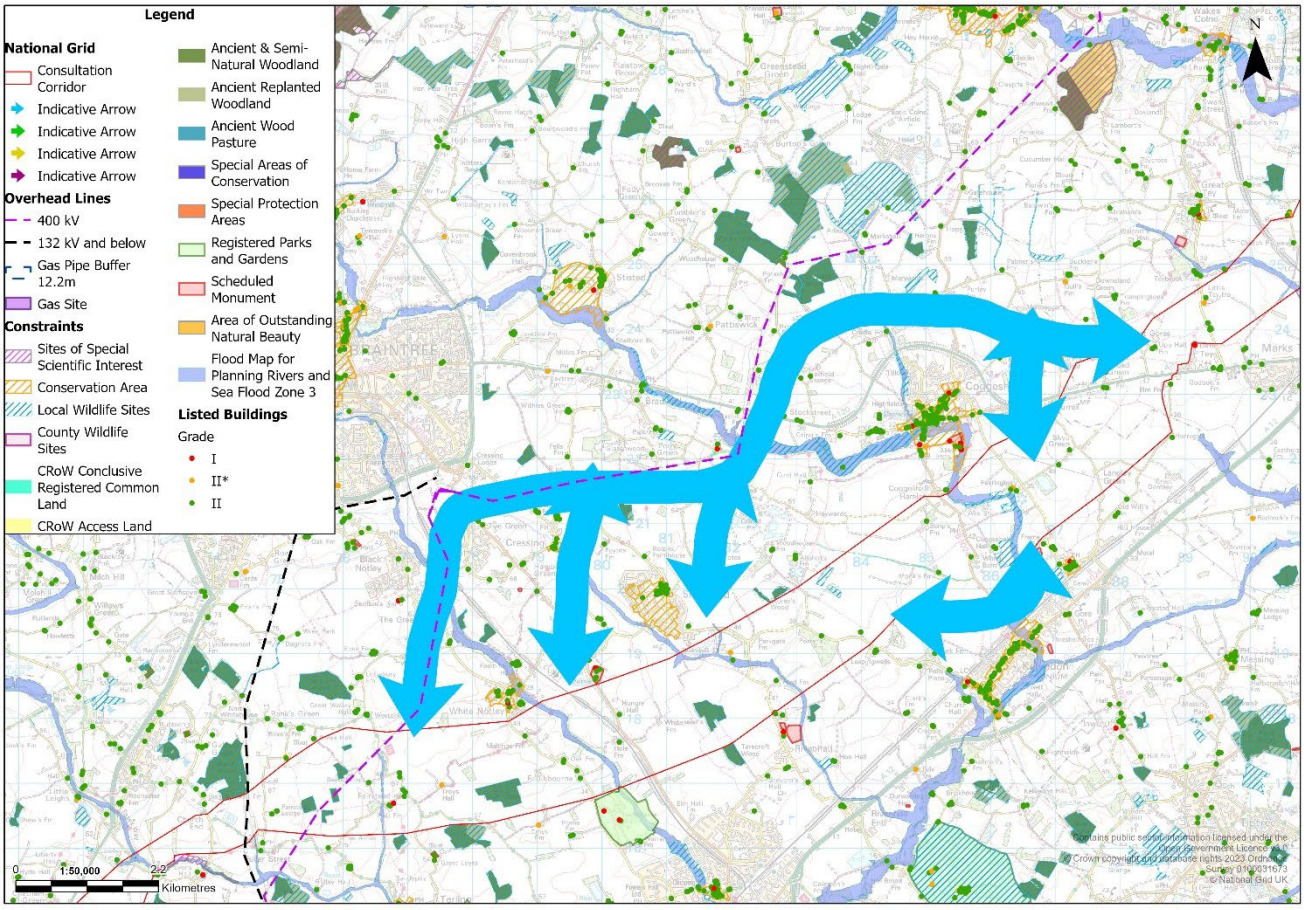
5.5.111 Alternative corridors that either close parallel the existing 400 kV overhead line to the north and / or to the east of Chelmsford or follow the route of the existing or proposed upgrade to the A12 to the south are less preferred for the reasons set out above.

5.5.112 Other feedback suggested:

- routeing to the north side of Coggeshall;
- avoiding the mineral workings between Coggeshall and Kelvedon, and a planned housing development at Marks Tey (Tey Green);
- routeing away from Faulkbourne; and
- re-routeing to reduce effects on Fairstead.

5.5.113 Routeing to the north of Coggeshall to reconnect with the consultation corridor to the east or west of Silver End, or east or west of White Notley has been considered. An alternative to the north would be less direct (between approximately 1.5 km – 5 km longer) would require an increased number of pylons (with the associated additional costs and environmental effects) and would involve more and sharper changes of direction than would be achievable within the consultation corridor (less compliant with Holford Rule 3). A northern route would also transfer effects to a greater number of potential receptors. This option has therefore not been taken forward and the consultation corridor remains preferred.

Figure 5.12 Indicative alternative routes – Coggeshall



5.5.114 Feedback also proposed routeing to avoid current and planned future mineral extraction sites between Coggeshall and Kelvedon. The area for future mineral extraction has no current status i.e. no allocation, approved planning consent or application. Routes to the north of Coggeshall which would avoid the future mineral extraction are not preferred (as set out above).

5.5.115 An alternative to the south would divert out of the consultation corridor close to Feering. This alternative would be less direct, require more and sharper changes of direction (less compliant with Holford Rule 3), would increase heritage effects at Feering (on a Grade I Listed church, the conservation area and a scheduled monument) reducing compliance with Holford Rule 2 and would route through woodland (which is a local wildlife site). It was considered that it would be possible to develop an alignment within the consultation corridor that would avoid pylons within the consented mineral extraction area and position pylons at the edge of the area for future mineral extraction and avoid routeing between the linked heritage assets at Feeringbury and Coggeshall. Such a route would also reduce effects on residential properties compared with the other alternatives and therefore the consultation corridor has remained unchanged.

5.5.116 Respondents also commented that the Project should be routed away from Faulkbourne. Routeing further south is constrained by Witham, the Grade I Listed Church of St Germanus and the Grade I Listed Faulkbourne Hall and associated Registered Park and Gardens. Routeing further north is constrained by White Notley and Grade I Listed assets at Cressing Temple. The consultation corridor is therefore preferred.

5.5.117 At Fairstead alternative routes to the south are constrained by Ancient Woodland, residential properties and the Longfield Solar Farm proposals, requiring an alignment with more changes of direction, which are therefore less preferred.

Fairstead to Writtle

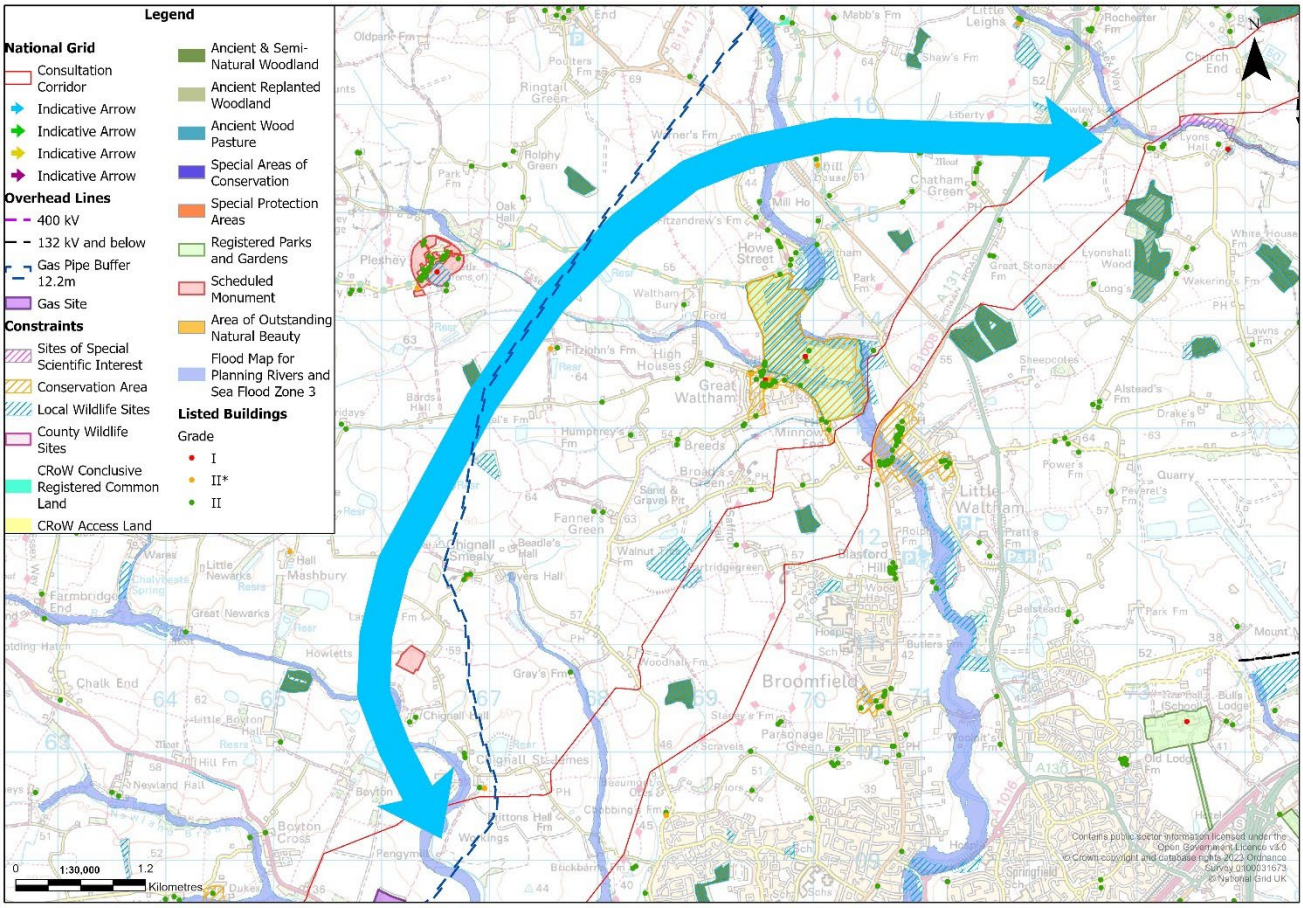
5.5.118 To the west of Fairstead the consultation corridor passes out of Braintree District and into Chelmsford District.

5.5.119 Feedback in this section suggested close paralleling of the existing 400 kV overhead line east of Chelmsford. As noted above (paras 5.4.2 – 5.4.6) this is less preferred and has not been taken forward.

5.5.120 Other feedback suggested routeing further to the west to avoid effects on the Little Waltham and Great Waltham conservation areas, reduce effects on residential properties and proposed housing, and to avoid restricting potential urban expansion to the west side of Chelmsford.

5.5.121 An alternative to the west of the consultation corridor, deviating from it to the south of Little Leighs, would, due to the extent of the Great Waltham conservation area and the residential property in Howe Street, pass around Warner's Farm. From here it would be expected to follow to the east of the existing high pressure gas pipeline to achieve appropriate separation from Pleshey and its heritage assets, before routeing southwest, crossing the pipeline to the north and then passing west of Chignall Smealey. It would likely reconnect with the consultation corridor between Boyton Hall and Boyton Cross adjacent to the Chelmsford Gas Compressor Site (see Figure 5.13).

Figure 5.13 Indicative alternative route – Great Waltham



5.5.122 Although this alternative would reduce potential heritage effects, particularly in respect of the Great Waltham conservation area and Langleys Registered Park and Garden, the bypass and screening from trees would reduce effects on Little Waltham conservation area and residential properties within the consultation corridor. Similarly residential properties in Great Waltham which are set back from the consultation corridor would benefit from extensive areas of trees that would filter views. Effects on residential properties would overall be reduced by the alternative as there are fewer properties within the more agricultural setting however effects on residential properties from an alignment within the consultation corridor are not considered to be at a level inconsistent with the relevant policy framework.

5.5.123 The alternative would be less direct, approximately 2.5 km to 3 km longer than the consultation corridor and it is therefore less compliant with Holford Rule 3. Overall, on balance due to its shorter length and absence of effects incompatible with relevant policy framework, the consultation corridor remains preferred and has been taken forward.

5.5.124 Some respondents expressed concern about potential interaction with the proposals for the A120 link road, however this has been considered as the draft alignment has been developed in this area (see Chapter 6).

5.5.125 Feedback also suggested following the A120 before turning west to route between Little Waltham and Broomfield. Although this would potentially reduce heritage effects it would directly affect proposed housing to the north-east and south-west of Little Waltham, and be less direct and would result in an alignment with greater changes of direction (less compliant with Holford Rule 3). This is less preferred than the consultation corridor and has therefore not been taken forward.

5.5.126 Routeing away from Broomfield Hospital, to prevent any impact on the air ambulance, and from housing proposals to the north of Broomfield Hospital was also suggested. The consultation corridor remains preferred in this location as it is considered that these concerns can be addressed through detailed routeing of the alignment.

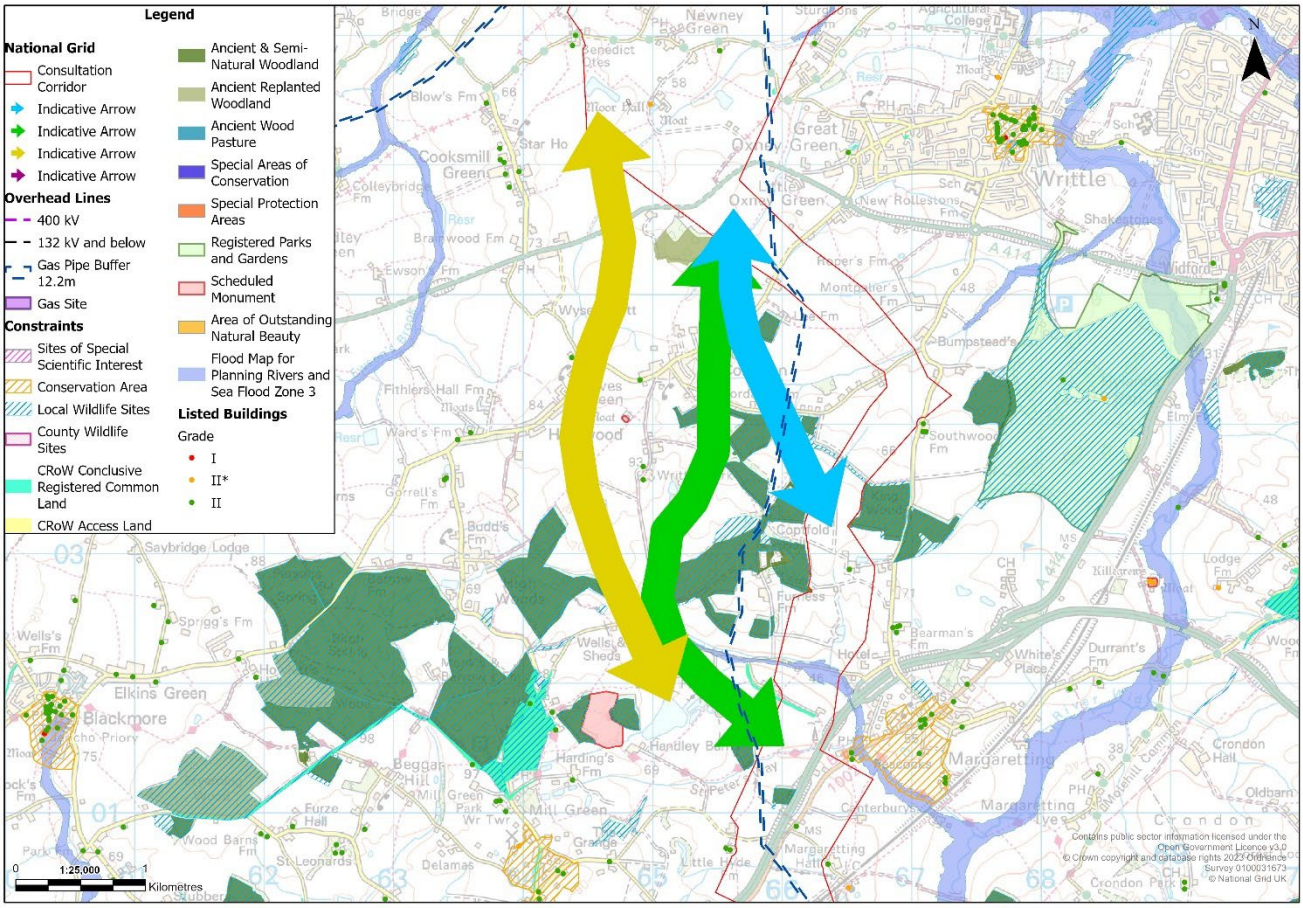
Writtle to Margaretting

5.5.127 In this section some respondents expressed concern about effects on Hylands Park. Given the separation of at least 600 m to the Park and extensive areas of intervening woodland this was not considered to be a basis for a change to the consultation corridor.

5.5.128 Feedback also suggested that alternatives should be considered southwards from the Writtle area to remove the relatively sharp change of direction to the west of Hylands Park, and that a more direct corridor would be appropriate in the Edney Common area following the shallow north / south valleys or making use of existing gaps between woodland.

5.5.129 An alternative would be to route between areas of woodland around 800 m to the west using a small gap in woodland created by a gas pipeline, passing closely to the north side of the BBC Transmitter site (shown turquoise on Figure 5.14). Whilst this alternative would reduce effects on residential amenity (increasing compliance with the Holford Rules Supplementary Notes) and slightly shorten the route (improving compliance with Holford Rule 3) it does not follow the grain of the landscape (reducing compliance with Holford Rules 4 and 5). More detailed consideration, including of the gas pipeline, identified the need for multiple sequential angle pylons to route between properties. Some loss of woodland including the edge of some ancient woodland would be unavoidable and therefore adopting this alternative was less preferred.

Figure 5.14 Indicative alternative routes – Writtle / Edney Common



5.5.130 A further two indicative corridors (shown yellow and green on Figure 5.14) were considered. These sought to use the shallow valleys passing to the east and west of Edney Common before reconnecting with the consultation corridor around Handley Green adjacent to Margaretting.

5.5.131 Whilst such alternatives would straighten and shorten the corridor route, at least partially follow the shallow valleys routes and reduce effects on properties at Nathan's Lane near the change of direction on the consultation corridor, effects would be transferred to a potentially greater number of other residential receptors. These alternatives would also pass through areas identified as Ancient Woodland where tree loss would be unavoidable to achieve the safety clearances required. These alternatives were therefore less preferred than the consultation corridor.

5.5.132 Although a change to the consultation corridor was not initially identified the preferred draft alignment has been straightened slightly west of Writtle and would deviate outside the consultation corridor (by up to approximately 110 m for a distance of approximately 400 m). This change is referred to as West of Writtle. Routeing sought to avoid a historic landfill site south east of Newney Green and positioning pylons on unsuitable ground. The straighter the alignment is also consistent with the Holford Rules and would reduce the need for large angle pylons in this area.

Margaretting to Hutton

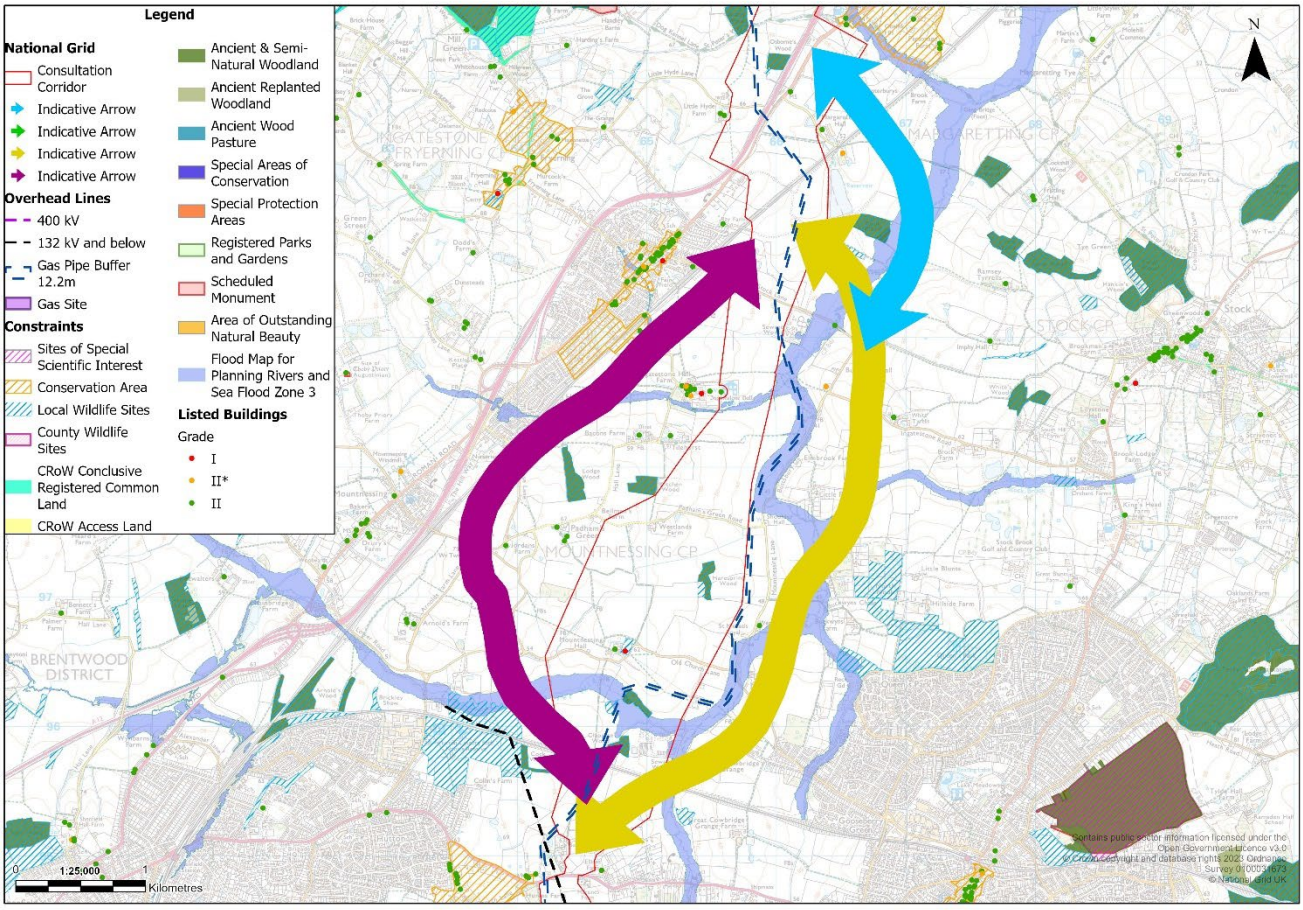
5.5.133 To the west of Margaretting the consultation corridor passes out of Chelmsford District and into Brentwood District before crossing back into Chelmsford District at the River Wid near Buttsbury Church. It then crosses back into Brentwood District at the border of Brentwood, Basildon and Chelmsford Districts before crossing briefly back into Basildon District to the east of the wastewater treatment works to the southeast of St Giles Church.

5.5.134 The consultation corridor passes to the west of Margaretting and to the east of Ingatestone before routeing southwards to a pinch point between Hutton and Billericay, to the immediate west of Havering's Grove and adjacent to an existing 132 kV overhead line.

5.5.135 Consideration was given to alternatives passing to the east side of Margaretting but these were not taken forward as a corridor here would be far less direct, need to pass close to Galleywood because of road and rail infrastructure and the numerous scattered residential and commercial properties and would also be less compliant with the Holford Rules.

5.5.136 An alternative passing to the further west of Ingatestone (not shown on the figure below) would, like the consultation corridor, need to reach the east side of Hutton. Routeing would be less direct and substantially constrained by the extent of residential and commercial properties and transport infrastructure south of Ingatestone around Mountnessing. This was therefore less preferred and not taken forward.

Figure 5.15 Indicative alternative routes – Ingatestone



5.5.137 A further alternative (shown pink on Figure 5.15) partly following the railway to the west of Ingatestone Hall was considered in order to reduce effects on Ingatestone Hall (where main views are to the east) and to allow greater separation to the Grade I Listed Church of St Giles. This would however be less direct and require a greater change of direction on relatively higher ground. It was therefore less compliant with the Holford Rules and less preferred than the alternatives to the east.

5.5.138 In order to consider the potential effects on the listed buildings in detail, provisional route alignments within the consultation corridor and further to the east (within the yellow corridor shown in Figure 5.15) midway between Ingatestone and Stock were developed. A route within the graduated swathe within the consultation corridor offered the most direct alignment following relatively lower ground within the Wid Valley however other constraints, Ancient Woodland, a wastewater treatment works and residential properties, restrict opportunities for routeing an alignment and could lead to effects on the Grade I listed buildings which may not be compatible with policy.

5.5.139 A more eastwards alternative was therefore developed within the yellow corridor in Figure 5.15, the routeing of which is restricted by the River Wid, the need to avoid a gas pipeline and the need to route to the east of Buttsbury church (which has association with Ingatestone parish). Various residential properties would also need to be avoided leading to a less straight alignment with more changes of direction than is possible within the graduated swathe. Effects on Grade I Listed heritage assets would however be much reduced.

5.5.140 Overall an alignment within the consultation corridor is less preferred over an alternative to the east, outside the consultation corridor, as although slightly longer and less direct the route further east would substantially reduce the effects on the Grade I Listed heritage assets at Ingatestone Hall and St Giles Church. This change to the preferred corridor is referred to as ‘Further east of Ingatestone’.

5.5.141 A more northerly corridor to reduce effects on the north side of Ingatestone was also considered (shown blue in Figure 5.15). Routeing here is restricted by Margaretting and residential properties just north of Margaretting Hall. Routeing here would result in an alignment relatively closer to more residential properties and also reduce the connection between the Grade II Listed Margaretting Hall and the Grade II* Listed Church of St Margaret within Margaretting village. It would also be a slightly less direct route. On balance the consultation corridor to the north east of Ingatestone in combination with the alternative further east passing to the east of Buttsbury Church and the wastewater treatment works are preferred.

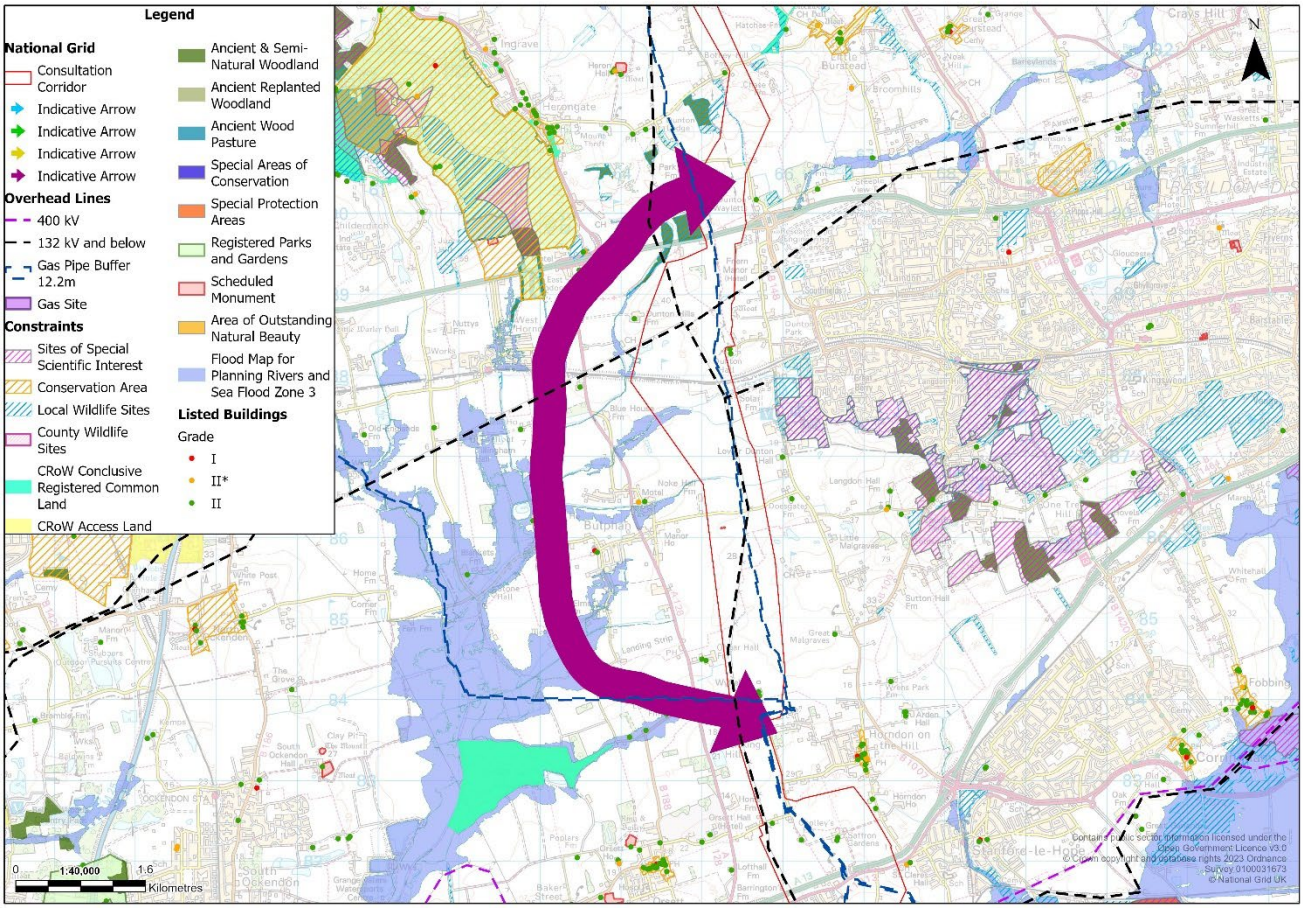
Hutton to West Horndon

5.5.142 Here the consultation corridor continues within Brentwood District, crossing into Basildon District south of James’s Wood, before crossing into Thurrock District south of the proposed Dunton Hills Garden Village and the railway.

5.5.143 Feedback on the section between the pinch point to the east of Hutton and the pinch point at Dunton Wayletts, between West Horndon and Basildon, suggested that a more coastal corridor should be adopted or that specific features (existing and proposed residential properties, a solar farm and a small airstrip at Chase Farm) should be avoided. Options within or in proximity to the coastal SPAs were considered and discounted in the CPRSS, which has itself been subject to a backcheck and review.

5.5.144 In response to feedback consideration has also been given to the avoidance of the proposed Dunton Hills Garden Village. The extent of urban areas prevents the adoption of alternatives to the east. An alternative to the west would have to skirt the northern edge of the proposed Garden Village development and the eastern edge of West Horndon, passing to the west of Bulphan, before reconnecting with the consultation corridor to the south of Thurrock Airstrip (shown pink on Figure 5.16). Such an alternative would be less direct with greater changes of direction. Effects would be transferred from proposed to existing residential properties and effects on the Grade I Listed Church of St Mary at Bulphan would be likely to increase. It would also pass very close to the western end of Thurrock Airstrip, requiring the use of underground cable technology (with two CSE compounds and additional environmental effects of these most notably landscape and visual effects) to allow flight activity to continue. Such an alternative would add cost to the Project, be less economic and efficient and was therefore not preferred.

Figure 5.16 Indicative alternative routes – Bulphan



5.5.145 On balance it is considered that a carefully routed alignment to the eastern edge of the consultation corridor is preferred. The majority of the Dunton Hills Garden Village proposals (based on an indicative layout provided in feedback) are set back by around 80m from an existing high pressure gas pipeline, which itself is some distance from the eastern edge of the consultation corridor. It is considered that there is sufficient space to allow for an alignment that is consistent with the Holford Rules and the relevant policy framework without reducing the available development area (as indicated on indicative masterplans provided as part of the consultation feedback).

West Horndon to Tilbury Substation

5.5.146 South of the railway line adjacent to West Horndon the consultation corridor passes into Thurrock.

5.5.147 South from West Horndon, feedback suggested paralleling or replacing the existing 132 kV overhead line and requested that alternatives be considered to reduce the potential for effects on Thurrock Airfield. Feedback on the southern end of the consultation corridor was mixed with responses variously favouring either the eastern and western corridors to the east of East Tilbury. The extent of a flood storage area between Tilbury and West Tilbury was also highlighted.

5.5.148 It is not feasible to closely follow or replace the alignment of the existing 132 kV overhead line. There are technical and safety considerations which restrict the space available for the combination of 400 kV overhead line and a 132 kV underground cable in proximity. UKPN have also indicated a preference for retention of the overhead line asset. Such an alternative would also place a 400 kV overhead line too close to the end of Thurrock Airfield. The preference therefore remains for an overhead line alignment within the graduated swathe, routed to reduce the potential for effects on continued flight activities at the airfield.

5.5.149 Having considered feedback and reviewed potential alignments the eastern alternative to the east of East Tilbury is not being taken forward. To the northern end of this alternative, part of the consultation corridor is restricted by gravel workings and a proposed energy park, elsewhere the corridor is also restricted by other mineral working, the presence of made ground and a gas pipeline. Routeing an overhead line is therefore very constrained and with further investigation of mineral workings and proposed developments may not be achievable.

5.5.150 Within the corridor to the west of East Tilbury, due to space restrictions between two existing overhead lines and the proposed Lower Thames Crossing (LTC) works, the crossing of the LTC scheme is best achieved by underground cables with CSE compounds to the north and south of the LTC works area. Similarly, the line entry to Tilbury Substation would require to be by underground cables, crossing under the existing rail line and 400 kV overhead line infrastructure.

5.5.151 The extent of the flood storage area to the south of West Tilbury would require a CSE compound to be sited to the north of West Tilbury. This would result in the two CSE compounds (to the south of the LTC crossing and to the north of West Tilbury) being under 2 km apart with a short section of overhead line between them through an area where two overhead lines already exist. In consideration of the additional environmental effects from the CSE compounds and the additional technical risks of the combination of CSE compounds, overhead line and underground cables, and the broadly similar cost to continuing the underground cables it has been concluded that underground cables will be used from the north of the LTC crossing to Tilbury Substation.

6 Design Evolution

6.1 Overview

6.1.1 The current preferred draft alignment has been developed within the consultation corridor as amended at:

- East of Wortham Ling;
- North of Flowton;
- West of Great Wenham; and
- Further East of Ingatestone.
- West of Writtle.

6.1.2 The context throughout the development of the Project is set by legislation and policy framework within the Electricity Act and National Policy Statements EN-1 and EN-5.

6.1.3 In addition to changes outside the corridor discussed in the preceding section, consideration has been given to feedback which proposed changes within the consultation corridor and to the graduated swathe (see Section 6.3 below), and to the proposed technology.

6.2 Design Principles and Technical Considerations

6.2.1 For the purposes of this initial assessment, the preferred draft alignment as presented in this document reflects the use of standard lattice pylons and where we might locate pylons, underground cables, Cable Sealing End (CSE) compounds (where underground cables join with overhead lines) and the new connection substation. The use of other pylon designs is still under consideration, if an overhead line route is progressed.

Overhead Line

6.2.2 NPS EN-5 paragraph 2.8.5 recognises the importance of the guidelines provided in the Holford Rules for the routeing of new overhead lines…*'the Holford Rules, were originally set out in 1959 by Lord Holford, and are intended as a common sense approach to the routeing of new overhead lines. These guidelines were reviewed and updated by the industry in the 1990s and should be followed by developers when designing their proposals*.

6.2.3 As well as the Holford Rules (and the Supplementary Notes) in developing the 2023 preferred draft alignment (hereafter referred to as the draft alignment) for an overhead line consideration has been given to a number of factors (including environmental, technical, construction and operational considerations) and the need to reach a balance of effects.

6.2.4 A number of design principles and technical considerations were applied to identify the draft alignment and specific pylon locations. In summary these included:

- seek an alignment that is compatible with the Holford Rules (see para 2.4.17);
- avoid or minimise impact on statutory, locally important environmental designations and socio-economic constraints. These can also include non-designated considerations such as:
  - landscape character;
  - non-designated heritage assets;
  - ecological resources (woodland, habitats etc);
  - recreational features;
  - commercial activities including aviation; and
  - residential properties (existing and proposed).
- technical specifications for pylon siting;
  - typical span length is 360 m (however this is influenced by a number of variables, for example topography, and span lengths may be longer or shorter);
  - minimum distances from the pylon centre point (where practicable):
    - watercourses, 40 m;
    - hedgerows, 30 m;
    - roads, 40 - 50 m (to enable erection of scaffolding for stringing process);
    - railway lines: at least pylon height falling distance between the pylon and any railway fence line;
    - public rights of way, 20 m; and
    - residential properties, maximum separation practicable whilst noting other constraints.
  - crossing of infrastructure - pylon heights and conductor clearance should be designed to allow for live line scaffold protection of the crossings during construction and any future operation and maintenance requirements. Cross railway lines, A- Roads and high-pressure gas and oil pipelines at a perpendicular angle, or as close to perpendicular as practicable.
- where the corridor is narrow and/ or heavily constrained as far as practical, position the alignment/pylons equidistance between receptors;
- where practicable, locate pylons at the edge of fields to reduce impact on farming operations, allowing sufficient space for conductors stringing at angle positions, and for future maintenance; and
- all other overhead lines (BT and UKPN (lower voltage, 11 kV, 33 kV and 132 kV)) where crossed are assumed not to be a constraint and will be mitigated (removed, diverted or underground).

Underground cables

6.2.5 In developing the draft alignment for the underground cables a number of considerations and design principles based on National Grid's duties, the relevant policy context, professional judgement and routeing experience have been applied. These included:

- seek an alignment that is as straight as possible (straighter cable alignments are preferred where possible in order to reduce overall cable length);
- avoid or minimise impact on statutory, locally important environmental designations and socio-economic constraints including avoiding areas of woodland and mature trees where possible;
- technical considerations:
  - avoid higher risk crossings where possible or minimise the number of constraint crossings (for example railways, major roads);
  - trenchless crossings to be close to perpendicular where constraints allow;
  - trenchless crossing techniques to be considered for higher risk crossings;
  - railway crossings to be perpendicular where possible. If not possible greater than a 75º angle to the railway alignment must be provided;
  - open-cut crossings of roads and rivers to be close to perpendicular. Obtuse angles are acceptable although significantly angled crossings are avoided as this can result in greater lengths of existing buried services needing to be self-supporting during the works; and
  - cable bends should be greater than 120 m where possible, to allow for standard duct connections. Where this is not possible, >30 m should be aimed for to avoid introducing unnecessary stresses when cable pulling.

6.2.6 The locations of existing underground utilities, roads, railways, watercourses have been identified in order to define the risk and outline the proposed method of crossing. This information has and will continue to inform the routeing process.

6.2.7 The current preferred draft alignment has been developed in light of the proposed changes to the 2022 consultation corridor, that are described in the Chapter 5, and with consideration of the graduated swathe as appropriate to the technology proposed. In some locations the draft alignment is outside the graduated swathe and in these cases the main influences on routeing are identified are described in Section 6.4 below.

6.2.8 The graduated swathe provided an indication of the area within the consultation corridor where pylons were more likely to be located. The current preferred draft alignment presented in this chapter has been developed taking into consideration feedback and the results of ongoing environmental and engineering studies. As National Grid are presenting their current preferred draft alignment this supersedes a graduated swathe over wider area. National Grid will continue to review and backcheck its proposals as the Project develops further.

EACN substation and cable sealing end compounds

6.2.9 Paragraph 2.9.18 of draft EN-5 refers to the Horlock Rules[11] (guidelines for the design and siting of substations) setting out that '*these principles should be embodied in applicants' proposals for the infrastructure associated with new overhead lines*' (Paragraph 2.9.18).

6.2.10 In refining the proposed location for the EACN substation consideration was given to the Horlock Rules and other factors including routeing of the overhead lines / underground cables in and out of the locations.

Technology Choice

6.2.11 In considering the more detailed routeing, a number of localised factors have led to the identification of locations where the technology choice is now underground. These areas, and the reasons for the technology choice are described in Section 6.4 below. National Grid will however continue to backcheck and review its proposals as the Project develops.

Consideration of alternative pylon designs

6.2.12 As noted above for the purposes of this initial assessment, the preferred draft alignment as presented in this document reflects the use of standard lattice pylons. The use of other pylon designs is still under consideration, if an overhead line route is progressed.

6.2.13 National Grid will be carrying out further assessments on pylon design. These assessment will include visual impacts and mitigation, environmental and ecological considerations, construction and lifetime maintenance effects. Different designs in use in the UK include:

- Standard lattice;
- Low height lattice
- T-pylons

6.2.14 The findings from the assessments will be presented at the statutory consultation.

6.3 Consultation Responses

6.3.1 Responses to the consultation which would not have resulted in a change to the corridor but referred to changes in the graduated swathe or the location of an alignment have been considered during the development of the draft alignment and are summarised below:

Changes within the consultation corridor

- proposal to amend the graduated swathe to the northern half of the preferred corridor broadly parallel with the existing 132 kV overhead line to the north-west of Barking and Barking Tye to reduce potential impacts on residential amenity and flight activities at Wattisham Flying Station;
- proposal to amend the graduated swathe to the south of Bramford Substation to facilitate an alignment to the east of the preferred corridor to reduce potential impacts on residential amenity in Burstall;

[11] See paragraph 2.4.21 of this Report

- proposal to continue the cable through the AONB to the EACN substation. This also allows adjustment of the overhead line near Ardleigh to increase the separation of the overhead line from the village;
- proposal to adopt underground cable technology in the vicinity of Great Horkesley for a distance of approximately 5.3 km from a CSE compound in the east between Horkesley Plantation and Harrow Wood and in the west on land to the west of Crabtree Lane and north of the B1508 to reduce potential impacts on the Dedham Vale AONB;
- proposal to amend the graduated swathe to the south-east of the preferred corridor at Aldham to avoid the potential oversail of properties and gardens to the north;
- proposal to amend the graduated swathe to facilitate an alignment to the north of Fairstead with a section of underground cable between CSE compounds under the existing 400 kV overhead line;
- proposal to amend the graduated swathe to pass to the east of Bushey Wood to increase distance from properties on Woodhall Hill;
- proposal to restrict the graduated swathe and alignment to the eastern edge of the preferred corridor to reduce interaction with the Dunton Hills Garden Village development proposal; and
- proposal to adopt underground cable technology from the north of the Lower Thames Crossing (LTC) proposals into Tilbury Substation to facilitate construction of LTC and the Project as efficiently as possible and respond to extent of flood storage areas. This change of technology also favoured routeing to the east of both existing overhead lines beneficially reducing the potential for interaction with the proposed development to the east of Chadwell St Mary.

6.4 Description of the 2023 Preferred Draft Alignment

6.4.1 A number of factors were considered in developing the current preferred draft alignment for consultation including the technical considerations set out above and environmental considerations. Only those factors which were differentiators have been described below.

Norwich Main Substation to Hapton

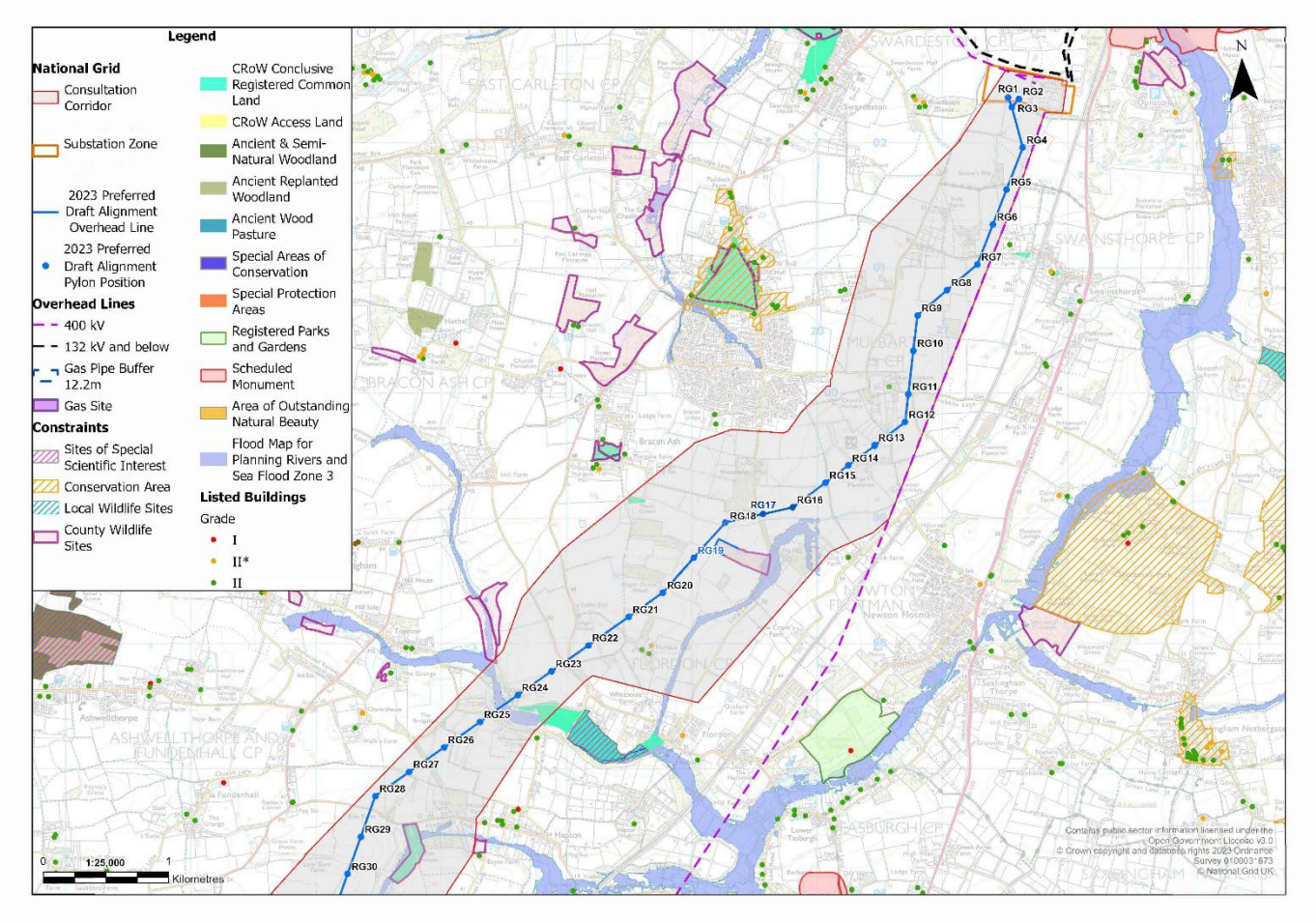
6.4.2 From Norwich Main Substation, an alignment to the east of the graduated swathe would allow for at least a partial parallel alignment with the existing 400 kV overhead line. Routeing more to the west would position an alignment close to residential properties at Mulbarton and would have increased effects on Kenningham Hall by positioning it between the existing and proposed overhead lines. National Grid's preference is to route to the east of the corridor to parallel the existing line where possible though we have recently become aware of proposals in close vicinity to the substation that may affect this arrangement. We will consider feedback, engage with the developer, and review our proposals as information becomes available and .

6.4.3 South of RG7 (see Figure 6.1) the draft alignment moves away from the existing overhead line in order to avoid effects on woodland and avoid siting pylons within the approved Bloy' Grove Solar Farm. Oversail of a small area of the solar farm is necessary to reduce effects on residential properties at Kenningham Hall.

6.4.4 From RG12 (see Figure 6.1) routeing to the southwest means that the draft alignment would oversail the existing solar farm but this is preferred as an alternative would require positioning a pylon within either the existing or the approved solar farm which would reduce the number of generating panels. Small deviations between RG16 and RG20 mean the draft alignment has avoided small areas of woodland (some of which are a CWS), and oversails a proposed solar farm.

6.4.5 The draft alignment then continues straight, passing to the west of Flordon and Hapton.

Figure 6.1 – Mulbarton to Flordan (RG1 – RG26)

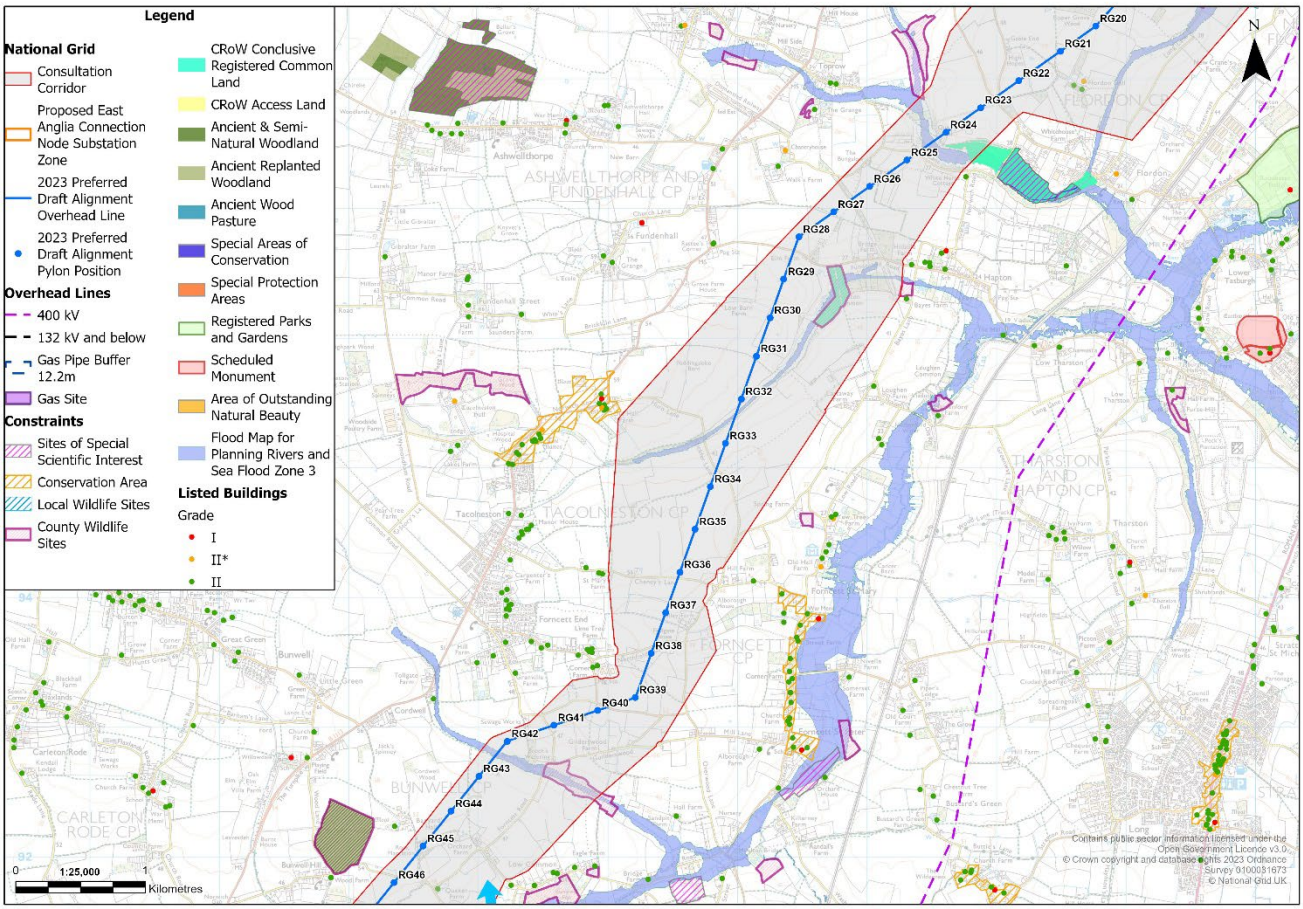


6.4.6 To the west of Flordon, pylons have been positioned out of the floodplain (and deeper peaty soils) which lead to Flordon Common (designated as SSSI and SAC (Norfolk Valley Fens)). Some effects on tree belts are unavoidable as alternatives to the east or west would require numerous changes of direction to avoid the woodlands.

Hapton to Tibenham Airfield

6.4.7 To the west of Hapton (between RG26 and RG30) the alignment is routed to the west side of the corridor utilising an angle pylon to avoid increased effects on woodland and potential effects on Hapton Common CWS. It would also have been in closer proximity to a greater number of residential properties and heritage assets at Hapton.

Figure 6.2 – Talconeston to Fornett (RG25 – RG44)



6.4.8 South from Hapton the draft alignment passes to the southeast of Forncett End, approximately equidistant from residential properties on Northfield Road. From RG39 (see Figure 6.2) the draft alignment turns and heads west to RG42. This is due to the location of residential properties within and to the west of Low Common and would avoid small areas of woodland and effects on Brocks Watering CWS.

6.4.9 Routeing closer to Low Common was less preferred as an alignment would oversail the CWS, would result in tree loss and would be closer to residential properties than the draft alignment.

6.4.10 From RG42 the draft alignment continues south west passing between undesignated woodlands before a slight change of direction at RG48 (see Figure 6.3) to cross the Tas valley.

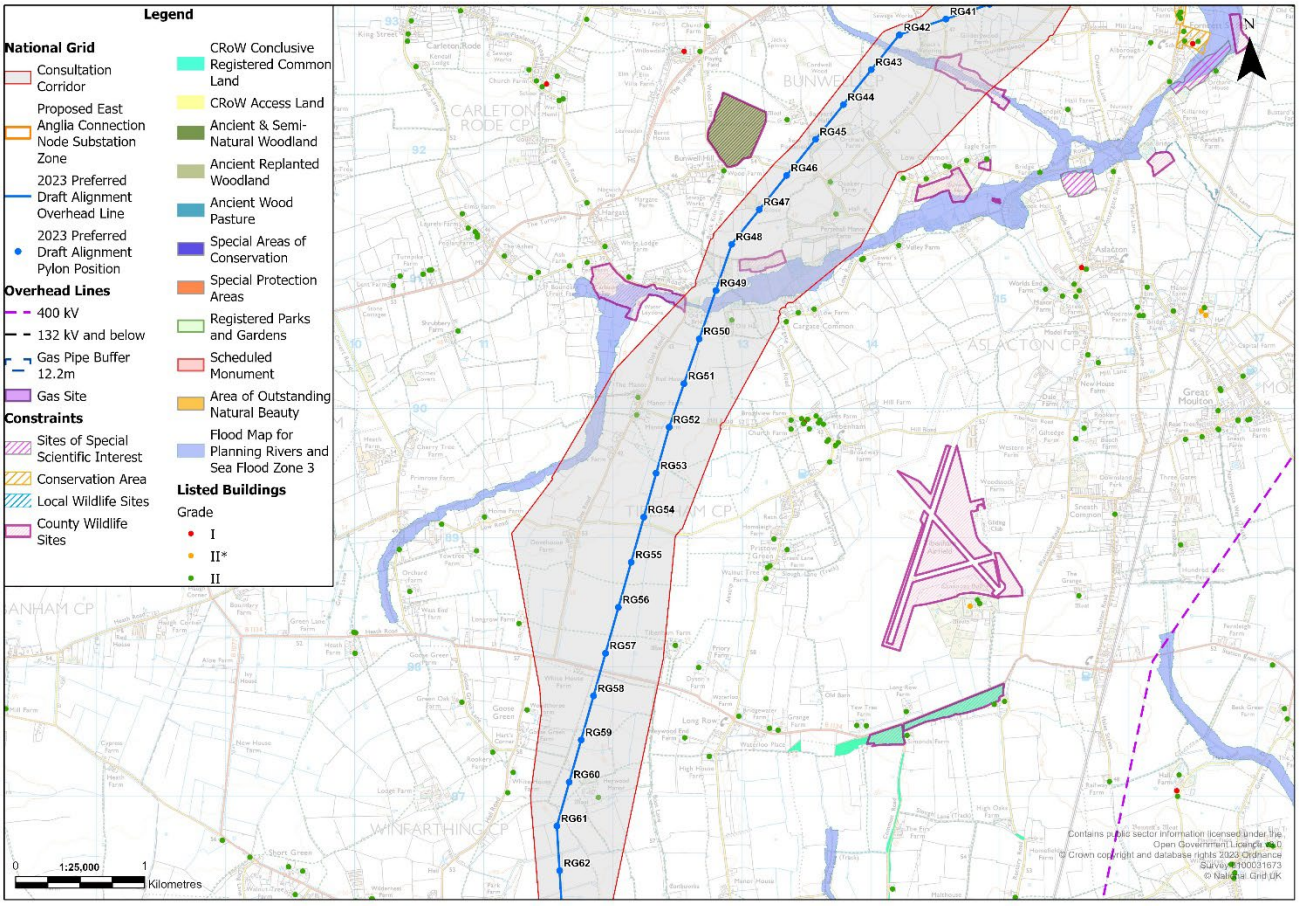
6.4.11 Some tree removal will be unavoidable, however by crossing the valley in this location (between RG49 and RG50) (see Figure 6.3) the draft alignment will avoid, as far as practicable, the mosaic of smaller fields that extend eastwards. The crossing location also allows for the draft alignment to be straight north to south through the valley thereby minimising the number of angle pylons.

6.4.12 The draft alignment then passes midway between residential properties and avoids oversailing a CWS with the consequent effects on trees. Pylons are also positioned outside flood zones.

6.4.13 Alternatives to the east or west would require more changes of direction to either increase separation to residential property and / or potentially slightly reduce effects on woodland. These were therefore less preferred. A localised diversion of the alignment to the east of Cargate Common was also considered, however this was less preferred due to impacts on a Source Protection Zone (SPZ) and increasing effects on residential properties at Tibenham and the Grade I Listed Church of All Saints. This alternative would also place an alignment closer to Priory Airfield, thereby increasing the likelihood of effects on flight activity.

Tibenham Airfield to Mellis

Figure 6.3 – Tibenham Area (RG44 – RG61)

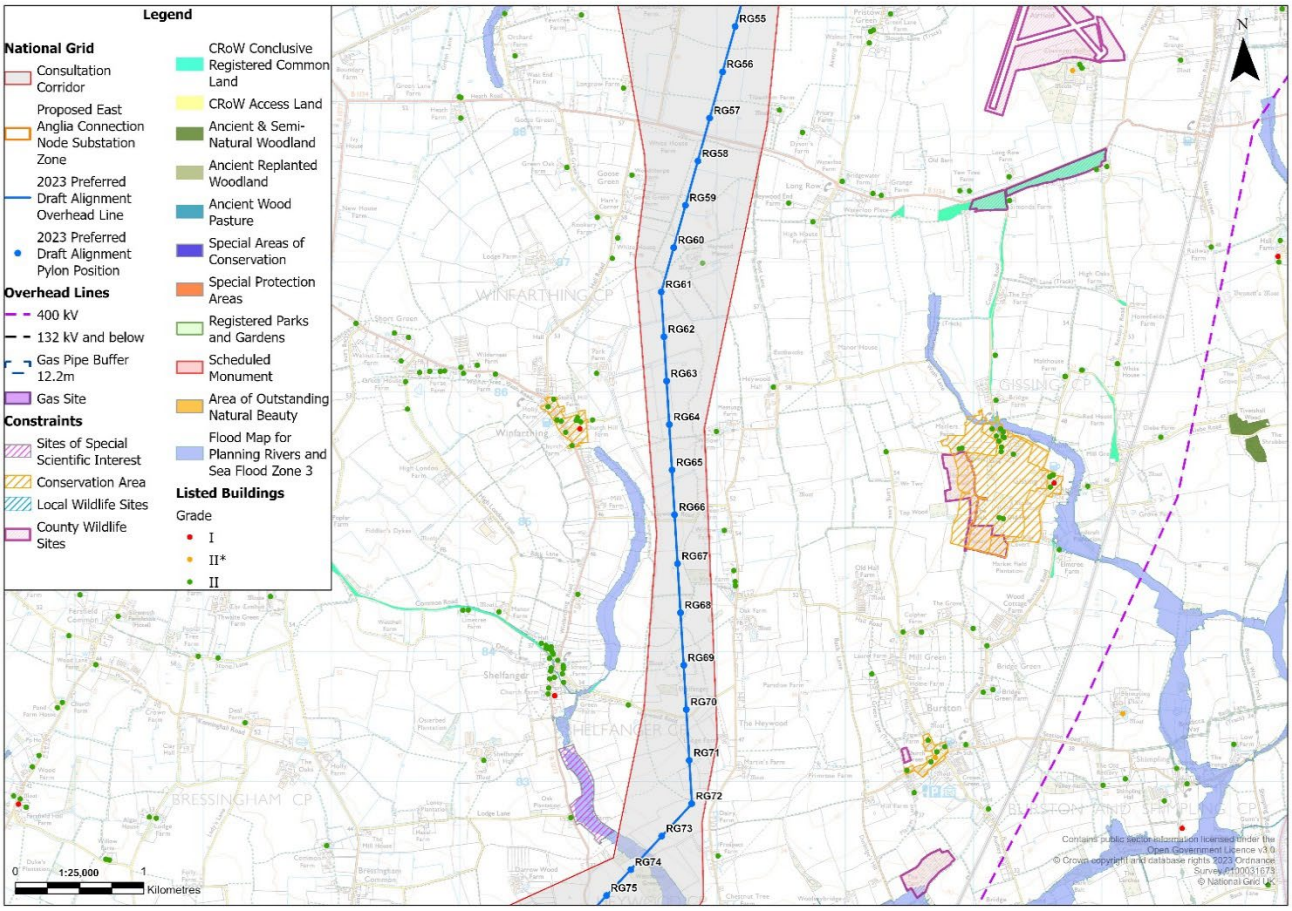


6.4.14 The draft alignment runs south broadly straight between RG48 and RG61. This allows separation from (and a parallel alignment to) Priory Farm Airfield and where pylon height will be kept as low as practicable. The draft alignment runs to the west of Tibenham Airfield (the draft alignment is approximately 2 km away from the nearest runway) at a greater distance than Priory Farm Airfield. Due to the distance from Tibenham airfield, it is considered that the Project will not interact with flight activities. Engagement will be undertaken with the airfield operators at both airfields to assess whether additional mitigation is necessary.

6.4.15 The draft alignment is positioned midway between residential properties as far as practicable (taking into consideration other constraints and environmental features). Pylon positions have been influenced by siting as far from the properties as practicable or so as to benefit from filtering / screening provided by non-residential buildings or vegetation.

6.4.16 The draft alignment is at approximately 700 m distance from an electrically sensitive facility in the vicinity of Priory Airfield. No effects affecting safety of activities at the site would be expected at 500 m distance (which is exceeded). A marginally straighter alignment, moving the alignment closer to the airstrip and electrically sensitive facility, could potentially reduce effects on residential properties. On balance this was less preferred as the draft alignment is in excess of 150 m from the residential properties.

Figure 6.4 –Winfarthing / Shelfanger (RG58 – RG74)

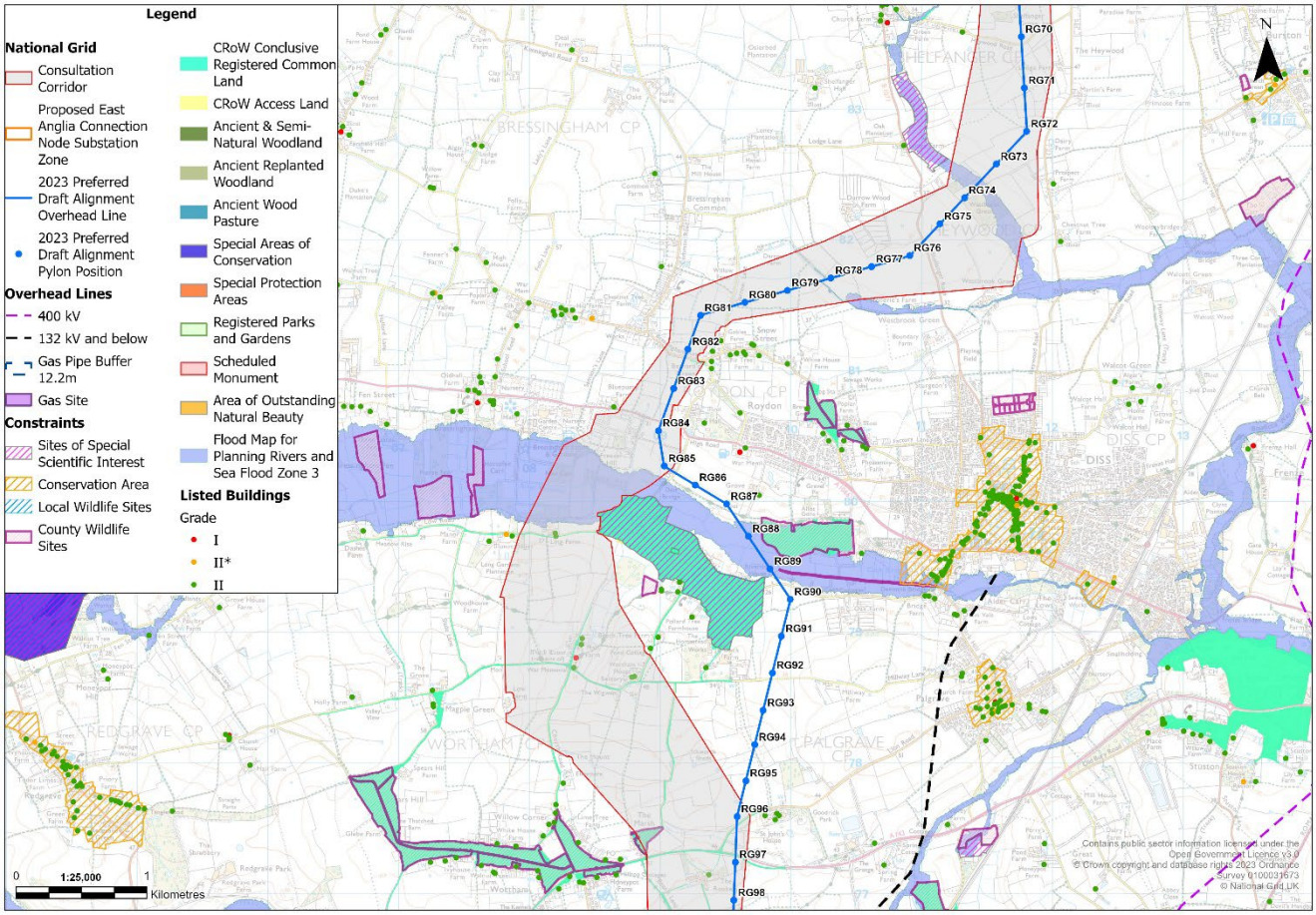


6.4.17 The angle pylon RG61 (see Figure 6.4) is required in order to reduce potential effects on the Grade II Listed Heywood Manor and residential properties. A route to the east of these properties was less preferred as it would have required more angle pylons and be more likely to conflict with the activities at Priory Farm Airfield.

6.4.18 From RG61 to RG72 the draft alignment is straight, routeing between residential properties in Winfarthing and Shelfanger to the west and properties along Heywood Road to the east. The draft alignment also avoids effects on small areas of woodland and avoids oversail of an undesignated moat to the north of Shelfanger Grove. Alternatives to the east or west would transfer effects to other residential receptors, with reduced effects on some offset by increased effects for others, or would require more deviations (and therefore larger pylons) to avoid increased loss of woodland.

6.4.19 The single sharper change of direction and larger pylon at RG72 was marginally preferred over the alternative of a more gradual change of direction, with two angle pylons at RG70 or RG71 and at RG73 or RG74. The more gradual change of direction would have slightly increased the separation to residential properties (from approximately 200 m to 300 m) but would result in a greater loss of woodland and hedgerow.

Figure 6.5 – Diss (RG72 – RG97)

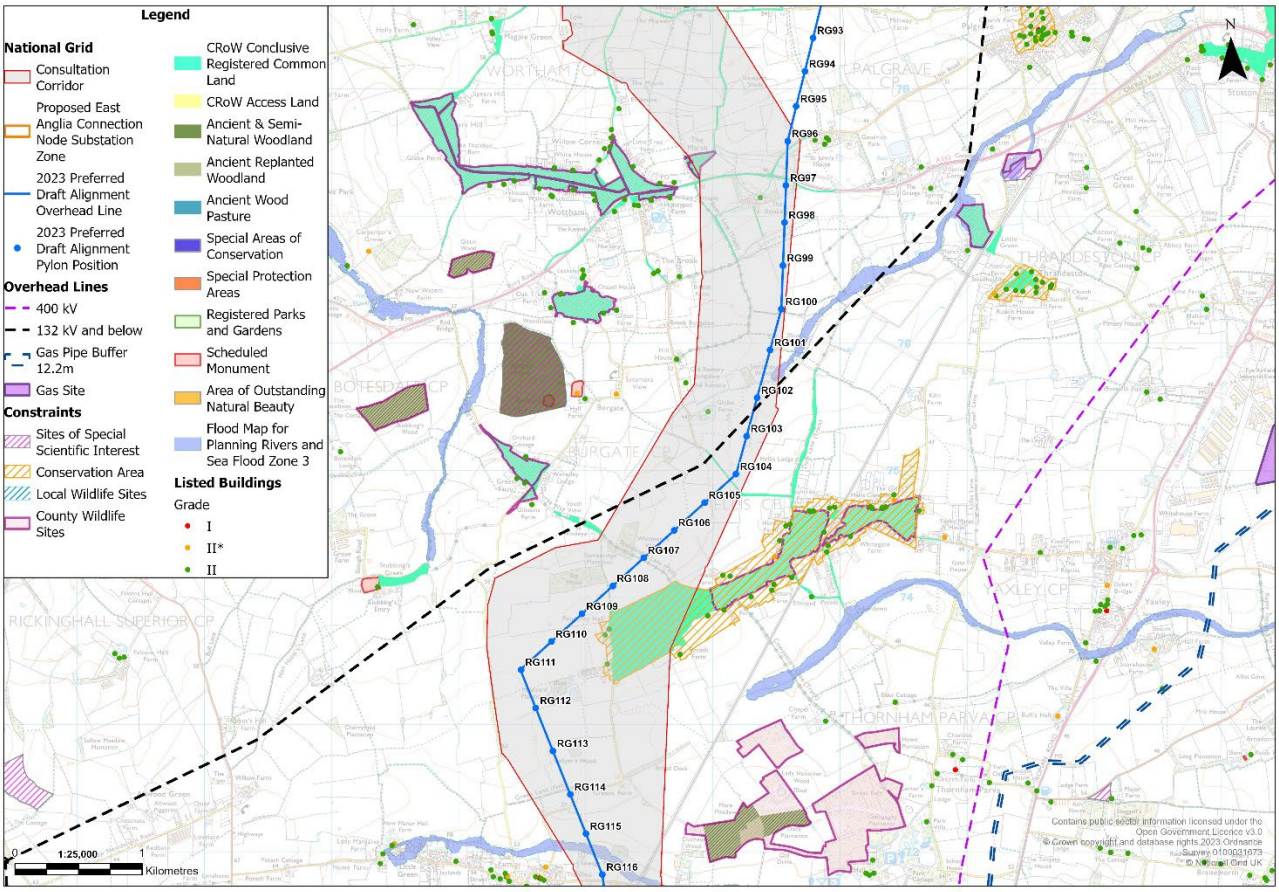


6.4.20 From RG72 (see Figure 6.5) the draft alignment has been routed south westward and passes to the west of Diss. Between RG72 and RG76 routeing considerations included the potential for effects on undesignated woodland within and to the north of Westbrook Green, and the location of the residential property at Dairy Farm. From here to RG81 the draft alignment is straight and broadly midway between residential properties. After changing direction at RG81 the draft alignment then runs south approximately midway between residential properties, crossing Bressingham Road and benefitting from filtering of views by existing tree cover.

6.4.21 Southwards from Bressingham Road (between RG89 and RG90), at the River Waveney, the route passes into Mid Suffolk District.

6.4.22 Between RG85 and RG96 the alignment is outside the 2022 consultation corridor (see Chapter 5). The draft alignment turns south-easterly immediately south of the A1066 (RG84) to pass between Roydon Fen and Wortham Ling. Angle pylons would be required at RG84 and RG85, to reduce effects on the Grade I Listed St Remigius Church, passing it on lower ground (30 m AOD compared with 45 m AOD), and at RG87, to avoid oversail of an undesignated moat. Pylons RG88 and RG89 would unavoidably be located within Flood Zone 2. The draft alignment would avoid most areas of woodland however there would be effects on a small area of woodland between RG89 and RG90.

Figure 6.6 –Mellis (RG96 – RG105)



6.4.23 South from RG90 (see Figure 6.6) the draft alignment passes to the west of the proposed Grange Solar Farm to the west of Palgrave, approximately midway between properties at Rookery Farm and St John's House. Another potential solar farm has also been identified from an EIA screening request to the local planning authority (on land between RG92 and RG96). Engagement will be undertaken to establish potential interaction and possible mitigation as the design details become available and we will review adjustments to pylon positioning that may be possible to reduce the effects on generation such as positioning pylons outside the boundary or on undeveloped areas.

6.4.24 The predominantly north to south route also increases the distance between the draft alignment and Brook Farm Airstrip (to the west of RG98 / RG99). Taller pylons in this area have been avoided in order to avoid potential effects on the airstrip. Engagement will be undertaken with the airfield operators to assess whether further mitigation measures are necessary.

6.4.25 Routeing to the west of The Rookery (a Grade II Listed building in the centre of the consultation corridor) was considered but less preferred than passing to the east. To the west potential effects on residential amenity would be transferred to other receptors rather than reduced overall, a less direct alignment with more changes of direction would be required, and the potential effects on Brook Farm airstrip would be increased as the separation distance would be reduced.

6.4.26 Southwards from The Rookery the draft alignment has been routed to avoid a number of pockets of undesignated woodland. By routeing to the eastern side of the corridor relatively fewer angle changes are required.

6.4.27 An alternative alignment passing to the west of Seethings Wood (between approximately RG100 and RG104) would require an additional angle pylon, to avoid effects on woodland, and would also slightly increase effects on Glebe Farm House (Grade II Listed). This was therefore less preferred.

Mellis to Mendlesham

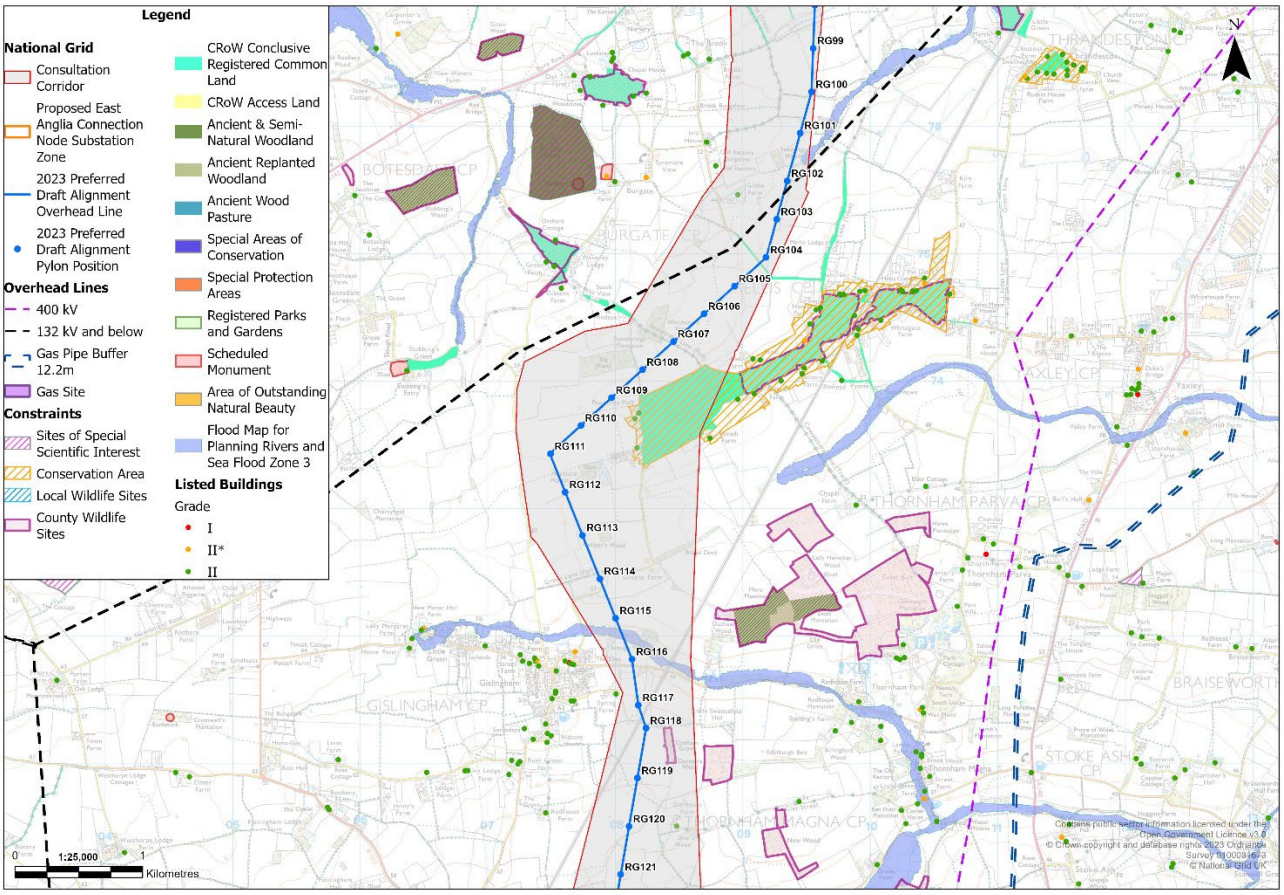
6.4.28 From RG104 (see Figure 6.7) the draft alignment passes to the west of Mellis and Mellis Common. Between RG104 and RG111 the angle pylons have been positioned to increase screening by vegetation or farm buildings.

6.4.29 Alternative alignments to the north and west of Big Wood and Whitmore Wood were less preferred. An alignment here would increase effects on residential amenity as it would be closer to residential properties, at approximately 100 m compared to 400 m with the draft alignment. It would also require the additional diversions or undergrounding of the existing 132 kV overhead line in order to utilise its alignment. The alternative would also require two angle pylons rather than one (RG111 on the draft alignment) and would result in a slight increase in effects on residential amenity and on a Grade II listed building.

6.4.30 West of Mellis Common (south from RG111) routeing is influenced by the need to cross the railway line to the east of Gislingham. In order to cross a road the railway line is partly on embankment in this area. Routeing of 400 kV overhead lines seeks to cross railways perpendicular and on level ground where possible in order to minimise the height of pylons required to achieve necessary safety clearances. Alternative crossing points north and south of the road / railway line crossing point were considered.

6.4.31 Crossing north of the road / railway line would be a less direct alternative and would require a large angle pylon at approx. 150 m distance to a number of residential properties and a campsite. A crossing point to the south would also require a large angle pylon at approx. 150 m distance but to fewer residential properties, with the closest property (Grade II Listed Spring Farm) benefitting from greater filtering of views by existing vegetation. The northern crossing would route through undesignated woodland adjacent to the road which is unavoidable. On balance a crossing point south of the road is preferred.

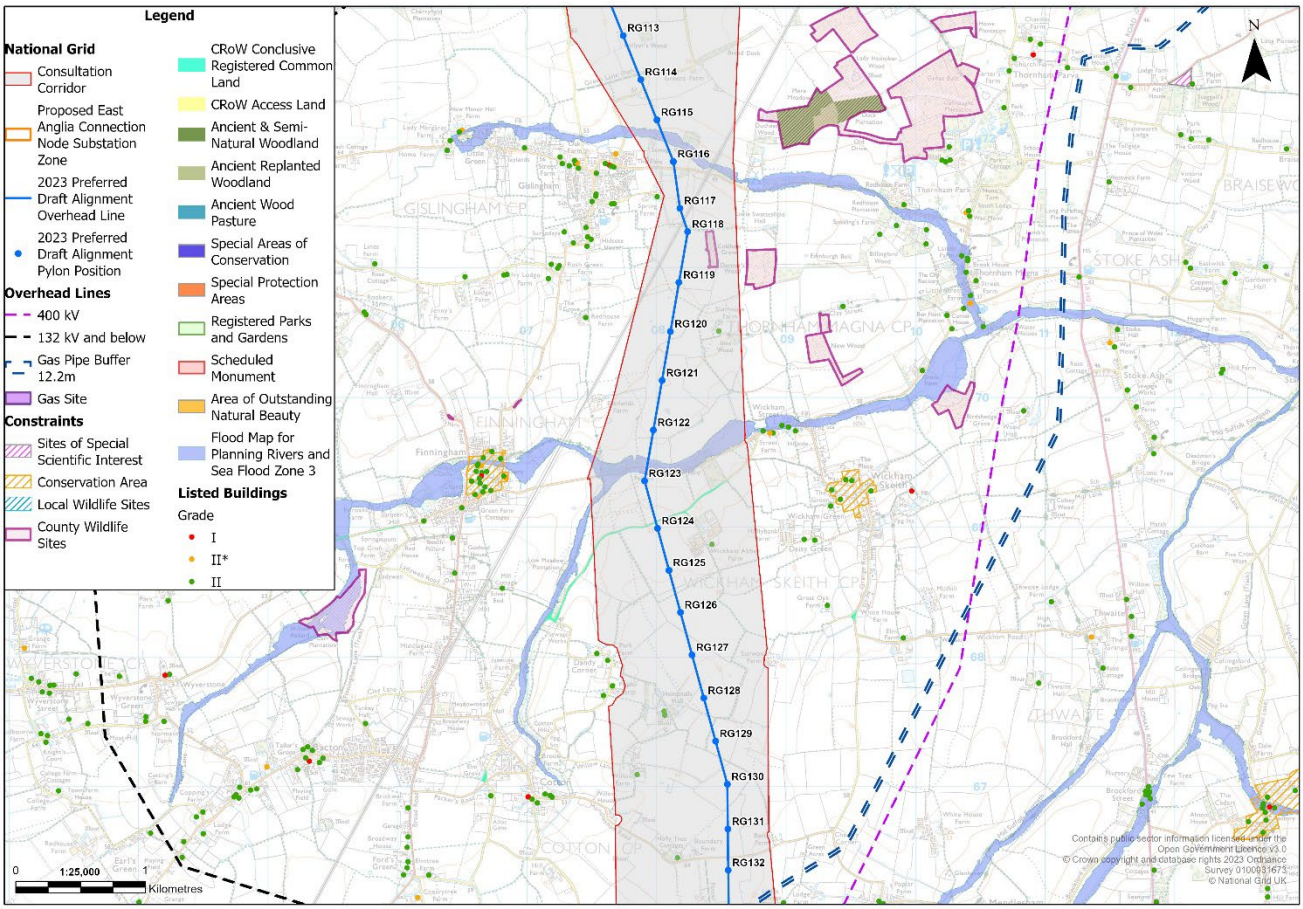
Figure 6.7–Mellis to Mendlesham (RG103 – RG116)



6.4.32 From Gislingham, between RG118 and RG130, alternative alignments would be possible to the east or west of Wickham Abbey Farm.

6.4.33 An alternative to the east of Wickham Abbey Farm, from RG120, would be closer to a greater number of residential properties, and would be seen in views which have less existing screening than for properties affected by an alignment to the west (for example Wickham Abbey Farm, Surwood Farm and Street Farm to the east compared with Hempnalls Hall to the west). The eastern alternative would be closer to more listed buildings (e.g. within Wickham Street and Wickham Skeith) than a western alignment. The western alignment would however cross an area of woodland north of RG123 (see Figure 6.8) which would be unavoidable. The western alignment would require one less angle pylon than an alternative to the east. On balance an alignment to the west was preferred.

Figure 6.8 – Gislingham (RG115 – RG129)

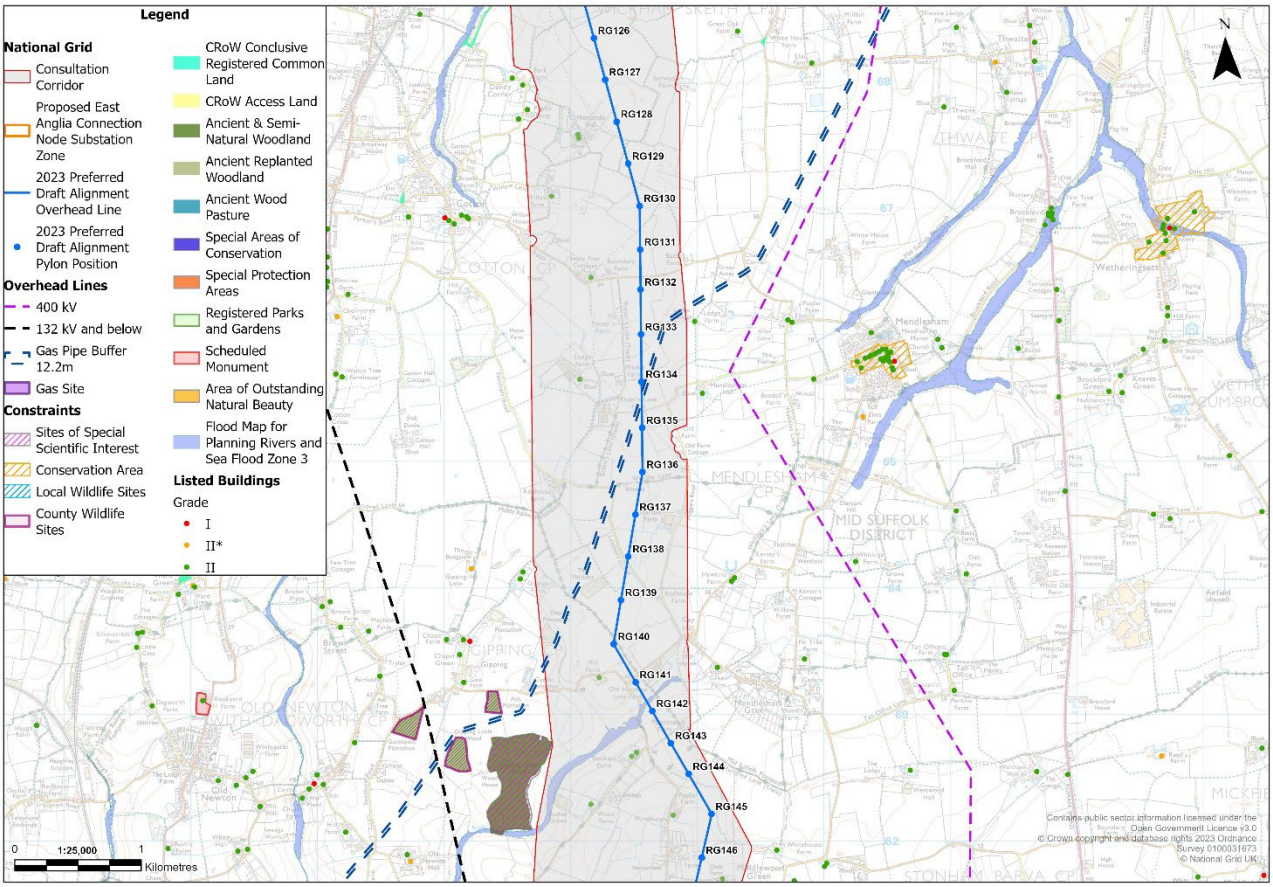


Mendlesham to Needham Market

6.4.34 Two alternatives were considered from RG130 to around RG140 (see Figure 6.9);

- a relatively straight alignment passing to the east of Boundary Farm and Wick's Farm; and
- a more deviated route passing to the west of Holly Tree Cottages and Lodge Farm.

Figure 6.9 – Mendelsham (RG129 – RG144)



6.4.35 The shorter and straighter alignment east of Boundary and Wick's Farms could be routed to achieve a separation of around 150 m from the nearest property (Wick's Farm), would avoid routeing through woodland, and would position pylons so that views would be filtered / screened by existing trees and woodland.

6.4.36 A western alignment would result in an additional change of direction and would broadly mirror the alignment of the existing 400 kV overhead line, with the proposed and existing overhead lines being separated by approximately 1.5 km. As with the eastern alignment there would be effects on residential properties but effects on those properties that are otherwise closest to both lines (Lodge Farm, Lodge Cottage, Medlesham Hall, Old Farm and Old Farm Cottages) would be reduced. The western alternative would be slightly longer and would require up to two additional angle pylons with greater changes of direction.

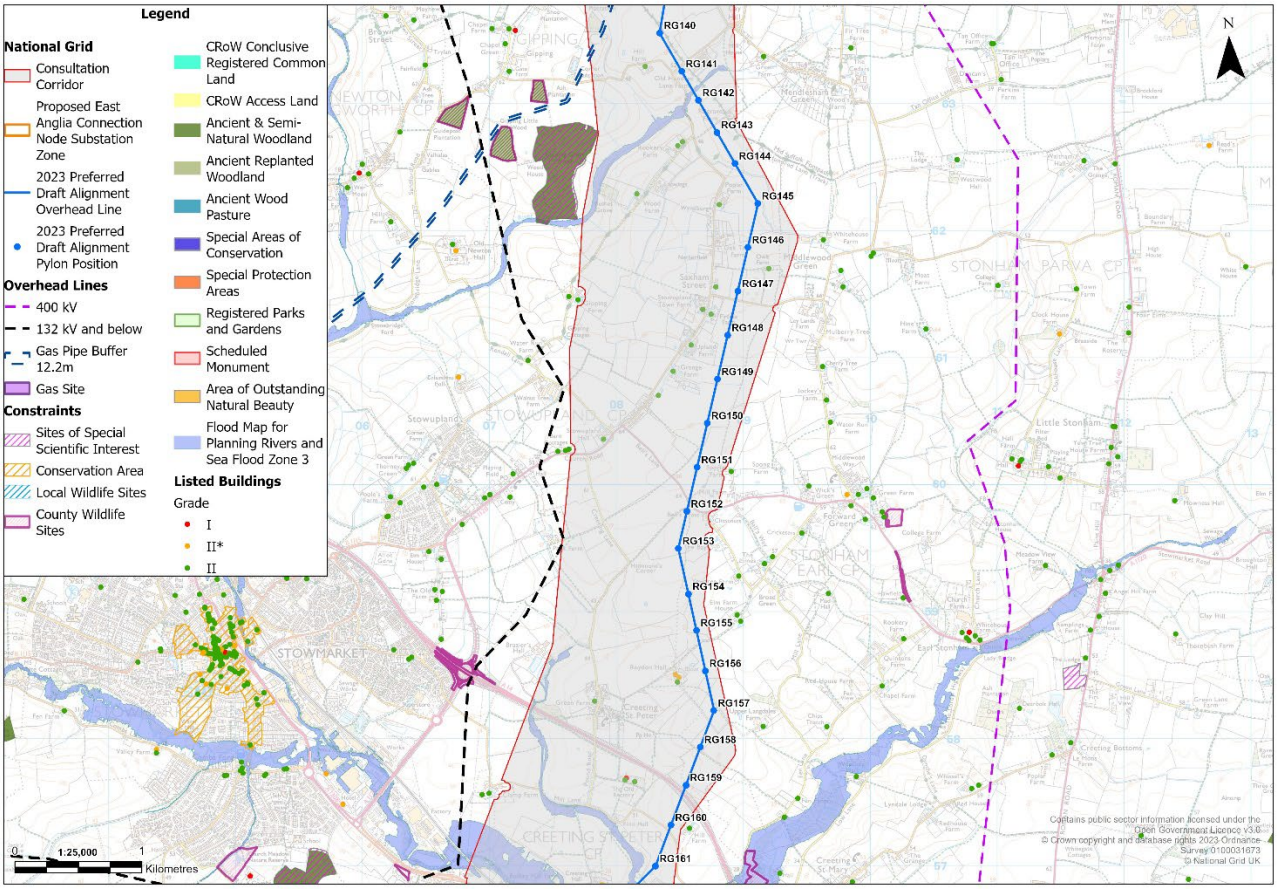
6.4.37 On the eastern alignment the closest distance between the existing and the proposed overhead line would be approximately 700 m (Mendlesham Hall is around 250m from the existing overhead line and 450 m from the proposed).

6.4.38 On balance the straighter eastern alignment is preferred as it would be more consistent with Holford Rule 3.

6.4.39 From RG140 to RG145 alternatives to the east and west of Old Hundred Farm were considered. A western alignment was preferred as it could be routed so that residential properties would have views that are at least partially filtered / screened by agricultural buildings and it would be further from the concentration of properties at Mendlesham Green.

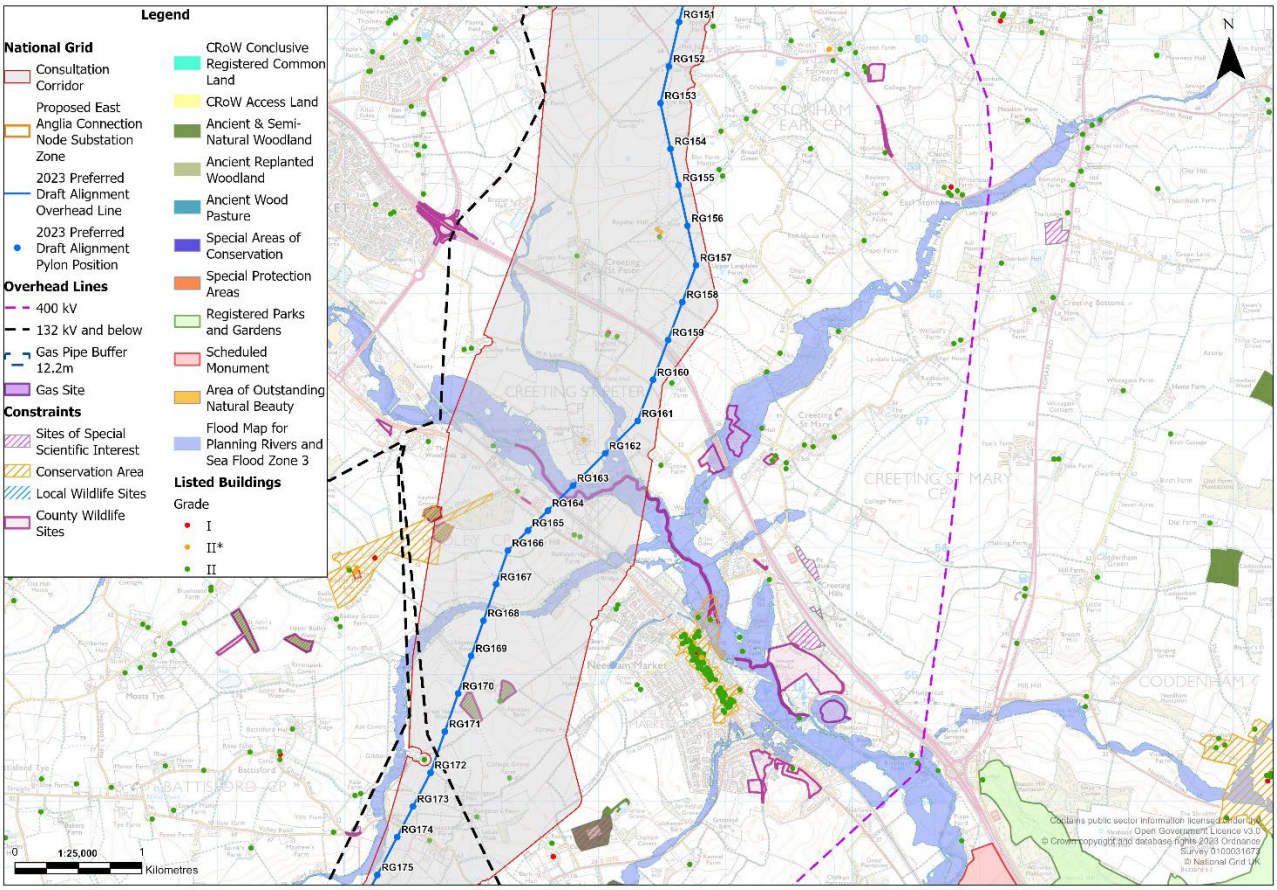
6.4.40 From RG145 to RG153 (see Figure 6.10) the draft alignment takes a south westerly route passing approximately midway between residential properties along Saxham Street to the west and those at Owls Farm, Sporles Farm and The Bays to the east. Alternatives would introduce additional changes of direction with negligible reduction in effects.

Figure 6.10 – Saxham Street (RG144 – 156)



6.4.41 From RG153 considerations for routeing include the crossing of the A14, the railway and the River Gipping, the location of the Grade II* Listed Creeting Hall and Roydon Hall and the Grade I Listed Church of St Peter.

Figure 6.11 – Gipping Valley (RG155 – RG172)



6.4.42 An alignment to the west of the church and Roydon Hall was less preferred as, whilst within a slight valley, effects on residential amenity in Creeting St Peter would be increased. A route to the east of Creeting Hall would also be on slightly lower ground and on the same side of Roydon Hall as a concrete products facility adjacent to Grove Farm thereby reducing the effects on the Hall when compared to a westerly alternative. An alignment to the east would also benefit from the presence of existing screening / filtering of views by vegetation and would avoid oversailing the main access routes to the Grade II* listed buildings and Grade I Listed church.

6.4.43 On balance an alignment routed to the east was preferred.

Needham Market to Bramford

6.4.44 Beyond the railway the draft alignment turns onto a slightly more southerly route, continuing straight to pass Gibbons Farm.

6.4.45 This represents a change from the graduated swathe in the eastern half of the corridor to the west. This is in response to feedback and is considered overall to reduce effects. The graduated swathe was previously favoured as the western side of the corridor whilst on relatively lower ground, presented more challenging terrain for construction and necessitating more (albeit small) changes of direction compared to the graduated swathe.

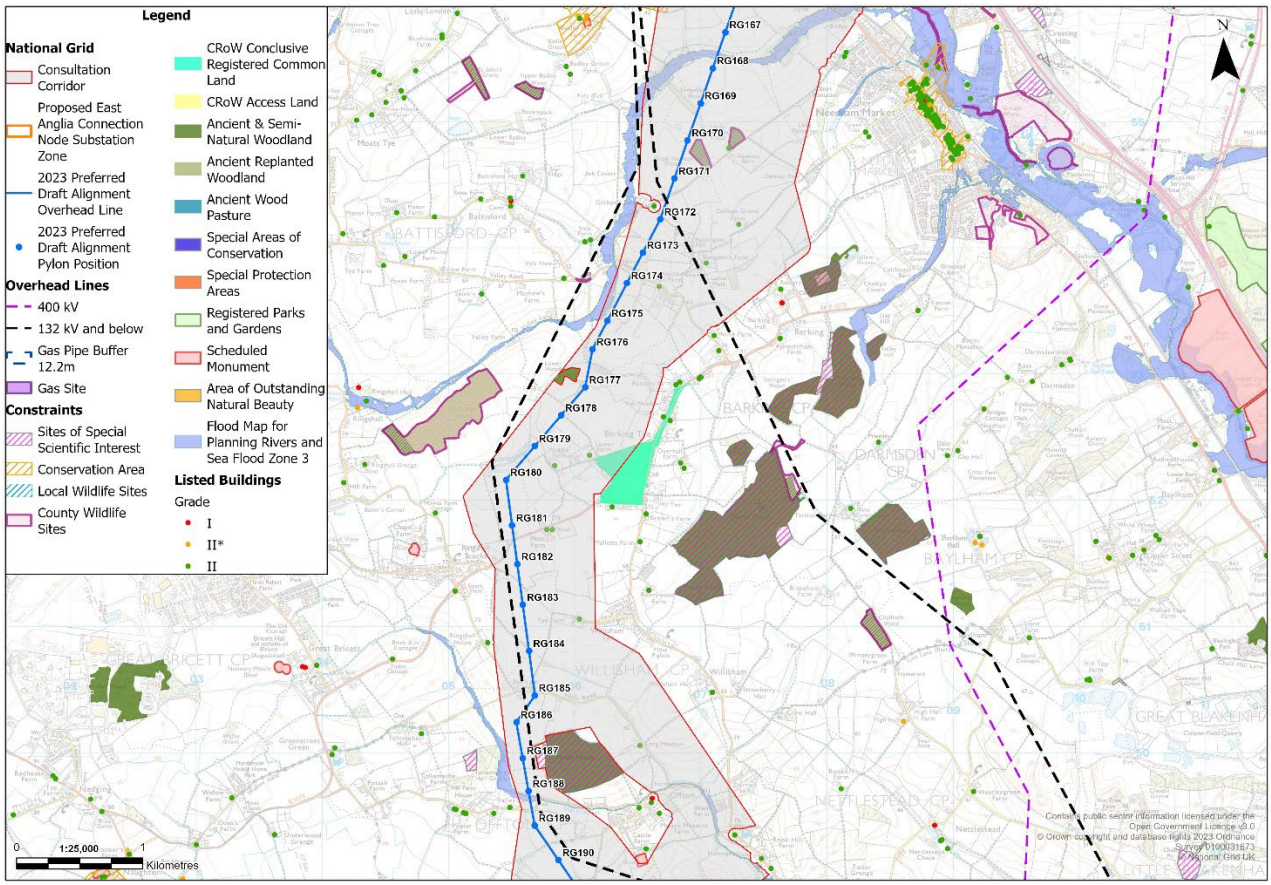
6.4.46 In response to feedback however further consideration has been given to the potential effects on the Grade I Listed Church of St Mary at Barking and the increased potential for routeing to the east of the corridor to be in conflict with activities at Wattisham Flying Station (given the higher ground to the east). Detailed routeing has therefore reconsidered the west of the consultation corridor.

6.4.47 Whilst there would be some transfer of effects to other receptors, overall, the effects are reduced on the Grade I Listed Church. The potential to affect activities at Wattisham Flying Station is reduced through the draft alignment being on lower ground, broadly paralleland close to the existing 132 kV overhead line. There is also generally greater separation to the nearest residential receptors.

6.4.48 Routeing to the east is restricted by Ancient Woodland at Little and Great Newton Wood, which are avoided, although there would be potentially unavoidable impacts on the south-eastern end of Lodgefield Row Woodland (RG169) (see Figure 6.11). The level of effect may however be reduced by the terrain and proximity of the pylon. Two additional angle pylons would be required to avoid this impact and as the woodland is undesignated this was less preferred than the draft alignment.

6.4.49 At Gibbons Farm (which includes the Grade II Listed Gibbons Farm Cottage), a short section of an existing 132 kV overhead line will be undergrounded to allow the routeing of the proposed 400 kV overhead line. This, and the positioning of RG172 to the south of the small road, to maximise the screening / filtering of views by existing vegetation, will reduce effects (see Figure 6.12).

Figure 6.12 – Barking to Willisham Tye (RG171 – RG186)



6.4.50 The draft alignment will then broadly parallel a further existing 132 kV overhead line (see Figure 6.12). Although this potentially positions up to 4 properties (at Gibbons Farm and Stone Croft) between the overhead lines there is relatively extensive screening of one or other line by existing vegetation which may reduce the magnitude of effects. National Grid will assess the effects in this area in relation to the potential need for mitigation including engagement with the DNO with responsibility for the 132 kV overhead line.

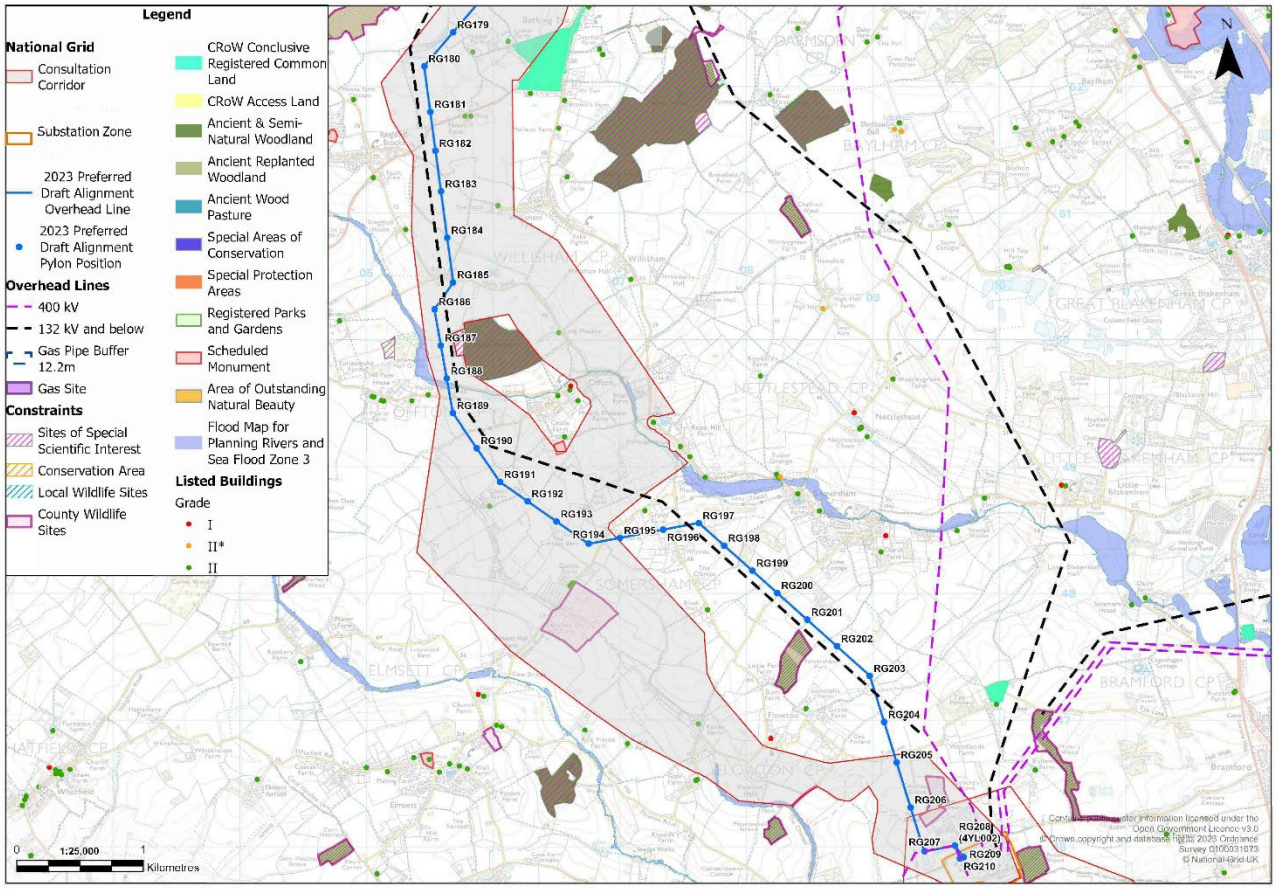
6.4.51 From here the draft alignment continues straight to RG180, with the exception of a small diversion (RG176 / RG177) to avoid effects on Ancient Woodland (Lower Wood). Crossing of recreational routes is unavoidable, however consideration was given to reducing the amount of oversail in order to reduce effects. This has meant that oversail of undesignated woodland is unavoidable though effects may be limited f as the draft alignment crosses the woodland where it is within a small valley.

6.4.52 The positioning of RG180 is limited by features which constrain the route alignment southwards. Residential properties at Ringshall Stocks restrict the opportunities for routeing to those that are to the east of the existing 132 kV overhead line. The combination of listed buildings and residential properties at Moat Farm, Middle Farm and Lower Farm, and at the southwestern edge of Barking Tye then restrict routeing options on the eastern side of the consultation corridor.

6.4.53 In order to avoid effects on the SSSI and Ancient Woodland at Middle Wood, to the north of Offton, crossing the existing 132 kV overhead line (between RG185 and RG186) and routeing the draft alignment to the west of the 132 kV overhead line is required (see Figure 6.12).

6.4.54 Southwards from Offton consideration was given to alternatives beyond the consultation corridor and graduated swathe combinations (see Section 5.5). A route to the south of Flowton was considered with an alignment either passing to the west of Court Farm and Gunns Farm and through to a CSE compound to the west of Flowton. This would have increased the separation to and reduced effects on the Scheduled Monument at Offton compared with the existing 132 kV overhead line infrastructure. A further alternative passing to the east of Court Farm and between The Cottage Barn and Caley Green Farm through to the CSE compound (also increasing the distance compared with the 132 kV overhead line to Offton Castle but to a lesser degree) was also considered. Overall, these alternatives were less preferred for the reasons set out in Section 5.5.

Figure 6.13 – Offton to Bramford (RG185 – to Bramford)



6.4.55 The draft alignment is now proposed to pass to the east and north of Flowton, a change from the proposal within the 2022 consultation (and referred to as the change North of Flowton).

6.4.56 The draft alignment will follow much of the route occupied by an existing 132 kV overhead line adopting a close parallel arrangement mostly to the east of the existing 132 kV overhead line. The draft alignment requires various crossings of the 132kV line requiring it to be undergrounded. The detailed arrangements and length of undergrounding has yet to be confirmed by the Distribution Network Operator (DNO) but is expected to include the section between RG185 and RG 197 as a result of the close proximity of 132kV crossings and need to reduce effects at Offton Castle.

6.4.57 A number of alternatives were considered:

- a fully parallel arrangement from the Middle Wood area – this was not preferred as whilst it would avoid the need to divert the existing 132 kV overhead line it would increase effects on Offton Castle (Scheduled Monument); or
- fully adopting the route of the existing 132 kV overhead line from the Middle Wood area – this was not preferred as whilst following the existing swathe created by the 132 kV overhead line reduces the magnitude of change, the potential effects at Offton Castle from the taller 400 kV pylons were considered to be inconsistent with policy.

6.4.58 The draft alignment would broadly continue the existing 400 kV overhead line route past Offton for a further 1 km (to RG194) (see Figure 6.13) so as to increase the separation to Offton Castle.

6.4.59 It is noted that the change of direction to pick up and follow the route of the existing 132 kV overhead line could occur in a number of locations:

- to pass to the north of Hill Farm and Grove Farm (from RG192) –less preferred because the benefits to the scheduled monument were not considered to be reduced as much; and
- alternatives further south, such as crossing south of The Clamps – these would transfer effects to a similar number of residential properties and position the line on higher ground for longer and were also therefore less preferred.

6.4.60 From here the draft alignment into Bramford Substation continues and avoids an area of woodland (identified as a CWS).

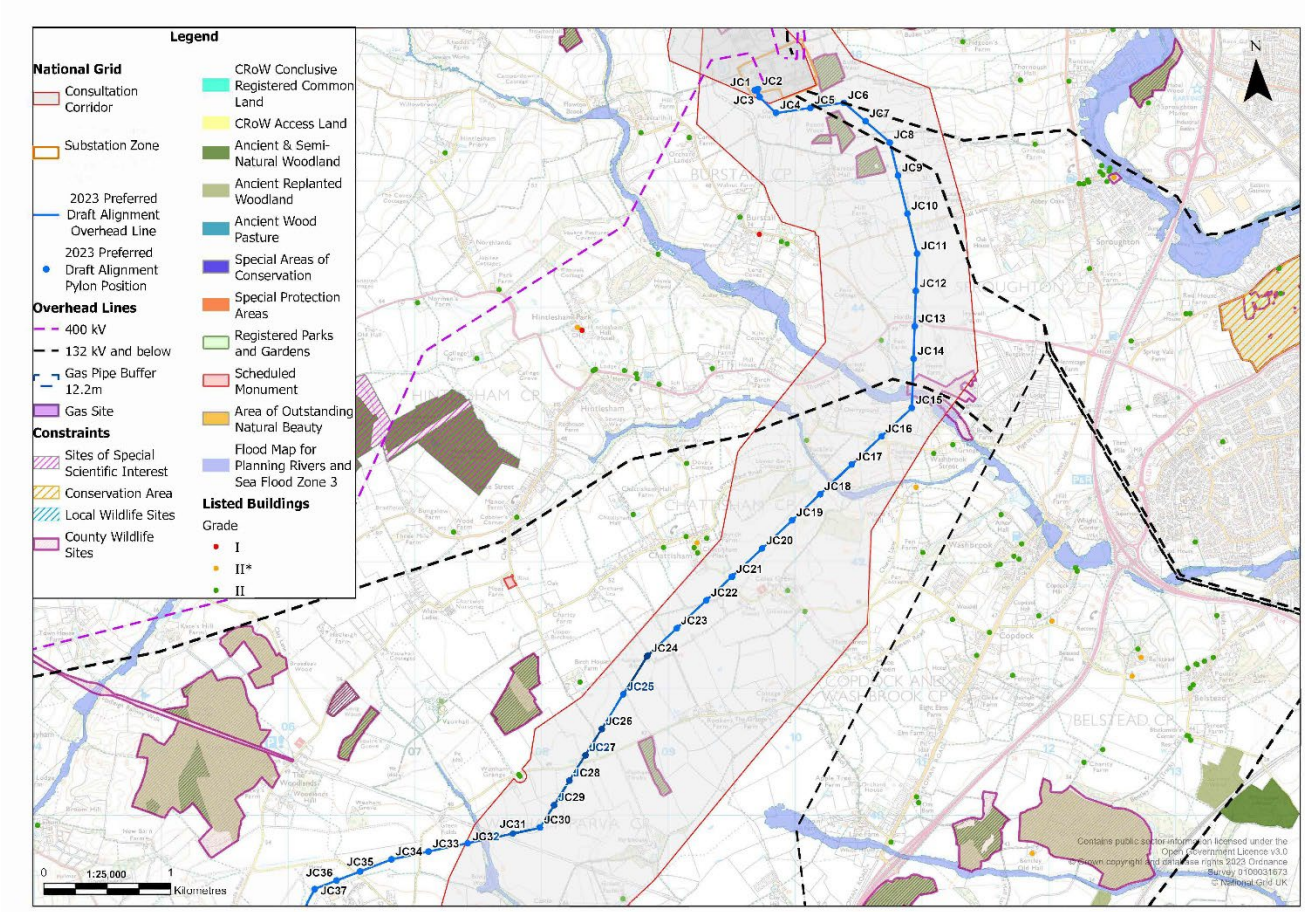
Bramford to CSE compound north of the AONB

6.4.61 South of Bramford Substation routeing has been influenced by consideration of the cumulative effects of the new 400 kV overhead line with other overhead lines, particularly existing and proposed 400 kV connections towards the Twinstead area.

6.4.62 Routeing has assumed that two existing 132 kV overhead lines will be undergrounded for a minimum of 1 km although this has still to be confirmed with the DNO. This will allow the draft alignment to pass to the east of Round Wood and Burstall Long Wood (both Ancient Natural Woodland), reducing the potential for cumulative effects on residential amenity. It allows a relatively straight alignment to the south approximately midway between residential properties on Burstall Road and residential properties at, and on the road to Home Farm and Fen Farm before oversailing the edge of Sproughton Park CWS (see Figure 6.14). A more eastern alternative passing closer to Ivywell Farm and to the east of Home Farm would be longer and less direct and was less preferred due to more extensive oversail of the CWS and closer proximity to residential receptors such as at Home Farm.

6.4.63 A more western alternative passing to the west of Fen Farm to one or other side of Cherryground was also considered. Whilst potentially more consistent with Holford Rules 4 and 5, by utilising landform and vegetation to filter / screen views, it would require an oversail of more woodland and would require more pylons and changes of direction to route around the valley terrain and residential properties. It would also negate the benefit of the removal of an existing 132 kV overhead line by the proposed Bramford to Twinstead Reinforcement. A draft alignment more to the east was therefore preferred.

Figure 6.14 – South of Bramford (Bramford – JC24)



6.4.64 From JC15 (see Figure 6.14) the draft alignment is relatively straight, in a south westerly direction, through to the proposed CSE compound at Notley Enterprise Park. The draft alignment passes midway between areas of undesignated woodland south of Lower Barn Cottages, midway between clusters of residential properties at the south-eastern corner of Chattisham, and around Coles Green Farm.

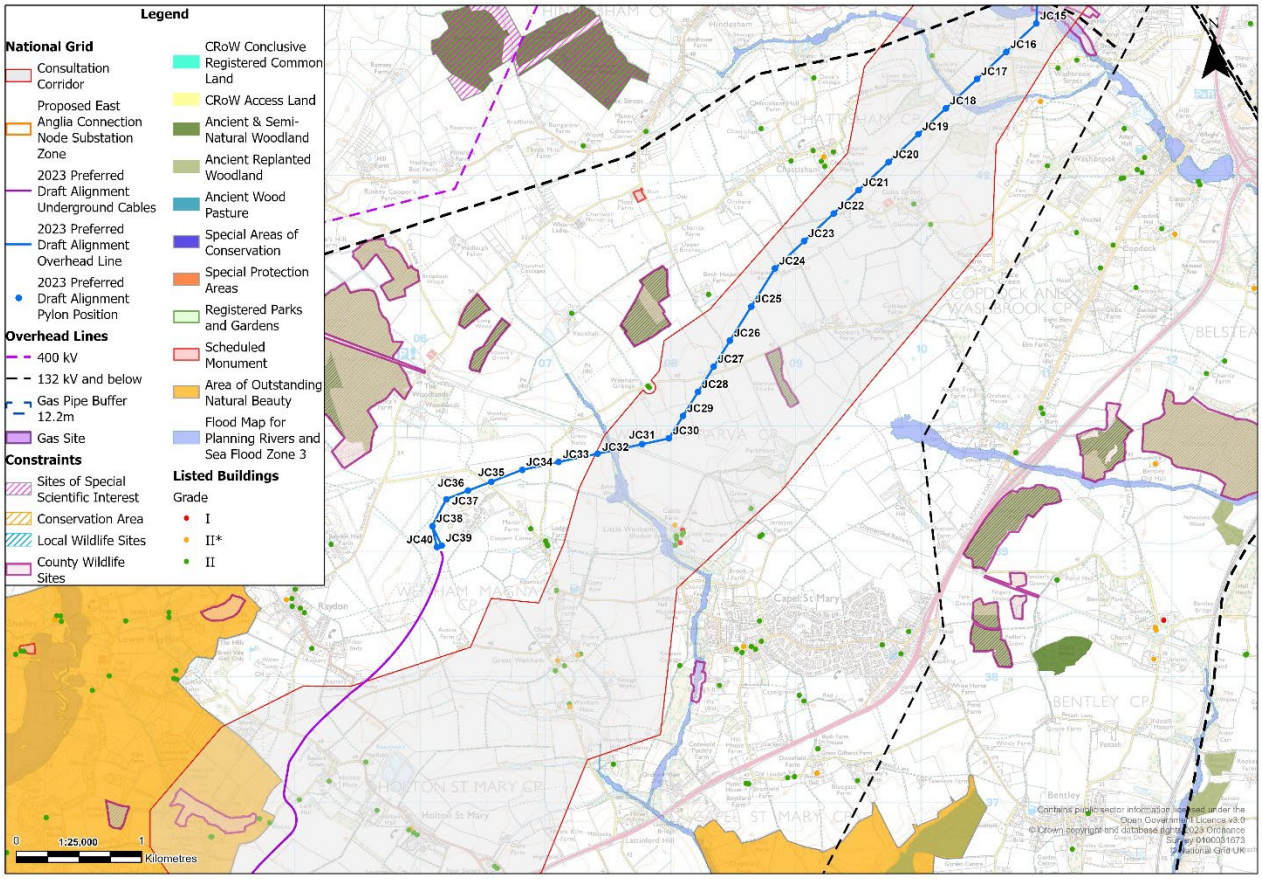
6.4.65 From here the draft alignment routes to the south of Birch House Farm and Wenham Grange to reduce effects on listed buildings and residential properties. Routeing northwards was considered but less preferred as routeing to avoid Brimlin Wood (CWS and ancient woodland) would have necessitated additional and sharper angle changes. A northwards alternative would also have placed an alignment much closer to the end of the Raydon Wings Airstrip (at approximately 500 m compared with 1.3 km distance) with mitigation, to maintain flight activities, likely to be difficult to achieve.

6.4.66 From JC30 (see Figure 6.15) the routeing of the draft alignment has been influenced by the location of the CSE compound. As set out in Section 5.5 the combination of the effects of an overhead line, underground cables and a CSE compound led to a preference for a CSE compound located to the southwest of Notley Enterprise Park.

6.4.67 The draft alignment passes to the north of Notley Enterprise Park. Routeing to the south would cross the south-east corner of the Enterprise Park and to the west of Manor Farm. This was less preferred than the draft alignment which is to the north due to closer proximity to a Grade II listed building and residential property at Manor Farm. The draft alignment increases the separation to the listed buildings and residential properties and was preferred.

6.4.68 The draft alignment would have greater effects on an undesignated memorial on the former airfield site and may (subject to detailed routeing) lead to loss of a small area of undesignated woodland between JC37 and JC38.

Figure 6.15 – North of AONB (JC24 – JC39 & CSE Compound)



CSE compound north of the AONB to EACN substation

6.4.69 From the CSE compound north of the AONB through to the EACN substation at Lawford underground cables are currently proposed. Typically for this size of connection there would likely be 18no. cables.

6.4.70 From the CSE compound the draft alignment is substantially through agricultural fields (mostly in arable cropping and improved grassland) but has been influenced by the presence of features such as residential properties, reservoirs and woodland and by infrastructure such as the high pressure gas pipeline.

6.4.71 The draft alignment passes to the southeast of properties at Rectory Gardens and to the north and west of Bacon's Green between Lark Hall and the woodland at Pintins. Routeing to the east of Bacon's Green is constrained by a high pressure gas pipeline. Routeing to the east of Holton St Mary, and south of Squirrels Farm and Wheatland Farm, would be possible but approximately 1 km longer with the consequent additional cost and environmental effects. This was considered less consistent with National Grid's duties. Routeing even further east is constrained by more extensive areas of woodland and scattered residential and commercial properties, including those at Stratford St Mary.

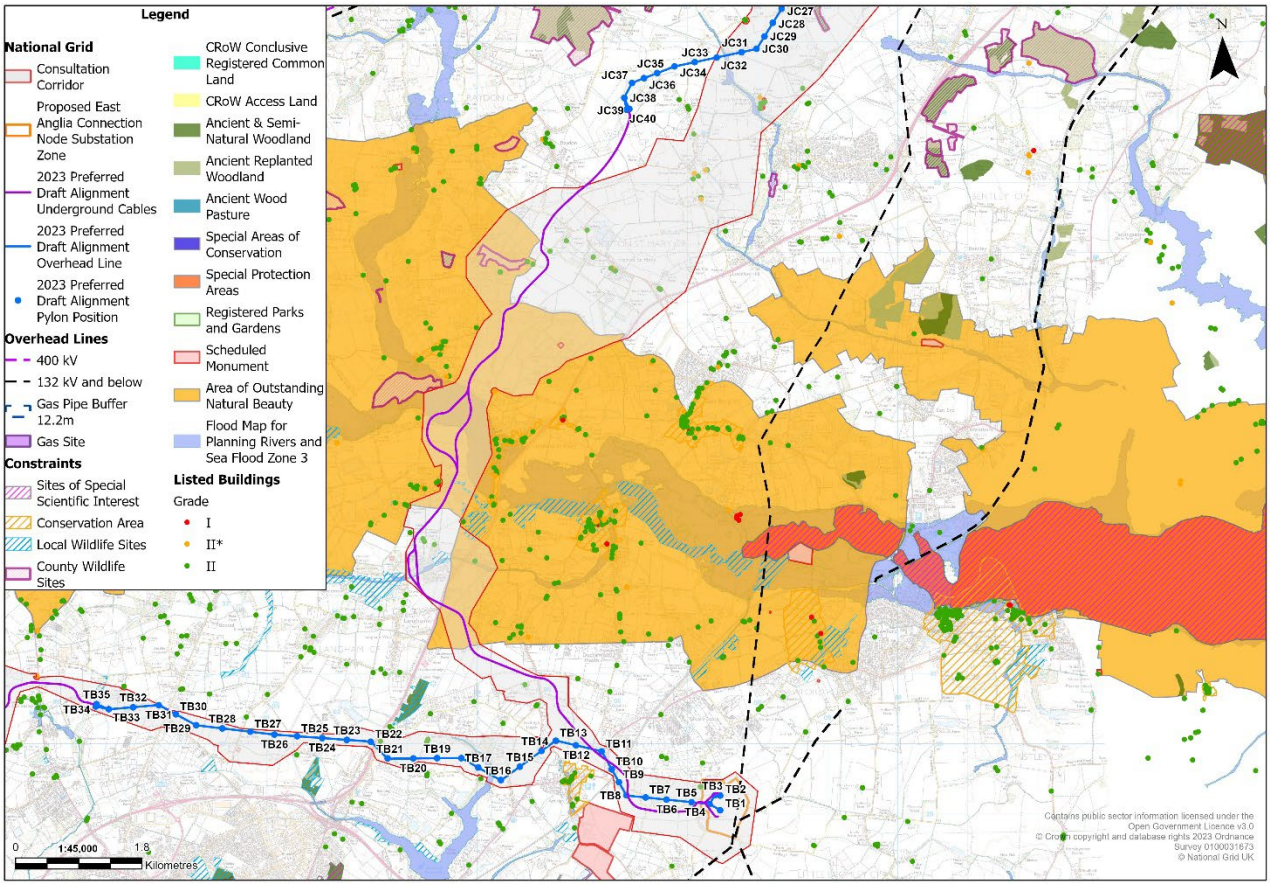
6.4.72 The draft alignment then passes Holly Bush Corner. Careful routeing and some restrictions on working areas should avoid effects on existing woodland, though some effects on some hedgerows would be unavoidable.

6.4.73 South of Higham Road crossing woodland and the River Stour is unavoidable as the draft alignment is to the west of Stafford St Mary. Constraints in this area have lead to the route being split with some cable expected to be installed in each, at the crossing of the River Stour and where we would cross Black Brook. Trenchless crossing techniques are proposed here and also at:

- Langham, where routeing is restricted by numerous residential properties, the Grade I Listed Church of St Mary and extensive areas of woodland; and
- the crossing of the A12.

6.4.74 A route crossing Black Brook and the A12 to the east of Ewens Farm was also considered but found not to be possible due to the location of various residential and commercial properties and the requirement for an unconstrained width for the trenchless crossing of at least 160 m.

Figure 6.16 – AONB To EACN substation – underground cable route



6.4.75 South-east of the A12 (see Figure 6.16) the draft alignment continues through agricultural fields before routeing to the north of Ardleigh. Trenchless crossing techniques would be used to cross the railway. The crossing of the railway has been positioned more to the north to allow the draft alignment for the overhead line from the EACN substation to be positioned closer to the Highways Depot approximately midway between residential properties.

6.4.76 The draft alignment for the underground cables then follows to the south of Little Bromley Road, to avoid the small lake, before crossing the road to enter the EACN substation midway between Bounds Farm and Badley Hall.

EACN substation

6.4.77 In identifying an area within which the proposed substation could be sited consideration has been given to a number of factors:

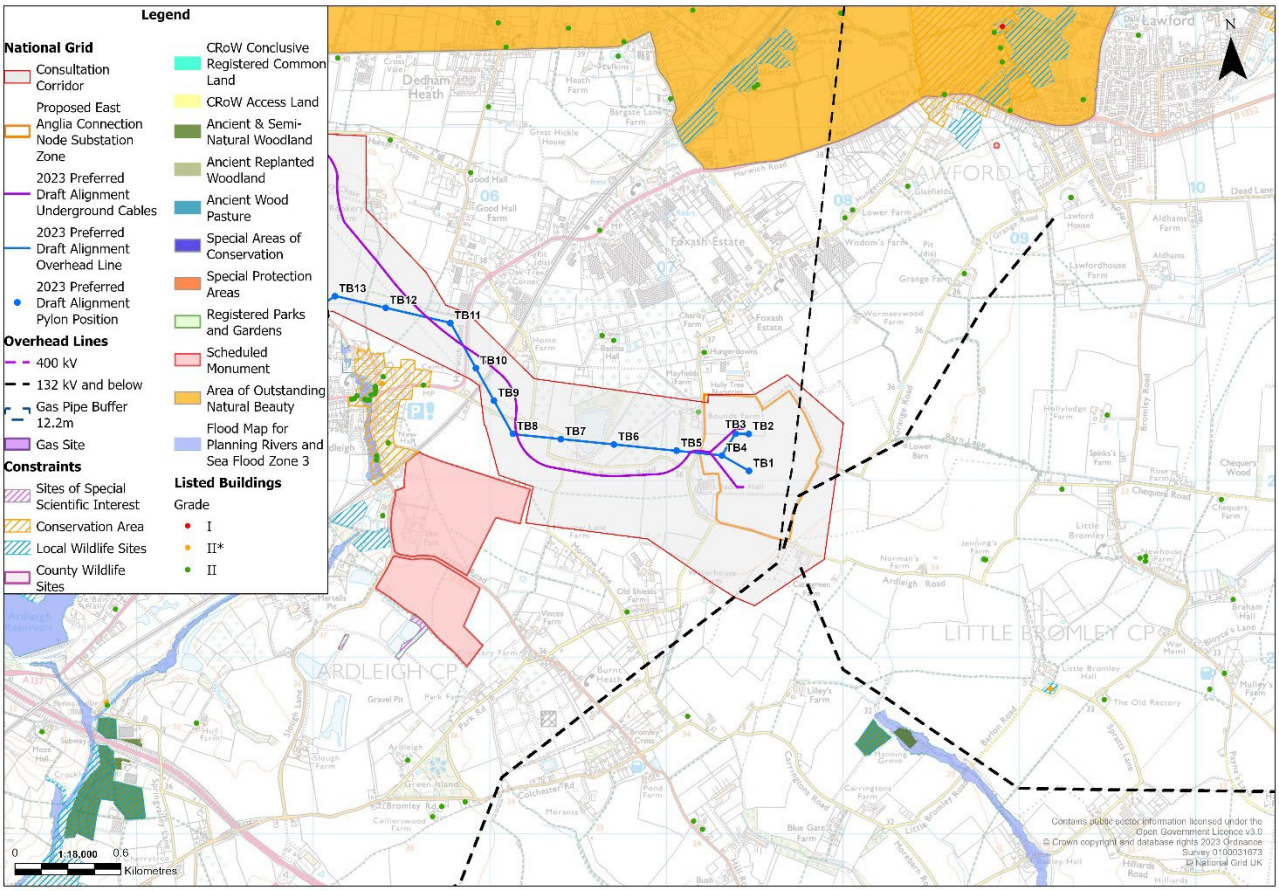
- 400 kV connections from the west – for both overhead line or underground cables sufficient space will be required to route between properties at an appropriate separation and for the necessary separation of circuits to connect into the EACN substation. Residential properties to the west include Badley Hall (on Little Bromley Road) and Bounds Farm (on Hungerdown Lane);
- customer connections from the east – by underground cables with a preference for the customer substation infrastructure (connected to the EACN substation by underground cables) to be in close proximity to the EACN substation; and
- land requirements for the various National Grid and customer infrastructure for permanent and temporary works.

6.4.78 In the 2022 non-statutory consultation the siting area for the EACN substation was shown in the vicinity of the UKPN Lawford substation with early emphasis (indicated by the darker shading in the graduated swathe) on an area directly north of the existing substation. Areas to the east of Grange Road or south of Little Bromley Road were also identified but with lower emphasis (lighter shading).

6.4.79 Considering the above factors it was concluded that the land to the north of Little Bromley Road and between Hungerdown Lane and Grange Road would provide an appropriate area for the EACN substation (see Figure 6.17). Locating the substation adjacent and to the west of the existing 132 kV overhead line would avoid the need to divert the 132 kV connection and also increase the separation to the nearby residential properties to reduce potential effects.

6.4.80 Siting to the east of Grange Road or south of Little Bromley Road was considered less preferred as it would reduce the benefits gained from existing screening, would typically increase the length and cost of 400 kV connections (less economic and efficient) and in some locations incur extra costs to mitigate existing 132 kV infrastructure. It would also locate the customer substations further east or south, similarly reducing benefits from existing screening and potentially positioning them closer to residential receptors such as at Norman’s Farm and Waterhouse Farm.

Figure 6.17 – Substation Siting Area



6.4.81 Landscape proposals will be developed comprising a mix of woodland, tree, scrub, hedgerow and grassland. Detailed proposals will seek to respect the character and pattern of the existing landscape and to soften, screen and filter views of the proposed infrastructure. Sensitively designed mounding/ false cuttings may also be explored.

EACN substation to Great Horkesley

6.4.82 Exiting the EACN substation on overhead line the draft alignment for the connection to Tilbury passes approximately midway between Bounds Farm and Badley Hall and continues west.

6.4.83 Routeing to the south of Badley Hall would result in a longer less direct route and would require two additional angle pylons. It would also transfer effects from Bounds Farm to a greater number of residential properties to the south, including Morrow Lane Farm and Waterhouse Farm. This was therefore not preferred.

6.4.84 Between TB8 and TB16 (see Figure 6.18) the Project passes around the north of Ardleigh. As set out in the CPRSS, and Section 5.5 of this report, routeing to the south of Ardleigh is not possible, as it is constrained by a range of features including residential properties, commercial property, mineral workings and scheduled monuments. To the north of Ardleigh, separation from residential property has been maximised and the number of angle pylons minimised by careful positioning. The draft alignment crosses the railway line approximately midway between the residential properties to the south of the Home Farm and north east of the Highways Depot, taking into account the location of the proposed new 400 kV underground cables.

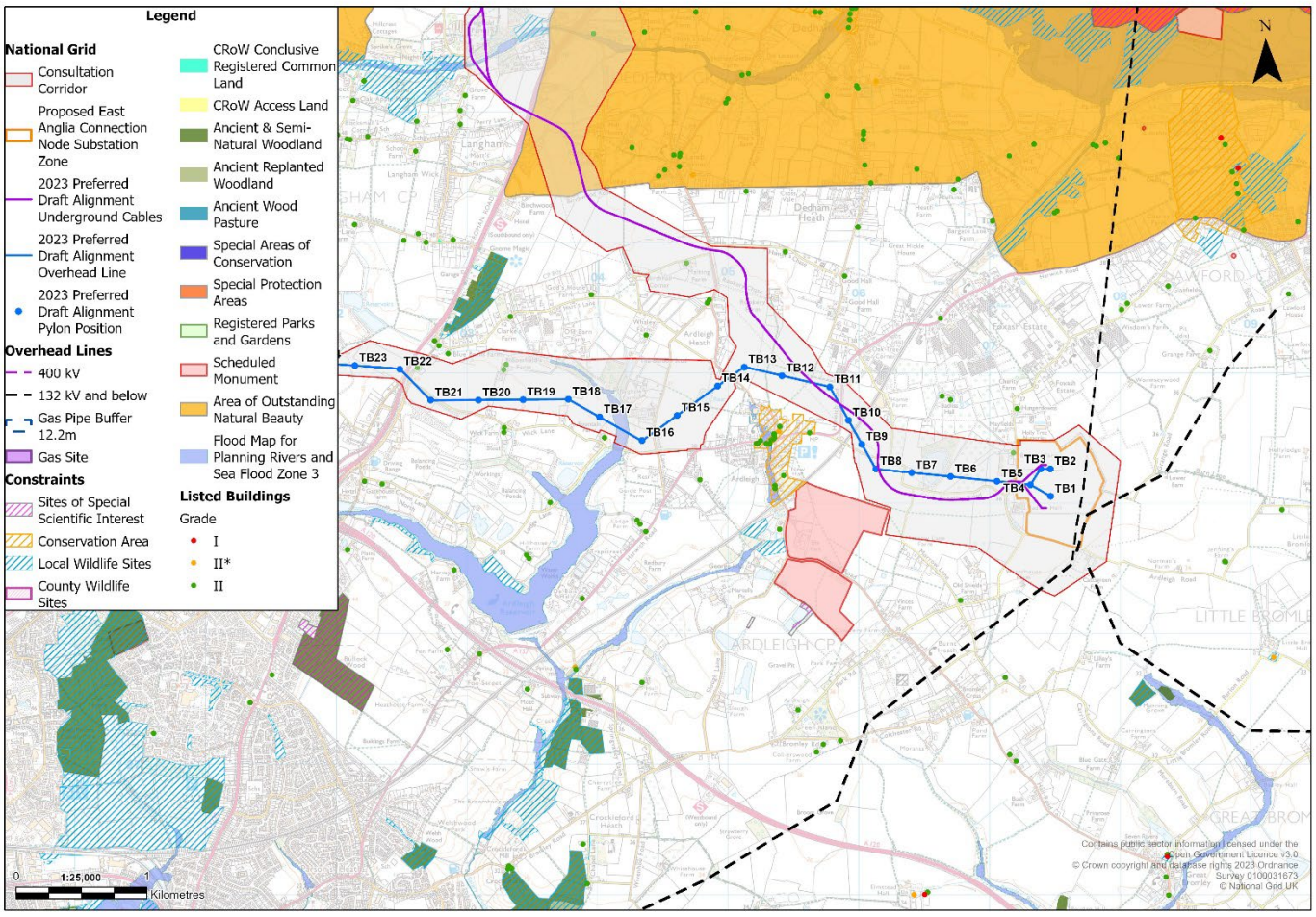
6.4.85 Pylons TB11 and TB13 (see Figure 6.18) have been positioned as far north as practicable, to reduce effects on receptors within Ardleigh. The angle pylons would be to the side of the views north from Ardleigh, with TB11 partially back-clothed by existing glasshouses and commercial premises.

6.4.86 From TB13 to TB16 (see Figure 6.18) at the northwest of Ardleigh the pylons have been positioned as far as practicable from the closest residential properties with the alignment located approximately midway between the properties.

6.4.87 From TB14 routeing to the north of Pyghtle Farm was considered but not preferred over the draft alignment to the south. Whilst some oversailing of woodland is unavoidable to the north or south the potential level of effects was considered likely to be much greater to the north. There was also the potential for the overhead line to adversely interact with equestrian uses to the north to a greater extent than other agricultural uses to the south.

6.4.88 From the crossing of the upper end of Ardleigh Reservoir the draft alignment is routed to the west and is relatively straight, although angle pylons will avoid specific constraints. TB18 (see Figure 6.18) has been positioned beyond woodland to provide some filtering / screening of views from the residential property to the south. A more northern positioning of this pylon to increase separation to the property was less preferred as it would require a greater amount of tree removal.

Figure 6.18 – EACN substation to Ardleigh (TB1 – TB20)



6.4.89 West from TB18, at the A12 crossing, the draft alignment deviates from its a straight alignment to minimise potential effects on proposed developments associated with mineral workings, a water supply reservoir at Crown Quarry, a food distribution warehouse and a small business park. The A12 is the point where the alignment crosses into Colchester District.

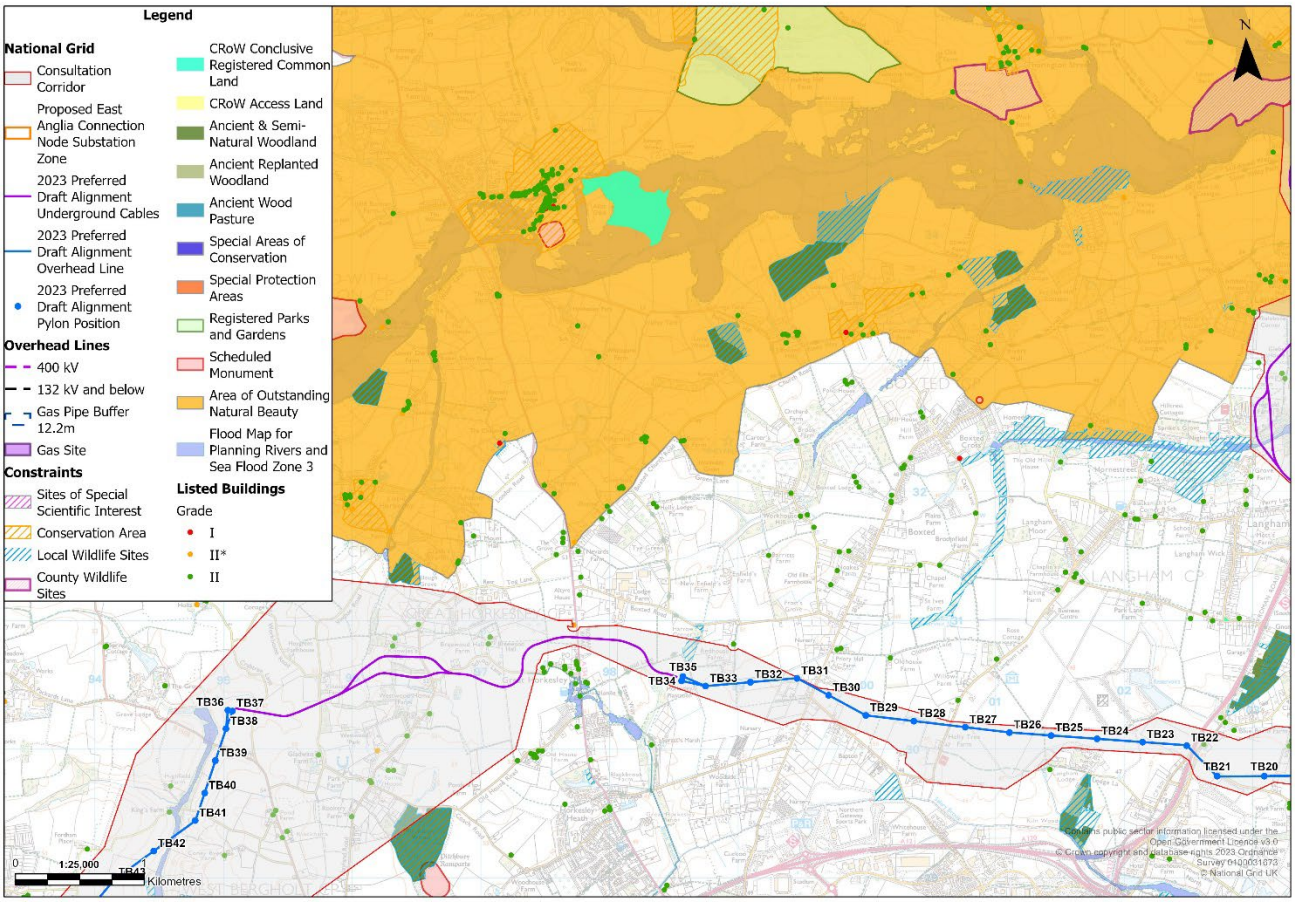
6.4.90 The main constraint to routeing in this location is the height of the proposed food distribution warehouse (approximately 23 m). Routeing to the south of the warehouse would involve oversailing an area of lorry parking, routeing at the edge of the Crown Quarry land, and over part of a car park before crossing the A12. Based on submitted application plans it would appear that an overhead line would not restrict the development proposals or interfere with normal activities during operation. The limited oversail of the lorry parking may partially restrict movements in the area during construction and maintenance but this could be managed with appropriate notice. Based on the submitted application plans for the water supply reservoir the closest pylon (TB21) would be on open land surrounding the proposals and not affect the reservoir. National Grid will seek feedback and engage with the developer in order to fully understand the proposals and any potential interaction with the draft alignment.

6.4.91 Routeing to the north would require a crossing over the lorry park access road, and would oversail the lorry park entrance requiring temporary closure (potentially over several days) during construction and any future maintenance. This is likely to be incompatible with the activities of the business and was not preferred.

6.4.92 Routeing to the north or south of the warehouse would not affect the proximity of pylon TB22 to the nearest residential property, at the northern end of Turnpike Close, as onward routeing is partially constrained by the solar farm to the immediate north. A northern route would reduce the direction change of pylons TB21 and TB22 but overall the potential impacts on the businesses mean an alignment to the south was preferred.

6.4.93 From TB22 (see Figure 6.19) the draft alignment continues to the west to a proposed CSE compound, deviating from a straight alignment to pass midway between residential properties at and to the north of Holly Tree Farm as well as those properties either side of the crossing of Straight Road. Pylons have been positioned such that residential properties are closer to mid-span positions.

Figure 6.19 – Ardleigh to Great Horkesley (TB20 – CSE East and including cable route)



Great Horkesley to Colne Valley

6.4.94 As set out in Section 5.5 of this report underground cables are now proposed in the vicinity of the AONB near Great Horkesley.

6.4.95 Two alternative locations were considered for the eastern CSE compound, informed by the Horlock Rules:

- close to existing woodland at Horkesley plantation, benefitting from screening; and
- adjacent to farm buildings to the south of Lodge Farm on Boxted Road.

6.4.96 The area adjacent to Horkesely plantation is preferred as it is more substantively screened from residential properties by existing woodland to north-east and south-west. The detailed positioning of the CSE compound would be slightly restricted by an existing gas pipeline to the south, but for construction and operation it is better to oversail this by overhead line than cross by underground cables.

6.4.97 The section of underground cable would terminate at the north east of Fordham, north of Colchester Road. Two alternative locations for the CSE compound were identified at the western CSE compound where sloping landform and onward overhead line routeing at least partially within a valley had potential to reduce effects on nearby residential properties and listed buildings. These where;

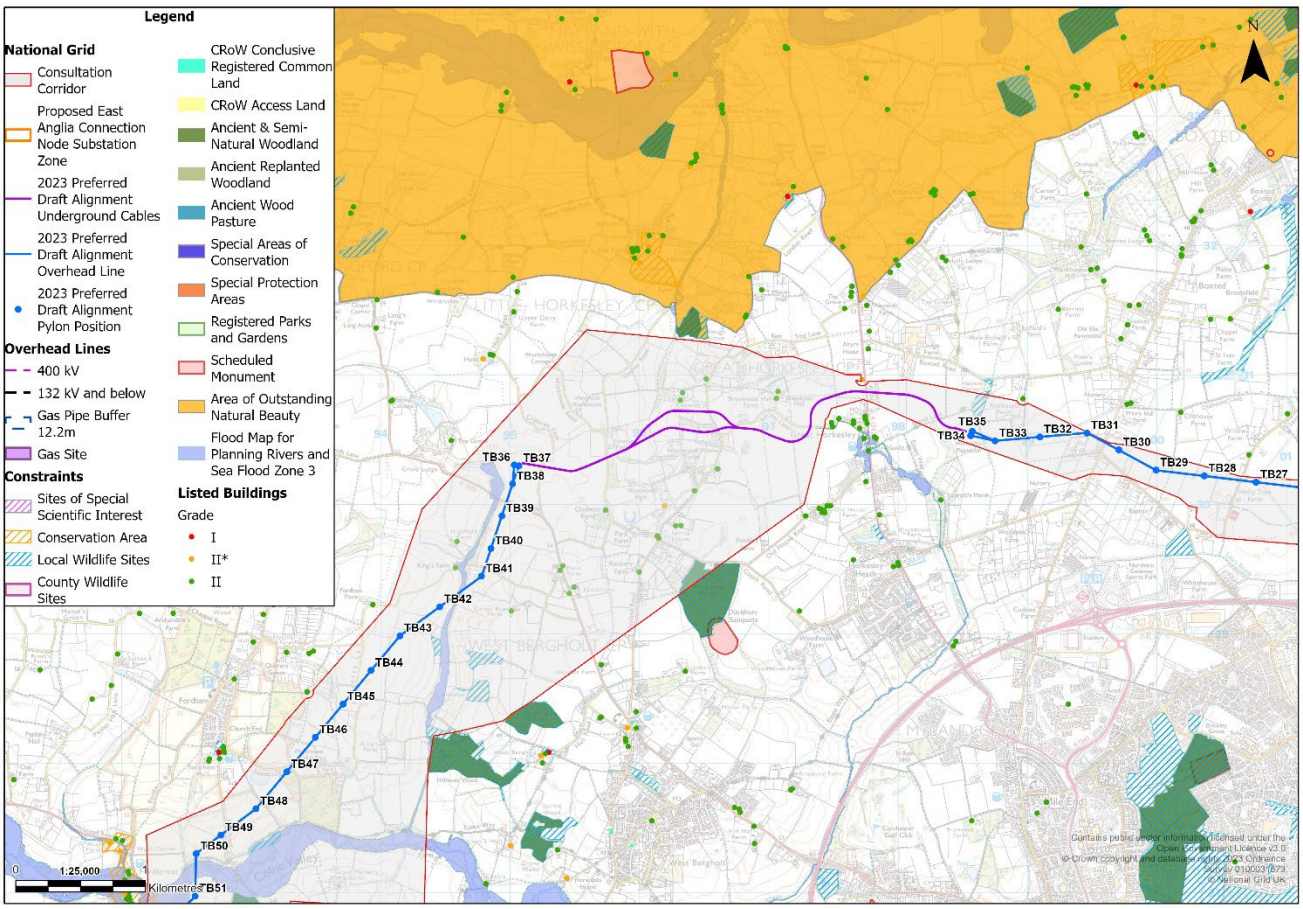
- to the east of pylon TB40 (to the west of Pond Farm); and
- to the west of a small waterbody to the northwest of the B1508 and Crabtree Lane junction.

6.4.98 The more southerly location, to the east of pylon TB40, would require a longer access road and longer underground cables (at additional cost) with no additional benefit and was therefore less preferred.

6.4.99 Routeing the underground cables between the east and west preferred CSE compound locations to the southern half of the consultation corridor was discounted due to the more extensive areas of ancient woodland, the scheduled monument at Pitchbury Ramparts, and the distribution of numerous scattered properties. Routeing to the north of Breewood Hall Farm and Knowles's Farm was also considered but was less preferred as it was very constrained by the relatively close proximity of residential properties and it would have greater effects on woodland and trees. The draft alignment is routed to the south of Breewood Hall Farm and between Knowles's Farm and Westwood Home Farm, and through to the CSE compound between Vinesse Farm and Gladwins Farm (see Figure 6.20).

6.4.100 Around the London Road / School Lane junction the presence of constraints such as waterbodies, woodland and residential properties has meant it was not possible to identify a suitable location with sufficient width for the required cables construction corridor. The draft alignment has therefore been split to utilise two corridors to provide the necessary space. The current preference is to route either side of the London Road / School Lane junction. A more southerly alternative is likely to require the use of trenchless crossing techniques to avoid interaction with the reservoir just north of Westwood Park and was less preferred.

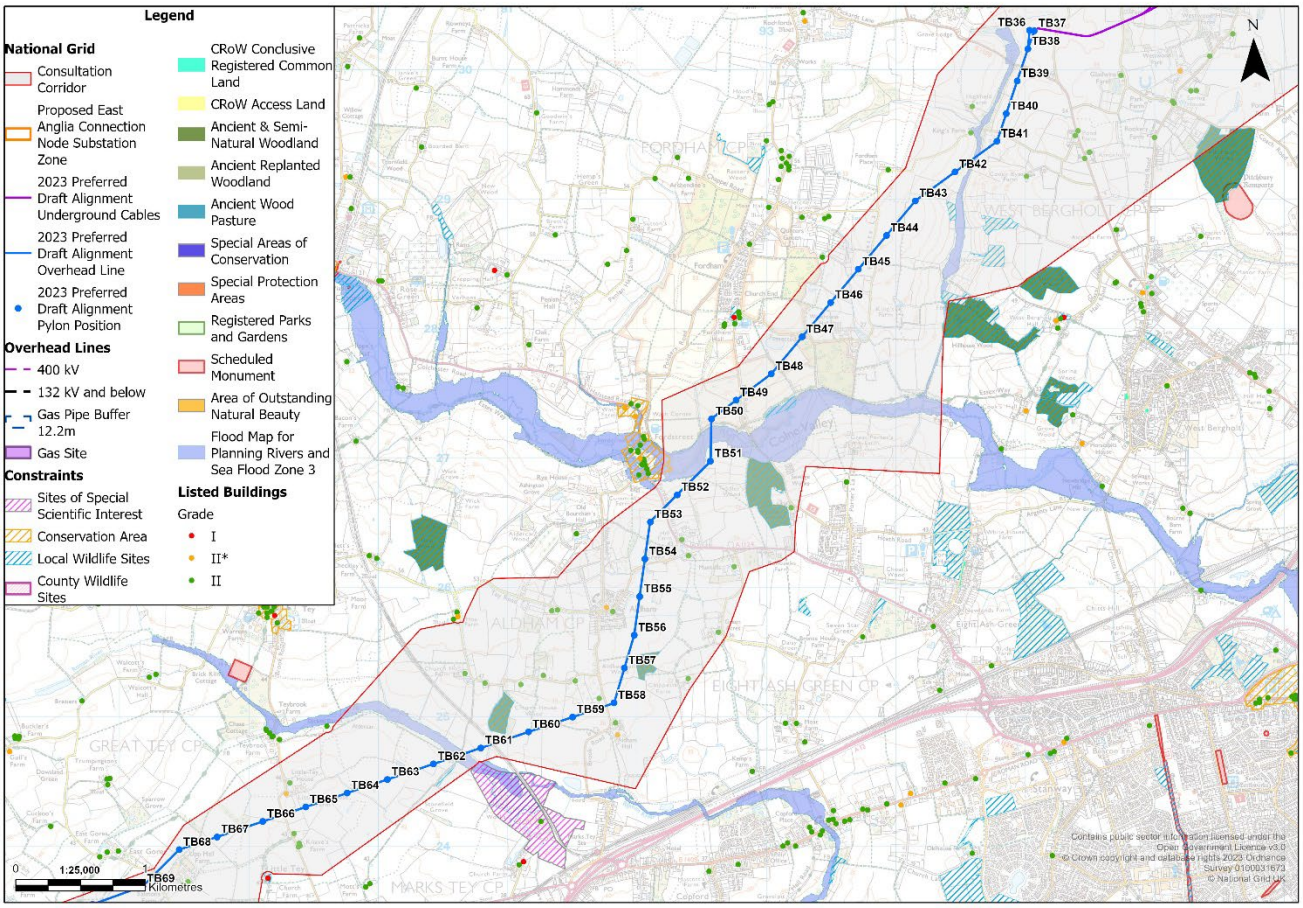
Figure 6.20 – Great Horksley & Colne Valley (TB33 – TB39)



6.4.101 Southwards from the CSE compound to the crossing of the Colne Valley the draft alignment for the overhead line is located approximately midway between residential properties or where existing trees / woodland may provide some screening (whilst maintaining as straight an alignment as far as practicable).

6.4.102 The draft alignment has been routed between areas of woodland, for example between King's Farmhouse and Coney Byes Farm (around TB41), and between wooded areas to the north and south of Watercress Hall (around TB46 and TB47) (see Figure 6.21).

Figure 6.21 – Colne Valley / Aldham (TB39 – TB61)



Colne Valley to Broad Green

6.4.103 The draft alignment oversails woodland approximately 500m to the east of Fordstreet where the floodplain is at its narrowest. There would be some effects on the woodland in order to achieve the necessary clearances.

6.4.104 A more eastern alternative location for the crossing of the Colne Valley was considered, turning south after Watercress Hall at around pylon TB47 (see Figure 6.21) and passing to the east of Mill House (east of Mill Road). Crossing the river, the route would turn to the west passing to the north of Fiddlers Wood Ancient Woodland and joining the draft alignment around pylon TB51. Whilst reducing effects on Fordstreet and on woodland the route would lead to increased effects on floodplain grazing marsh (three pylons would potentially be within priority habitat areas) and would present additional construction risks from working on peaty soils within the floodplain. On balance the draft alignment to the west was preferred.

6.4.105 Southwards from the River Colne, routeing is restricted by a dispersed pattern of residential development. To the east of Gallows Green gaps between residential properties are approximately 100 m and there are also limited gaps between residential properties to the north of Aldham (between Aldham and Old Bourchier's Hall). Multiple changes of direction would be required to avoid residential properties and there would be unavoidable effects on trees and woodland.

6.4.106 The draft alignment is routed between Aldham and Gallows Green, deviating to the east and south of the 2022 graduated swathe. Separation from Aldham is limited by avoidance of the ancient woodland at Aldham Hall Wood whilst maintaining as straight an alignment as practicable.

6.4.107 South of Aldham the draft alignment turns west approximately midway between Brick Cottages and Aldham Hall (at TN58) to the west of Brook Road. From here it continues straight between Church House Wood Ancient Woodland and Marks Tey Brickpit SSSI and to the north of Upp Hall Farm. Passing to the south of Upp Hall Farm would have been closer to and would lead to increased effects on the Grade I Listed Church of St James at Little Tey and so was less preferred.

6.4.108 From Upp Hall Farm, routeing has been influenced by the crossing point of the A120 where the draft alignment crosses into Braintree District. Alternatives considered included:

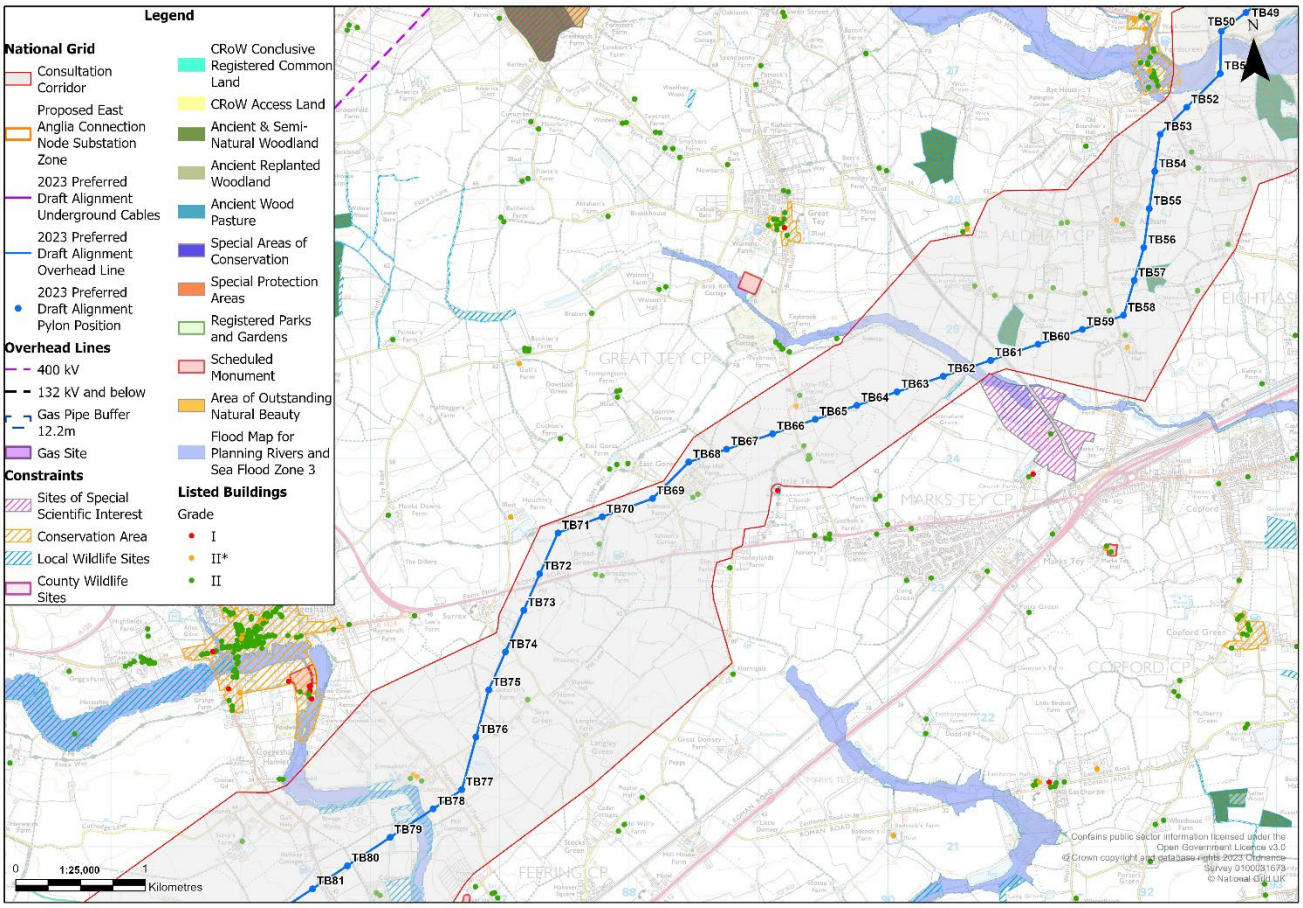
- to the east of Broad Green,
- west of Broad Green between Broad Green and Surrex; and
- to the west of Surrex.

6.4.109 A route to the east of Broad Green would be closer to residential properties than a route between Broad Green and Surrex albeit there would be fewer properties affected by a route to the east than by the draft alignment (noting however that the greater number are at around 200 m separation with under 100 m for a route to the east). A route east of Broad Green route would also more directly interact with the proposed Tey Green development proposals (routeing close to the centre compared with routeing to the western edge for the draft alignment) although the proposals are at an early stage of development. Effects on the Grade I Listed Church of St James at Little Tey may also have been increased with a route east of Broad Green.

6.4.110 An alignment to the west of Surrex would transfer effects from one set of residential receptors to another and would take the overhead line through a smaller gap (around 150m) between residential properties than that to the west (over 500 m). Routeing here was also less preferred as it would require sharper changes of direction than alternatives to the east of Surrex. Overall an alignment west of Broad Green and east of Surrex is preferred.

6.4.111 There is an undetermined planning application for change of use from agricultural land to garden / equestrian land in proximity to TB73 and TB74. Further consideration will be given to this once it is determined.

Figure 6.22 – Marks Tey (TB59 – TB78)

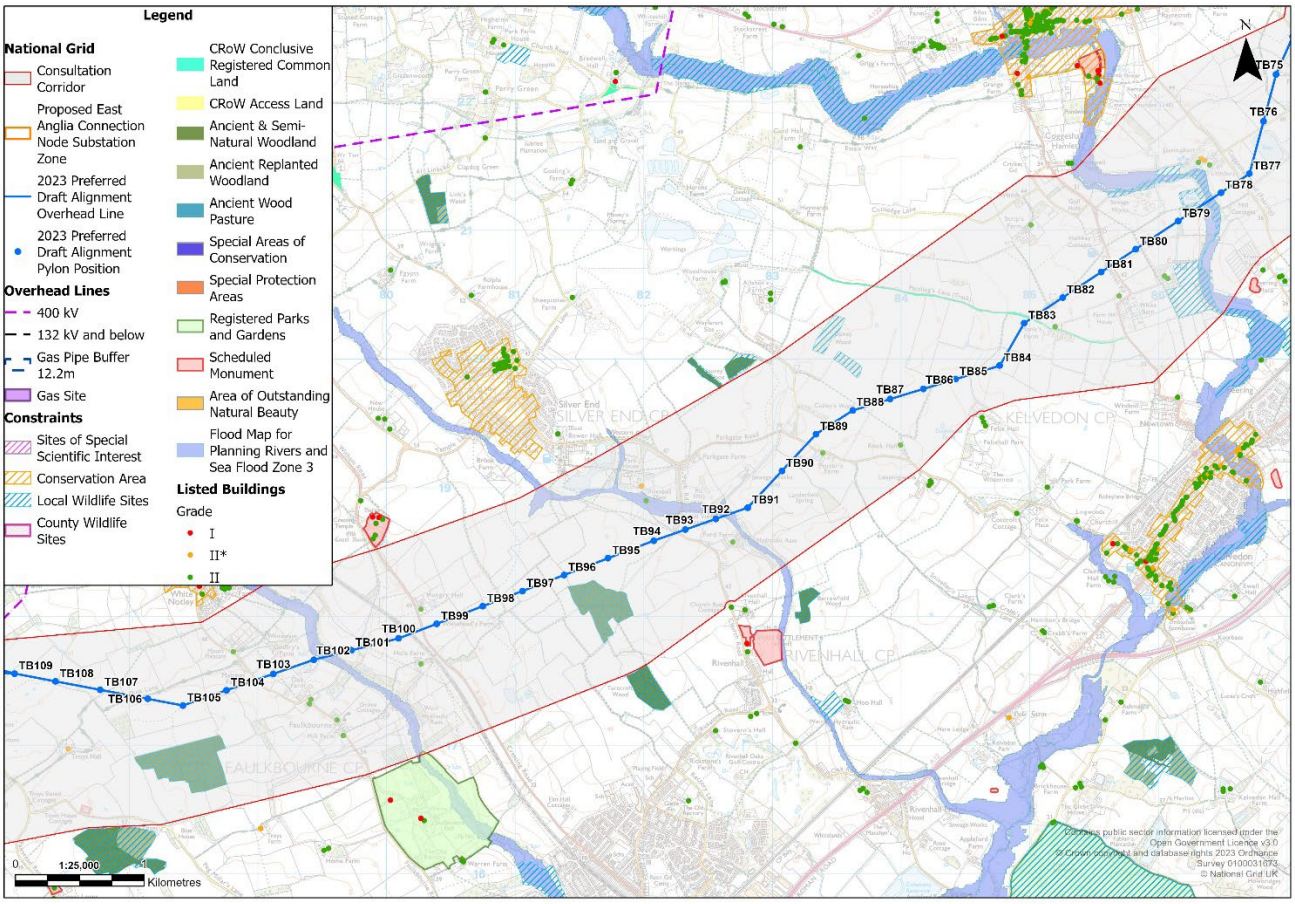


Broad Green to Fairstead

6.4.112 From Broad Green the routeing of the draft alignment was influenced by a number of considerations:

- the need to pass to the south of the inter-related medieval Grade I and II* listed buildings at Coggeshall Hamlet and Feeringbury (north of TB78);
- reducing the potential for interaction with an existing mineral extraction operation and an area for which the operators may seek consent for future mineral extraction (TB82 – TB86); and
- proposed housing development at Newton.

Figure 6.23 – Coggleshall /Kelvedon (TB78 – TB98)



6.4.113 Alternatives to north or south of the draft alignment either increase effects on heritage assets or increase effects on a greater number of existing and planned residential properties and were less preferred. The draft alignment oversails the existing mineral extraction operation but cannot avoid an area for which the operaor may seek consent for future extraction. We have sought to position pylons to the very edge of the possible future extraction area, however no application has currently been submitted.

6.4.114 In order to reduce the number of angle pylons and to reduce effects on residential properties the oversail of woodland is unavoidable. The draft alignment is approximately midway between Mill Cottages and Monk's Farm (to the south) and Halfway Cottages and Littlebury (to the north).

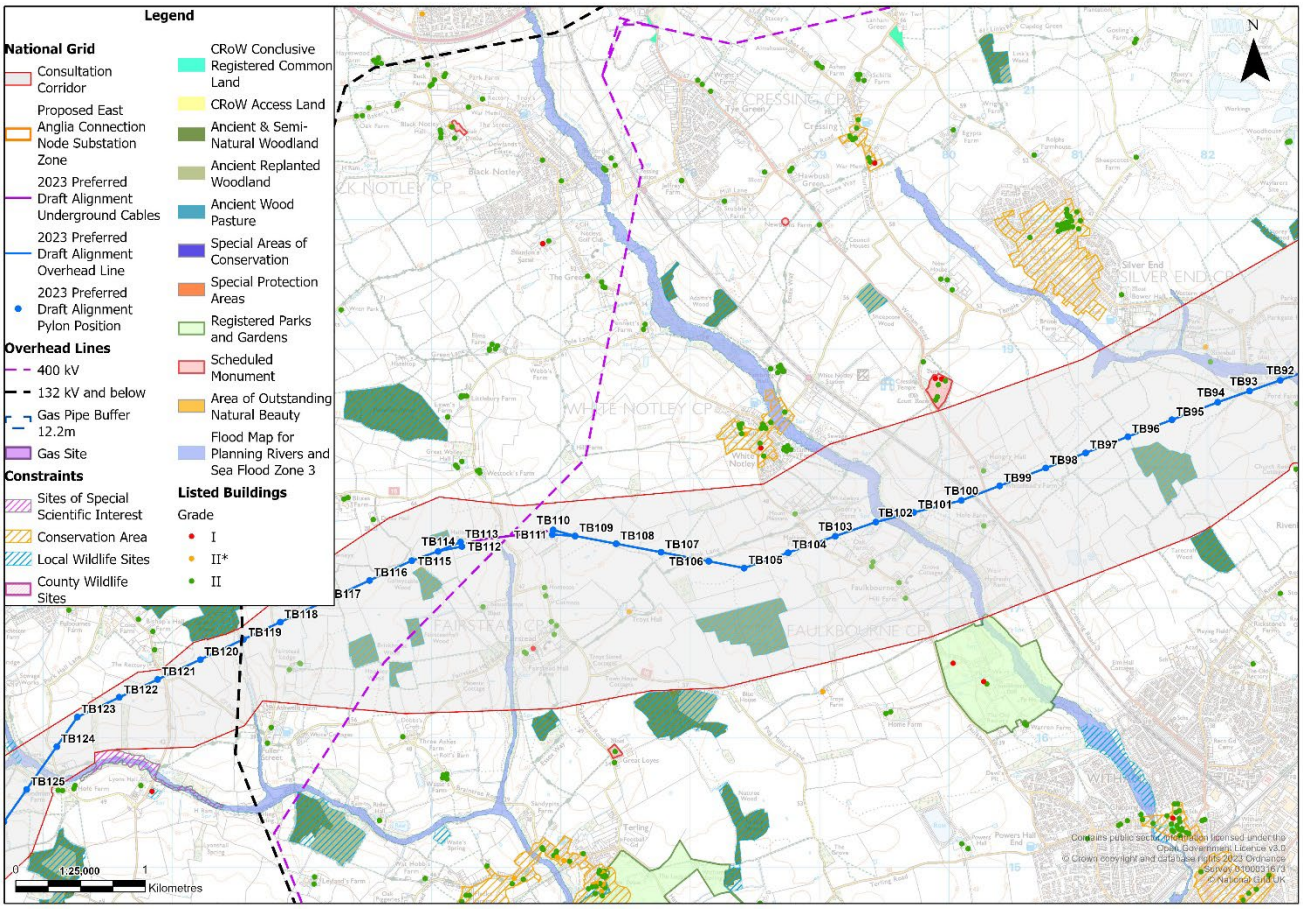
6.4.115 Between Coggeshall and Faulkbourne the draft alignment deviates slightly from a straight line to reduce effects on woodland, avoiding Cutley's Wood and the ancient woodland (Rivenhall Thicks) to the north of Tarecroft Wood. The draft alignment has been routed approximately midway between properties, for example between Hill View Cottages and Ford Farm and between Hungry Hall and Whitehead's Farm and Hole Farm.

6.4.116 The draft alignment oversails a proposed solar farm at Rivenhall, in part to avoid routeing over Rivenhall Thicks (ancient woodland and LWS) and residential properties. Pylons have however been positioned outside the area of the solar farm generating panels. Alternatives to route to the northern or southern edge of the consultation corridor would have avoided oversail of the proposed solar farm but were less preferred for the below reasons:

- routeing to the south would be less direct, with sharper changes of direction to avoid ancient woodland in Rivenhall Thicks, and would have increased the effects on the Grade 1 Listed Church of St Mary and All Saints at Rivenhall; and
- routeing to the north would have increased effects on woodland and on the Grade II* Listed Rivenhall Place.

6.4.117 The draft alignment continues broadly straight to the north of Troys Wood (Ancient Woodland) and to the west of Faulkbourne, routeing approximately midway between residential property such as between Maltings and Godfry's Farms and Oak Farm. Oversail of undesignated woodland to the east of these farms alongside the River Brain is unavoidable. Avoiding effects on the woodland would have required a diversion to the south between TB96 and TB105 (see Figure 6.24). This would have increased the route length by approximately 1 km and would have required an estimated additional three pylons to route between Faulkbourne and Faulkbourne Hall. Effects on the Grade I listed buildings at Faulkbourne Hall, and the Church of St Germanus and a Grade II Listed Park and Garden would have increased. Effects on residential properties would mostly have been transferred between properties and effects on woodland would have been reduced. On balance these effects and the costs arising from a less direct alignment were less preferred.

Figure 6.24 – Fairstead (TB96 – TB120)



6.4.118 From TB105 (see Figure 6.24) the draft alignment has been influenced by the crossing of the existing 400 kV overhead line, the location of which was influenced by feedback on the consultation corridor (see Section 5.5 of this report) and the graduated swathe.

6.4.119 Feedback on the potential effects at Fairstead by proposing a northern shift of the graduated swathe to avoid locations such as Fairstead Lodge and Fuller Street.

6.4.120 Alternative corridors to the south are constrained by a combination of Ancient Woodland, residential property and the proposals for Longfield Solar Farm meaning that an alignment would require more changes of direction. This was therefore less preferred.

6.4.121 Moving the graduated swathe to the northern half of the consultation corridor would generally increase separation from residential properties and provide opportunities to site the CSE compounds (required to achieve the underground cable crossing of the existing 400 kV overhead line) where they would benefit from screening / filtering or back-clothing by existing landform and woodland to reduce effects on views.

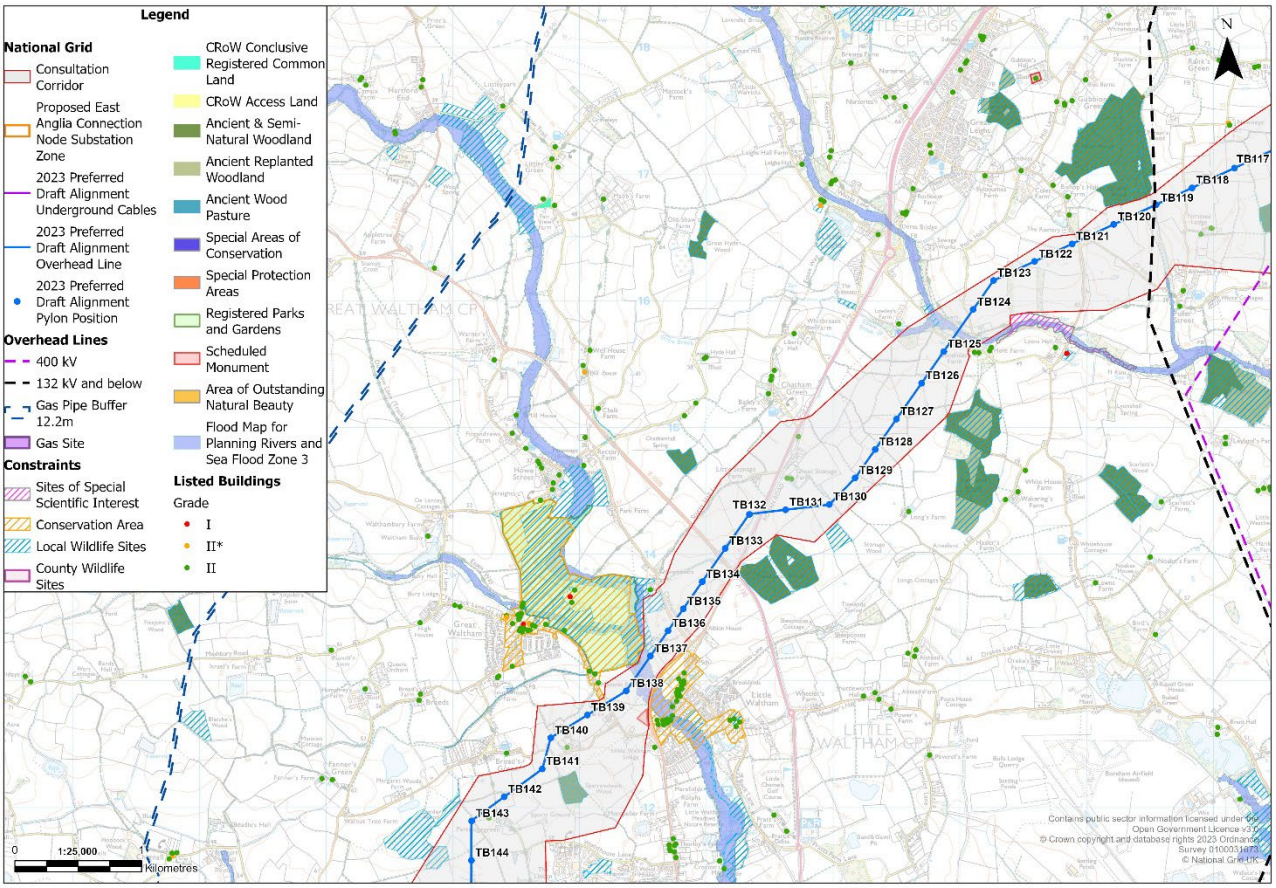
6.4.122 Careful routeing of the alignment for the underground cables through the willow tree planting under the existing overhead line and potentially the use of trenchless crossing techniques would further reduce potential effects on woodland and the willow plantation.

Fairstead to Margaretting

6.4.123 Beyond Fairstead, the draft alignment continues south west, crossing into Chelmsford District. The draft alignment would pass between Lowley's Farm and Goodman's Farm. Routeing to the south of Goodman's Farm would have been more direct but was less preferred due to of increased effects on the Grade I Listed Church of St Mary the Virgin, the location of Lyons Hall, and increased effects on woodland including woodland within the River Ter SSSI. Opportunities for routeing north and west of Lowley's Farm are constrained by the Ancient Woodland at Manns and Parsons Woods and residential property at The Rectory. These would also have been less direct and would have to deviate away from the new Chelmsford Northeast Bypass.

6.4.124 Scattered residential properties and listed buildings restrict the crossing of the A131 to the south of Great Stonage Farm. A location relatively towards the east of the consultation corridor was preferred as it would position pylons, including and northwards from TB129, (see Figure 6.25), to the east of the new bypass reducing effects of the draft alignment on the closest properties at, and north from, Great Stonage Farm. Routeing to the east of Stonage Wood would be less direct and require sharper changes of direction and was less preferred. Pylon positioning in the draft alignment has accounted for the Chelmsford North East Bypass but engagement will continue as the Project develops in order to understand any potential implications for routeing.

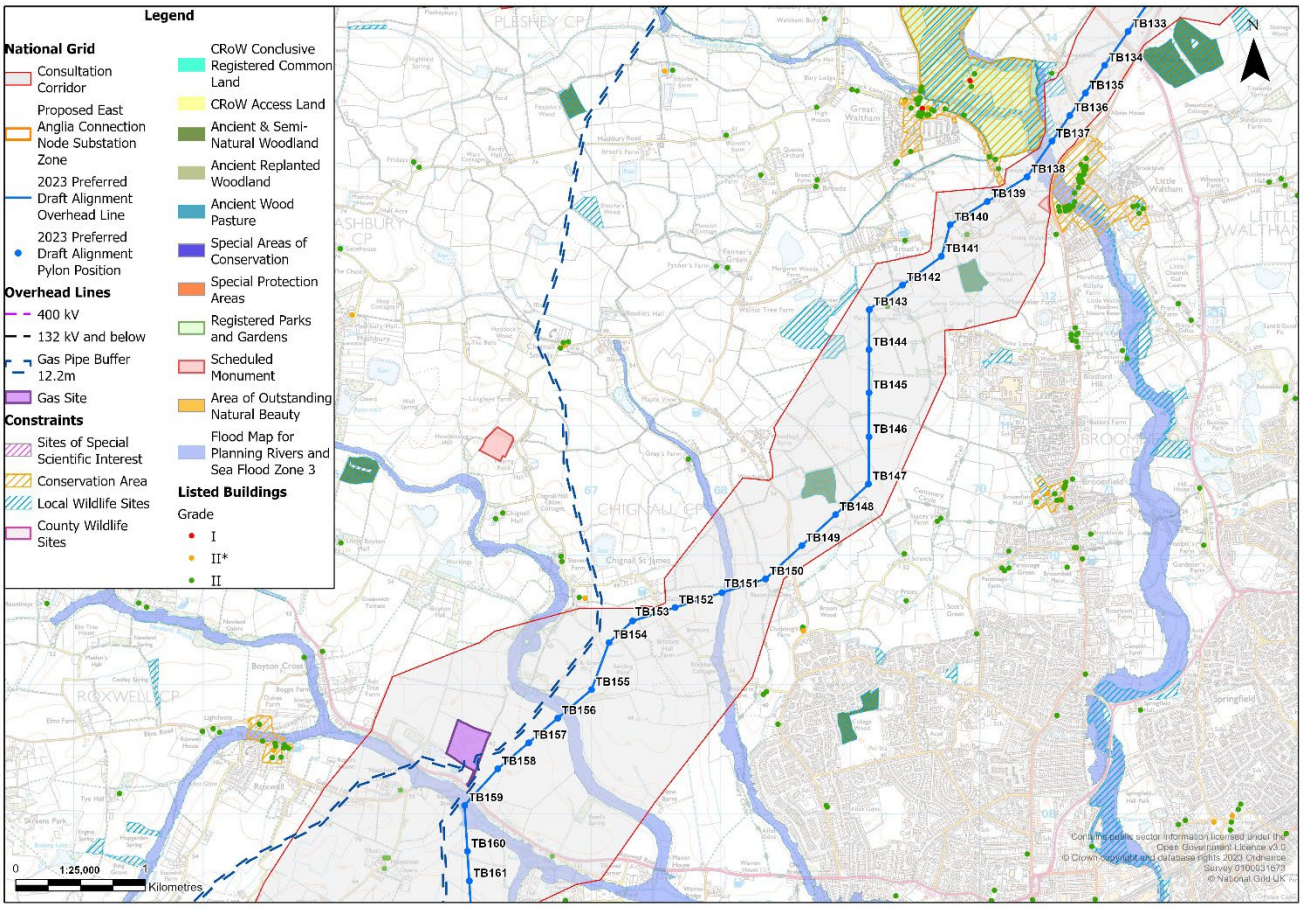
Figure 6.25 – Great Leigh to Great and Little Waltham TB120 – TB140)



6.4.125 Between Great and Little Waltham the draft alignment passes approximately midway between the edge of the Great Waltham conservation area and a registered Park and Garden, and the Little Waltham conservation area. Pylon spacing would be reduced here (requiring an additional pylon). This would reduce the required pylon heights and therefore would reduce impacts on views from these features.

6.4.126 Deviation from a straight alignment is required to avoid residential properties. The draft alignment is broadly equidistant between those at Minnow End, Ball's Farm and Broad's Green. Routeing to the east of Ball's Farm and around the east and south of Sparrowhawk Wood would reduce effects on residential properties at Broad's Green but was less preferred as it would require more and sharper changes of direction and would also directly impact existing and proposed housing developments to the north of Broomfield.

Figure 6.26 – Broomfield / Chelmsford (TB141 – TB161)



6.4.127 Between TB143 and TB152 (see Figure 6.26) the draft alignment passes to the east of Bushy Wood (a change from the graduated swathe) to increase separation from and reduce effects on residential properties at Woodhall Farm and Woodside.

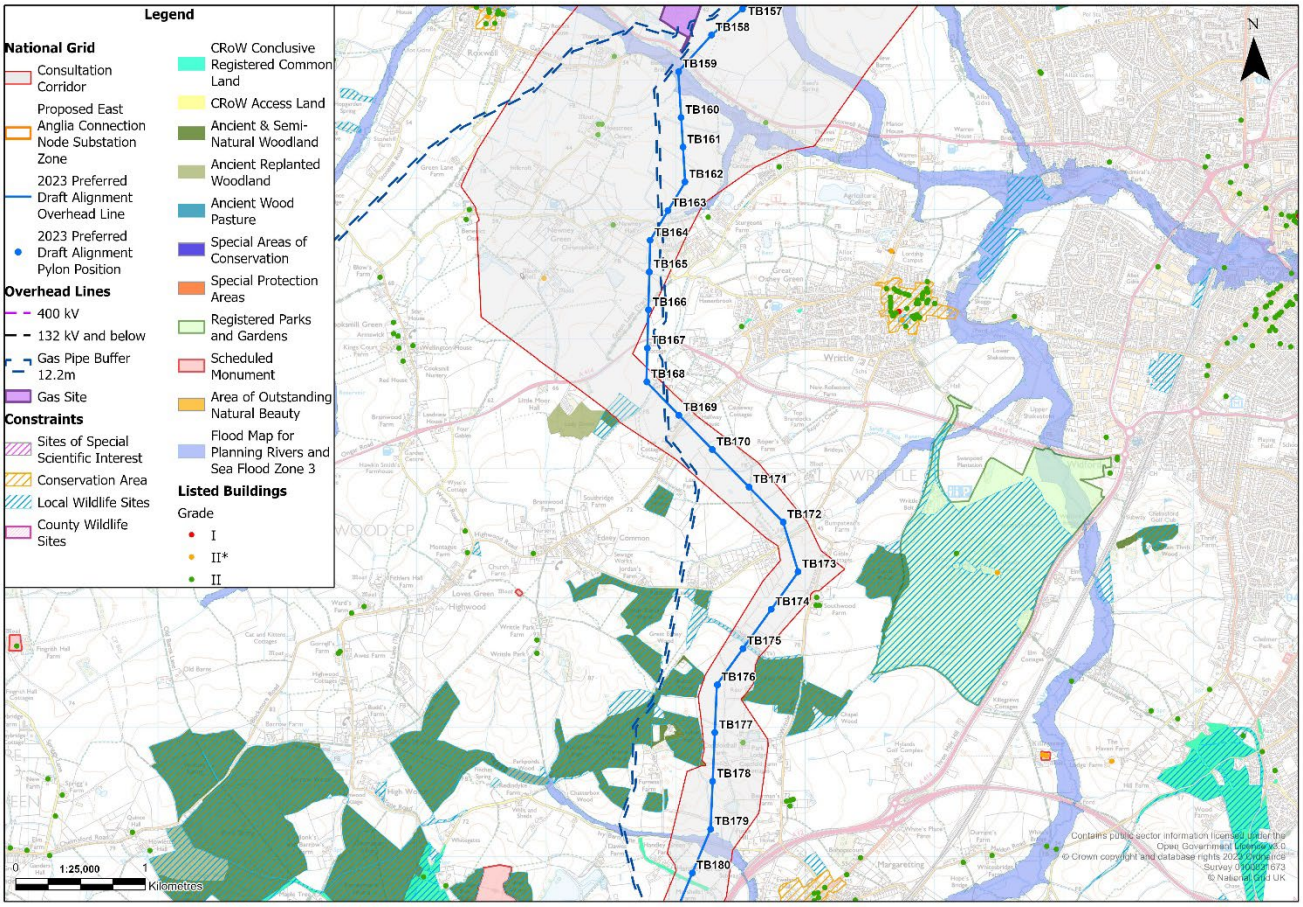
6.4.128 Routeing southwards from here is constrained by the proposed Warrens Farm housing development to the north of Roxwell Road, adjacent to the Roxwell Quarry former workings. The draft alignment passes between Clatterfoot and Brittons Hall Farm and oversails the historic mineral workings (between TB154 and TB155).

6.4.129 Scattered residential properties limit alternatives for crossing Roxwell Road to either immediately east of the gas pipeline (just east of Blackwall Bridge) or immediately west of Thatchers Farm. There are a greater number of residential properties close to the western alternative, albeit at similar separations than to the east. Routeing to the east is also straighter and more direct with less sharp angles and is therefore preferred.

6.4.130 From Blackwall Bridge (TB159) the draft alignment broadly parallels the high-pressure gas pipeline to the south of Little Oxney Green. Routeing would be initially to the east before crossing to the west to the north-west corner of Writtle College grounds, passing approximately midway between Newney Hall and Writtle College. Routeing more to the west was not preferred as it would have increased effects on woodland or be relatively closer to individual residential properties.

6.4.131 The draft alignment to the west of Writtle adopts an alignment requiring a slight expansion of the 2022 consultation corridor to reduce the angle of direction change and avoid positioning a pylon on unsuitable ground in the adjacent landfill area. As a result the draft alignment extends up to approximately 100m to the east of the consultation corridor for an approximate distance of 400m. This change is referred to as West of Writtle

Figure 6.27 – Writtle / Edney Common (TB160 – TB179)



6.4.132 As discussed in Section 5.5 of this report alternatives were potentially available for the route south from Little Oxney Green however the consultation corridor remains preferred. The draft alignment is broadly central to the consultation corridor, approximately midway between residential properties. A single sharper change of direction near the crossing of Nathans Lane (between TB171 and TB172) was considered but was less favoured because it would require routeing closer to residential properties to achieve straight alignments to the north and south.

6.4.133 To avoid Chapel Wood Ancient Woodland and achieve appropriate separation from residential properties and listed buildings at Coptfoldhall Farm, a deviation from a straight alignment through to Margaretting is required (TB176 – TB179). A further deviation is required to pass approximately midway between Marshalls Farm and Handley Green and avoid Osborne's Wood Ancient Woodland (TB181 – TB183).

Margaretting to A127 East Horndon

6.4.134 From just before the A12, the route as presently proposed initially criss-crosses the district boundaries of Brentwood District and Chelmsford District and then Brentwood District and Basildon District.

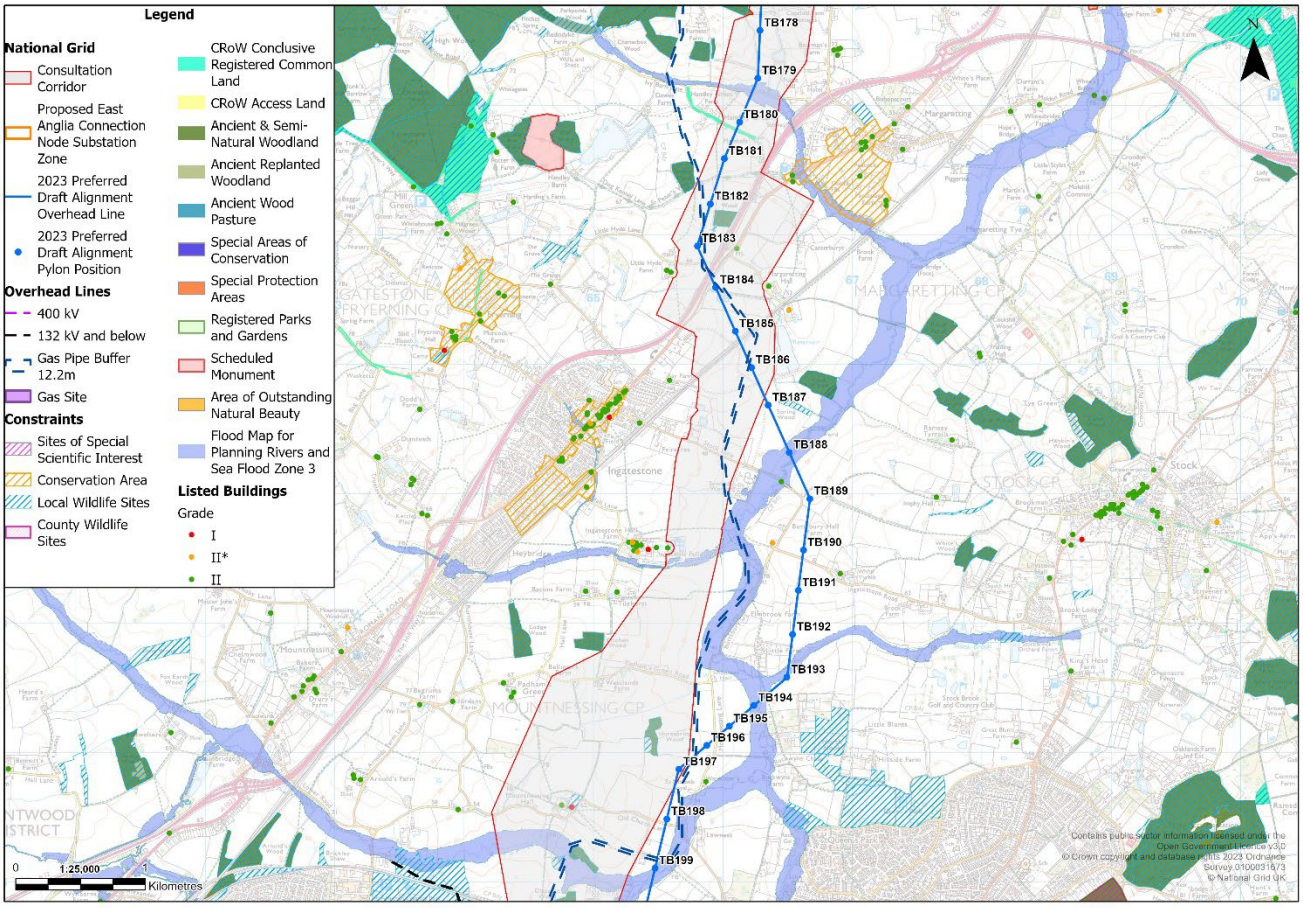
6.4.135 South of Osborne's Wood, routeing considered the requirement to avoid a high-pressure gas pipeline, the crossing of the A12 and the potential effects on the listed building and residential property at Little Hyde Farm.

6.4.136 A more northerly crossing point than the draft alignment to reduce effects on the north side of Ingatestone was considered but routeing is restricted by Margaretting and various residential properties to the north of Margaretting Hall. This would have placed any alignment relatively closer to more residential properties and also reduced the connection between the Grade II Listed Margaretting Hall and the Grade II* Listed Church of St Margaret within Margaretting village. It would also be slightly less direct and therefore was not preferred.

6.4.137 After crossing the A12 and the railway, as set out in Section 5.5 in response to consultation feedback, the consultation corridor was no longer preferred considering potential effects on the Grade I Listed Ingatestone Hall and Church of St Giles, and the draft alignment has been routed further east of Ingatestone.

6.4.138 From the A12, the draft alignment passes to the east of the Grade II* Listed Church of St Mary at Buttsbury (TB190) (see Figure 6.28) before turning initially to the southwest to avoid woodland and then turning south again (TB193) to achieve separation from St Giles Church passing it to the east and then south of the wastewater treatment works.

Figure 6.28 – Ingatestone (TB182 – TB198)



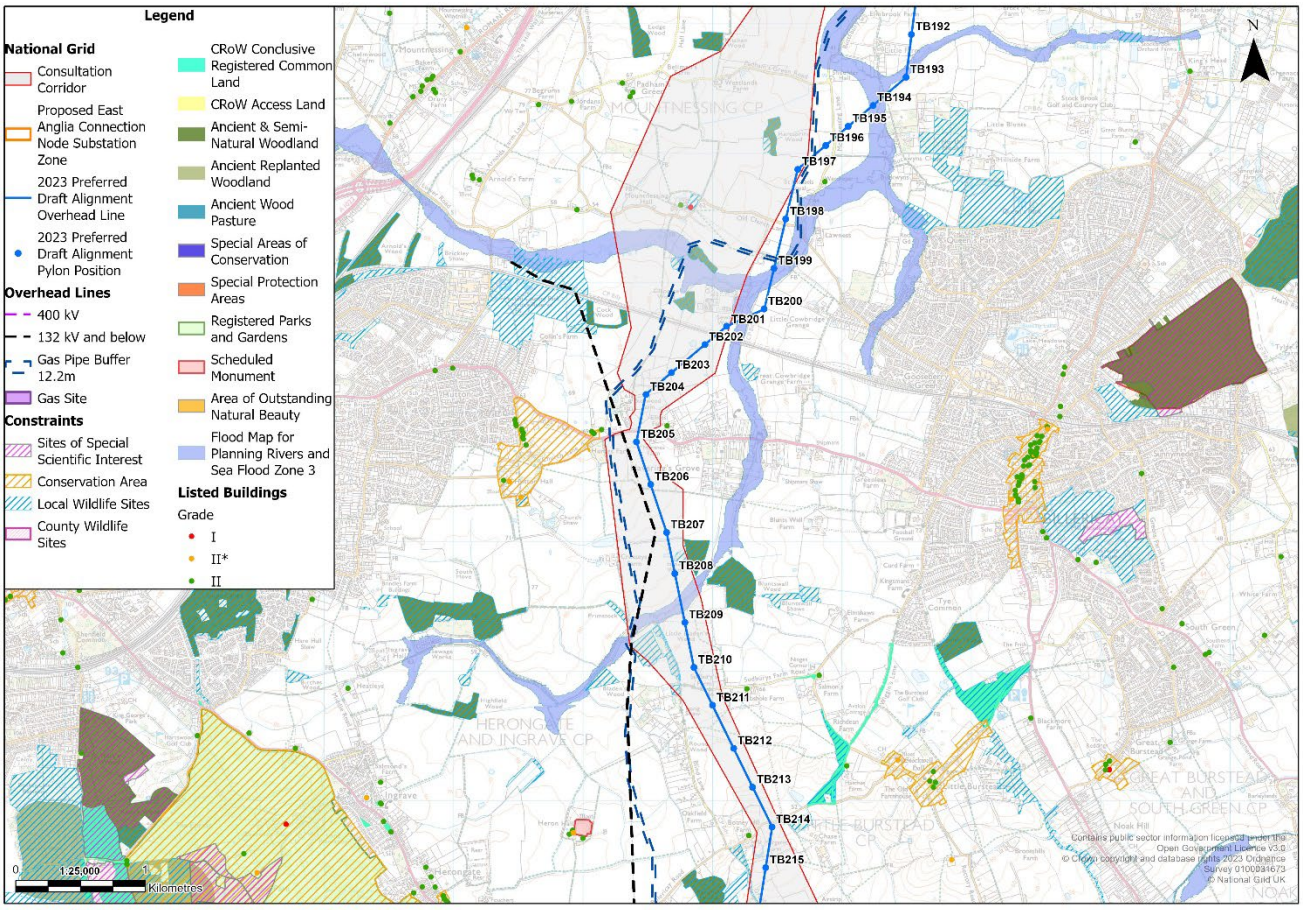
6.4.139 Routeing west of the Church of St Mary at Buttsbury was considered but would have positioned an overhead line between linked churches and would have crossed a network of well used recreational routes. On balance a route passing to the east of the Church of St Mary at Buttsbury was preferred.

6.4.140 Routeing south of the Church of St Mary at Buttsbury, passing to the east of Wardroper's and Lawness, was less preferred as an overhead line would be on slightly more elevated ground closer to a greater number of residential properties and would have greater effects on trees within hedgerows.

6.4.141 South of the railway, the draft alignment changes direction to pass through a relatively narrow gap, where separation from an existing 132 kV overhead line is required whilst maintaining separation from residential properties at Bushwood Farm and Martines Farm (TB204 – TB206) (see Figure 6.29). The draft alignment is then relatively straight, maintaining separation from an existing 132 kV overhead line.

6.4.142 The draft alignment then passes approximately midway between properties to the western end of Sudburys Farm Road (TB210 to TB211) and approximately midway between properties on Billericay Road to the east of Botney Hill Farm (TB214) with the pylon positioned downhill from the residential properties at Botney Hill Farm.

Figure 6.29 – Hutton (TB197 – TB213)



6.4.143 South from Botney Hill Farm the draft alignment is relatively straight, deviating to the south west to increase the separation between the alignment and the Chase Farm Airstrip (north east of TB217) (see Figure 6.30). Engagement will be undertaken with the operators to establish if any further mitigation measures are required.

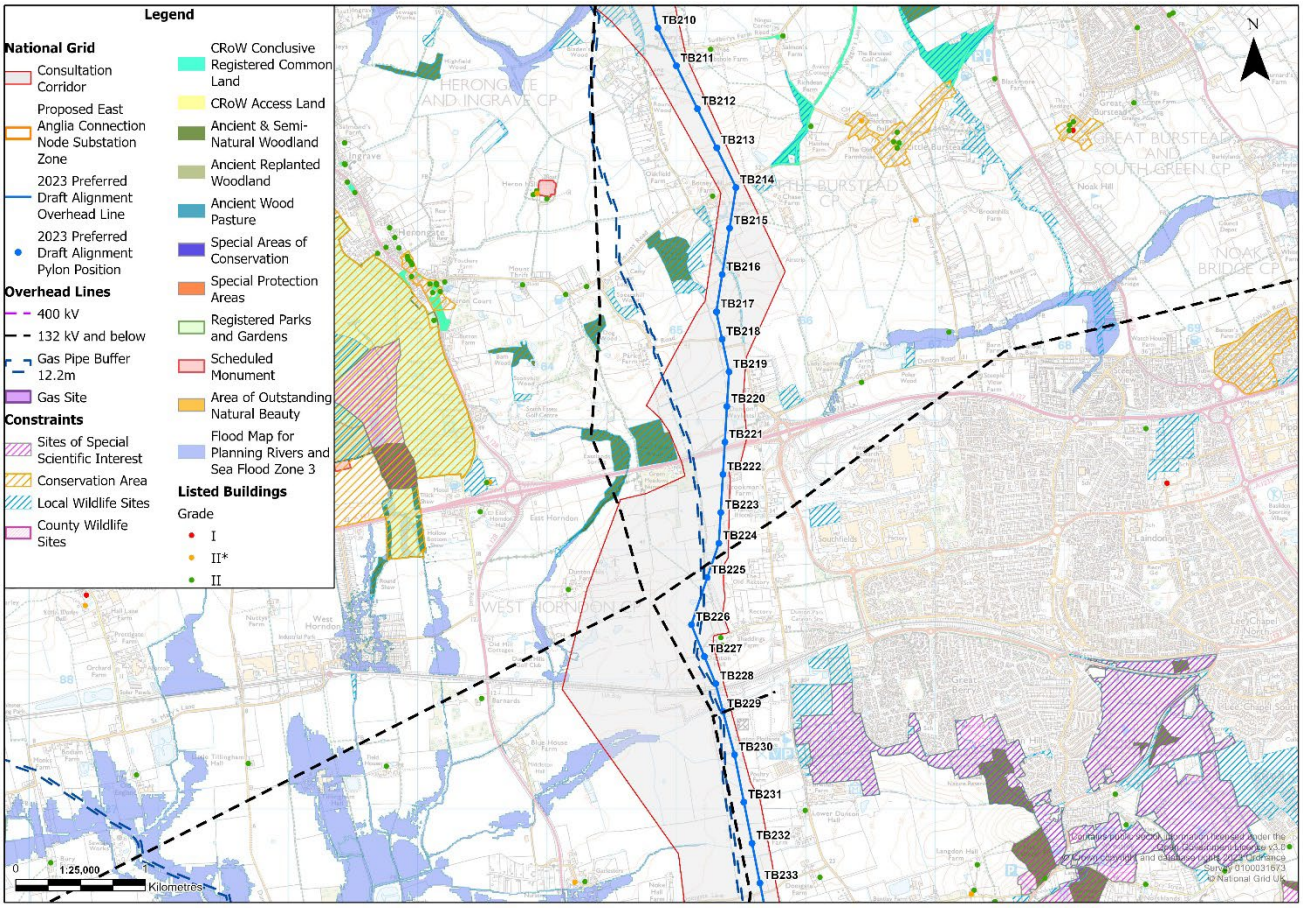
6.4.144 In order to avoid potentially placing a pylon within Park Farm Solar development the draft alignment would be closer to residential property at Dunton Wayletts (around TB219). Here the draft alignment is also constrained by the need to cross the A127 as close to 90 degrees as practicable.

A127 East Horndon to Tilbury Substation

6.4.145 The proposed Dunton Hills Garden Village development located between the A127 to the north, the A128 to the west and the railway to the south, and to the west of the high-pressure gas pipeline, is a constraint to routeing. As set out in Section 5.5 alternatives were considered but were less preferred.

6.4.146 The proposed housing development and is expected to be a minimum of 80m distant from the high-pressure gas pipeline located to the west to meet safety clearances. The draft alignment is routed mostly to the east of the high-pressure gas pipeline, and approximately 200 m from the expected edge of the new development (TB222 to TB224).

Figure 6.30 – Dunton Hills Garden Village (TB214 – TB231)



6.4.147 Existing residential properties and Grade II listed buildings and an undesignated moat in the vicinity of Dunton Hall have required TB226 to be positioned to the west of the gas pipeline (within Brentwood District). Following information supplied as feedback to the 2022 non-statutory consultation, this pylon has been positioned along the draft alignment at around 100 m from proposed development areas reducing the potential for the overhead line to restrict development.

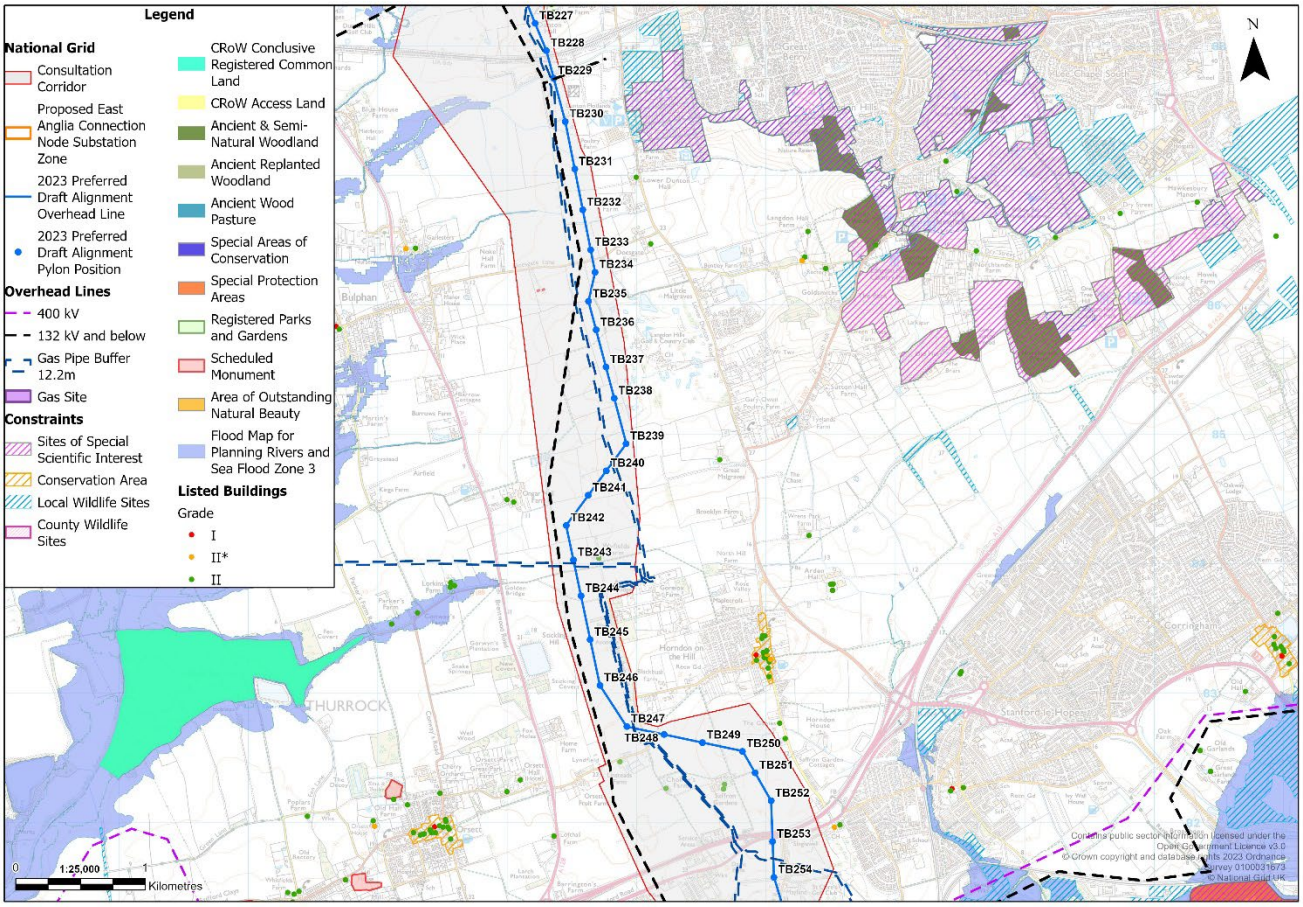
6.4.148 Southwards from Dunton Hall, at the boundary with Thurrock District, routeing is restricted by the railway crossing, an existing 132 kV overhead line and Solar Farm. Routeing close to the gas pipeline was preferred as the railway is close to grade here allowing pylon heights to be lower than if the crossing was made at an embanked section. This location also better facilitates the positioning of the scaffolding necessary to protect the railway during construction works. Due to the location of the gas pipeline and existing 132 kV overhead line it would be necessary to oversail part of the solar farm

between TB228 and TB230 (see Figure 6.30).

6.4.149 After crossing the railway the draft alignment parallels the existing 132 kV overhead line through to TB235 (see Figure 6.31).

6.4.150 At Bulphan routeing to the west of the consultation corridor was considered but was less preferred than routeing within the eastern part of the corridor. Routeing to the west would involve greater interaction with the existing 132 kV network and would be closer to Thurrock Airfield. Mitigation for potential effects on the airfield to the west of the corridor may only be achievable by using underground cables with the associated additional cost and environmental effects. It would also be likely to increase effects on the Bulphan WWII bombing decoy Scheduled Monument to the south of Doesgate Lane and was therefore less preferred.

Figure 6.31 – Thurrock (TB230 – TB253)



6.4.151 At TB235 (see Figure 6.31) the draft alignment moves away from paralleling the existing 132 kV overhead line, adjacent to Langdon Hills Golf & Country Club. This was preferred as it would reduce the potential for effects on flight activities from Thurrock Airfield. Closer pylon positioning has also reduced pylon heights further reducing the potential for effects on aviation. The draft alignment is not expected to restrict the proposed re-development of parts of the Langdon Hills Golf Course.

6.4.152 The draft alignment returns to paralleling the existing 132 kV overhead line (TB242 – TB246) to pass to the west of Horndon on the Hill. The draft alignment then passes to the north and west of Wyfields Farm. An alternative passing to the east and south of Wyfields Farm was considered but was less preferred as it would have positioned the farm between the existing 132 kV and proposed overhead lines.

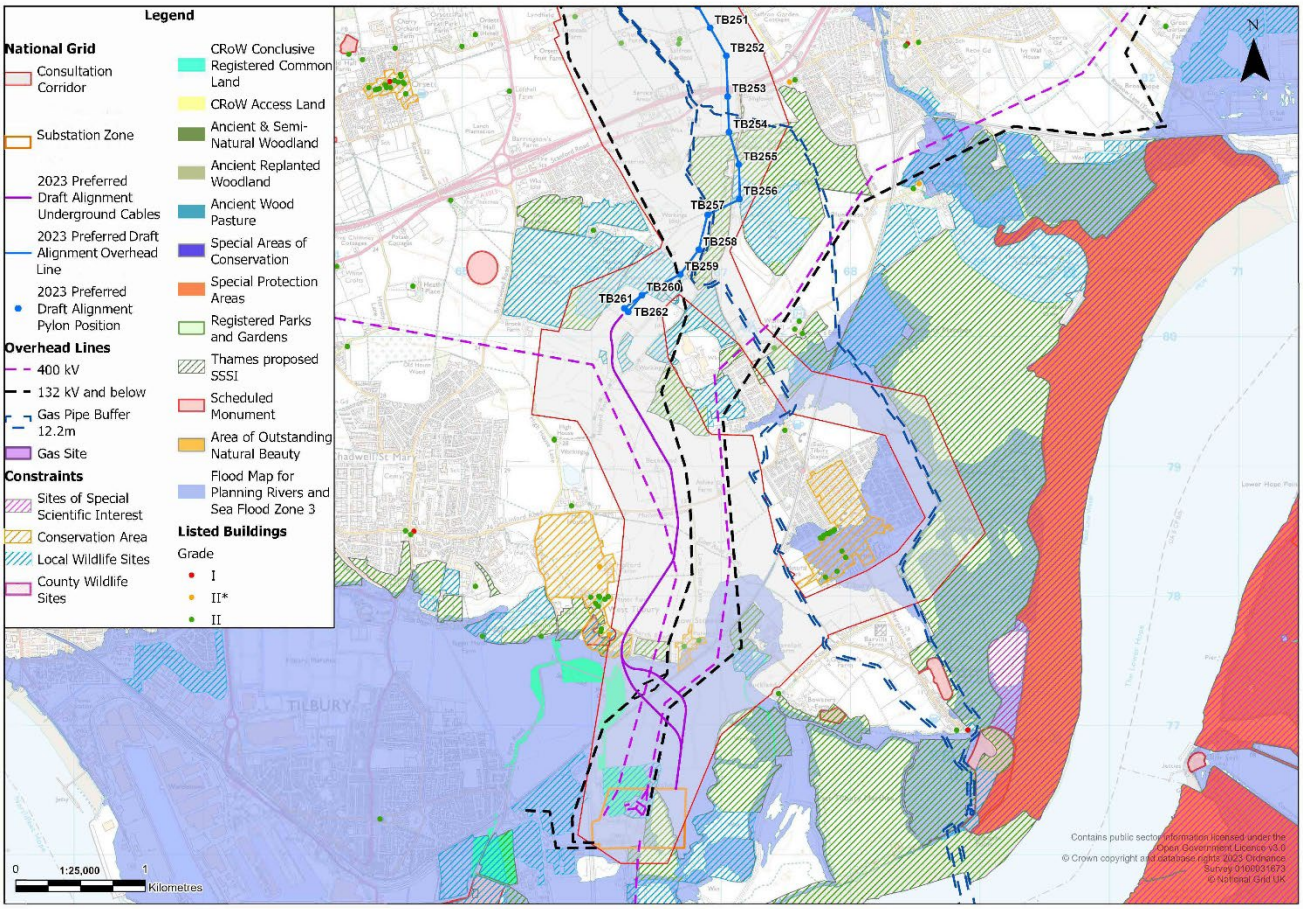
6.4.153 Further deviation from parallel to the existing 132 kV overhead line to route past Southfields is required for the reasons set out in the Section 5.5 which included restricted space between residential properties and constraints from previous minerals and landfill workings and the routeing of a gas pipeline. These constraints do require oversail, and potentially positioning of one pylon, within the search area of the Thames Marshes SSSI extension. As details of the SSSI extension emerge following surveys we will consider implications for routeing.

6.4.154 Section 5.5 set out the reasons for the technology change and routeing from the crossing of the Lower Thames Crossing (LTC) proposals through to Tilbury substation. Due to space restrictions between two existing overhead lines and the proposed LTC works, the crossing of the LTC works would be best achieved by underground cables. It was concluded that it was preferable to continue the underground cables through to the line entry to Tilbury Substation, given the extent of flood storage areas and the need to cross under the existing railway and existing 400 kV overhead line infrastructure. Feedback also identified a proposed housing development to the west of the existing 400 kV overhead lines.

6.4.155 If the LTC was crossed by underground cable before transitioning back to overhead line a CSE compound would have to be located to the west of the existing overhead lines because of insufficient space to the east. This would substantially reduce the potential development area due to the need to ensure safety clearance is maintained to the existing overhead lines.

6.4.156 Routeing the 400 kV underground cables in this area would also substantially reduce the land available for development but given that an option to re-route outside of the development area, with negligible additional underground cable length, was available this was preferred with the underground cable routed to the east of the existing overhead lines to the north of Muckingford Road. The draft alignment for the underground cables route then passes to the east of the Grade II* Church of St James at West Tilbury (also potentially identified as SSSI extension area) before crossing the railway (using trenchless crossing techniques) to approach Tilbury Substation from the northeast. Approaches from the north and west are constrained by planned new power generation site and Tilbury Port activities.

Figure 6.32 – LTC to Tilbury Substation (TB252 – Tilbury)



7 Next Steps

7.1 Introduction

7.1.1 The feedback from the 2022 non-statutory consultation together with further technical and environmental work has led to the development of the 2023 preferred draft alignment ('the draft alignment') which is set out in this document.

7.2 Next Steps

7.2.1 National Grid is undertaking a non-statutory consultation on its current proposals between 27 June and 21 August 2023.

7.2.2 National Grid recognises that there are still technical and environmental issues which require further work in order to develop the 2023 preferred draft alignment further.

7.2.3 During the coming months further studies will be undertaken along the 2023 preferred draft alignment including environmental and other site-based surveys which will further inform the location of the EACN substation and CSE compounds, pylon positions and underground cable route (particularly at difficult crossings) and the location of areas required temporarily for the construction of the Project.

7.2.4 Feedback from the 2023 non-statutory consultation will also inform this more detailed work.

7.2.5 The Project will be the subject of environmental impact assessments and there will be on-going consultation with stakeholders, interested parties and members of the public.

7.2.6 As with previous stages our initial decisions will be back checked in the light of the findings of these further studies and assessments and new material information.

7.2.7 National Grid expects to undertake a statutory consultation on its proposals in Spring 2024 and will be providing Preliminary Environmental Information at that time.

National Grid plc
National Grid House,
Warwick Technology Park,
Gallows Hill, Warwick.
CV34 6DA United Kingdom

Registered in England and Wales
No. 4031152
nationalgrid.com