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# Bramford to Twinstead Reinforcement

4.1 Project Development Options Report  
January 2022



nationalgrid

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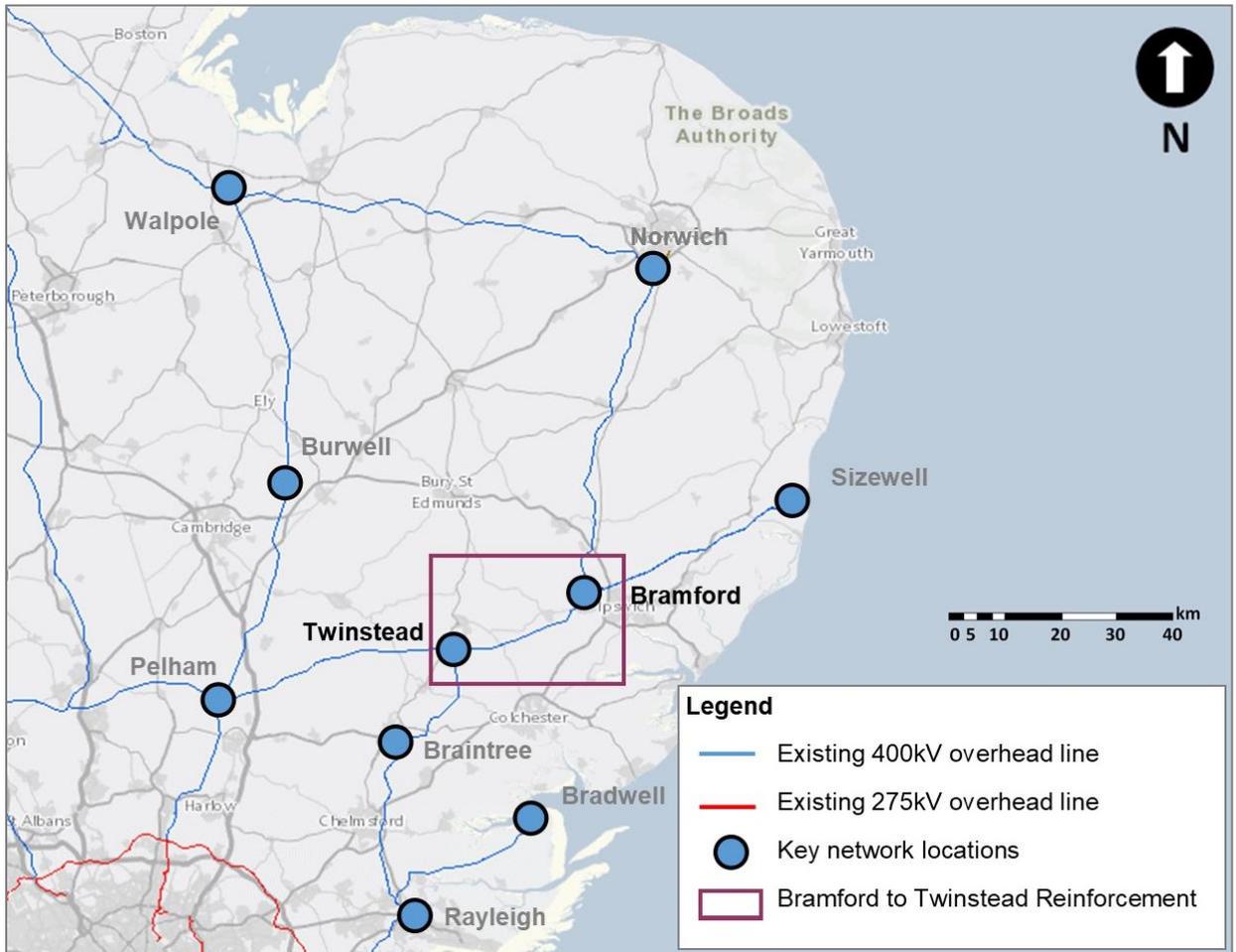
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# 1. Introduction

## 1.1 Background to the Bramford to Twinstead Project

1.1.1 Proposals for a reinforcement between Bramford and Twinstead (Figure 1.1) were initially developed by National Grid Electricity Transmission (National Grid) between 2009 and 2013 to support the connection of new generation projects in East Anglia, primarily new nuclear and wind.

Figure 1.1: Key Existing Electrical Transmission Infrastructure Within East Anglia



1.1.2 Changes to when the planned new generation would come online in East Anglia meant that work was put on hold at the end of 2013. Network studies now show that the reinforcement needs to be in place before the end of the decade.

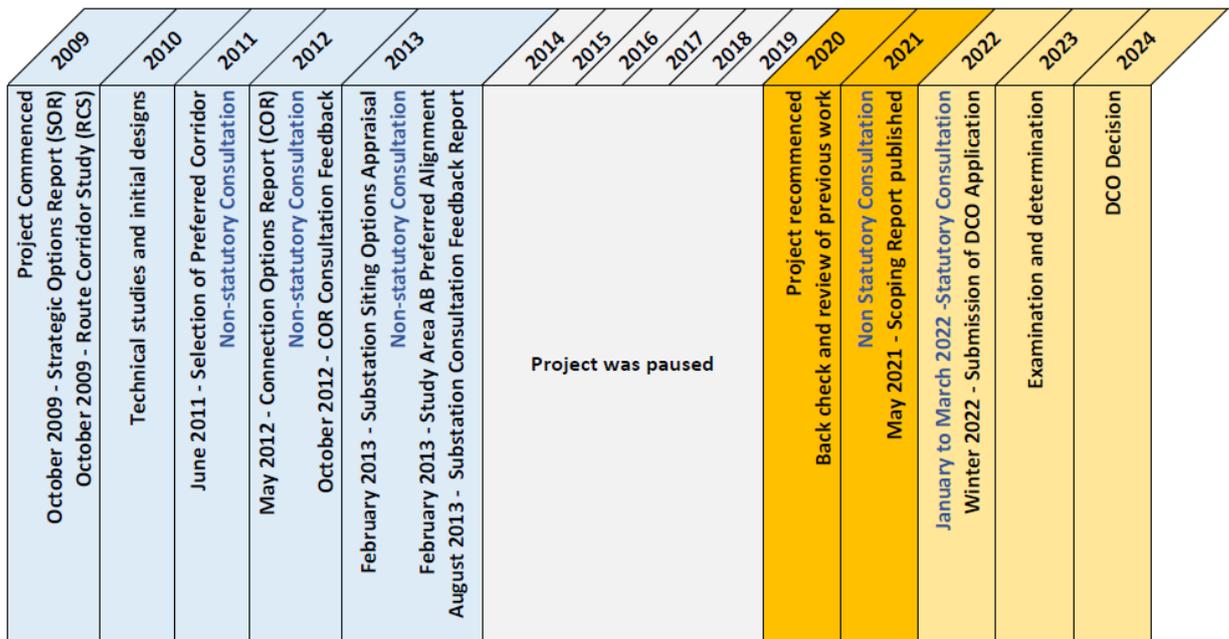
1.1.3 The level of generation and interconnection capacity expected to connect in East Anglia is significant and is largely driven by new nuclear, offshore wind and interconnection capacity. There is significant development proposed in East Anglia and the expectation is that this area will continue to see growth to support the UK's Net Zero transition. The limited number of physical routes for electrical power to flow in and out of the region limits the amount of additional generation that can be incorporated to the National transmission system without further reinforcement.

1.1.4 Further work undertaken in 2020, including a back check and review of previous work, has shown that there is a need to reinforce the transmission network between Bramford and Twinstead, in order to continue to meet power supply and demand by the end of the decade. National Grid has therefore recommenced work on the reinforcement project.

## 1.2 Purpose of this Report

1.2.1 This Project Development Options Report sets out how the project has evolved to the current Draft Alignment presented within the statutory consultation documents. The Project Development Options Report was initially published as part of the non-statutory consultation in Spring 2021 (National Grid, 2021a). The report has been updated as part of the statutory consultation materials to cover the changes to the design that have occurred since the non-statutory consultation to its current position (January 2022). Figure 1.2 sets out a high level timeline of the project, including the key reports that have been published to date (as set out in Chapter 4) and the consultation related to these.

Figure 1.2: Timeline of the Project (Including Key Reports and Consultation)



1.2.2 As part of the project recommencement, National Grid held a non-statutory consultation in spring 2021 to seek views from interested parties, local residents and communities on the evolving design of the project. Further details on the consultation and feedback received can be found in the Non-statutory Consultation Report (National Grid, 2021a).

1.2.3 Chapter 5 summarises the design changes that have occurred following the non-statutory consultation. It includes design changes that have been made in response to consultation feedback, as well as changes made in response to the findings of technical surveys and the environmental assessment process.

## 1.3 Terminology

- 1.3.1 The project is classified as a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008. NSIPs are projects of certain types, over a certain size, which are considered by the Government to be so nationally important that permission to build them needs to be given at a national level, by the Secretary of State. 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).
- 1.3.2 A DCO grants the beneficiary of the DCO, permission to construct, operate, maintain and decommission the authorised development. In addition, a DCO may apply, modify or exclude an existing statutory provision where it relates to the authorised development. As such, the DCO will also include legislative provisions in relation to; highway works; public rights of way; Traffic Regulation Orders; discharging water; dealing with human remains; tree works (including those protected by a Tree Preservation Order and important hedgerows); the compulsory acquisition of land; the temporary use of land and any additional legislative provisions, as required.
- 1.3.3 The application will identify the Order Limits, which will encompass the land required temporarily to build the project and permanently to operate the project. The Order Limits include the Limits of Deviation (LoD), which represent the maximum variation within which the final alignment and pylons would lie. Therefore, National Grid will not be seeking approval for a specific alignment (including pylon locations). This will provide flexibility during detailed design and construction for unforeseen circumstances, such as unsuitable ground conditions or ecological constraints.
- 1.3.4 This report uses the term 'Draft Alignment' for describing the route of the project as currently proposed. This has been developed as a result of ongoing engineering, environmental assessment work and consultation feedback to date. Additional terms are used within the report to describe other alignments as follows:
- 2012 Alignment: This was the alignment presented within the Connection Option Report (COR) and represented the conclusion of the work undertaken between 2009 and 2012. This is generally described in Section 4.5;
  - Indicative Alignment: This was the alignment presented during the 2021 non-statutory consultation and in the Scoping Report. It was similar to the 2012 Alignment but with some location specific amendments, as set out in Section 4.6;
  - Draft Alignment: This is the current alignment presented within the statutory consultation documents. This lies within the draft Order Limits and is a concept to help communicate the potential route (both overhead and underground sections) of the project; and
  - Final Alignment: This term is used to describe the alignment that would be submitted with the application for development consent. It will take into account feedback received during the statutory consultation.

## 1.4 The Project

- 1.4.1 National Grid is proposing to reinforce the transmission network between the existing Bramford Substation in Suffolk, and Twinstead Tee in Essex. This would be achieved

by the construction and operation of a new 400kV electricity transmission line over a distance of approximately 29km.

1.4.2 The reinforcement would comprise approximately 19km of overhead line (including pylons and conductors – the ‘line part’) and 10km of underground cable system. Four cable sealing end (CSE) compounds would be required to facilitate the transition between the overhead line and underground cable technology. Each CSE compound would be fenced, and contain electrical equipment, support structures, a small control building and a permanent access track.

1.4.3 National Grid is proposing to remove approximately 27.5km of existing overhead line and associated pylons as part of the project. This comprises 25km of existing 132kV overhead line between Burstall Bridge and Twinstead Tee, and 2.5km of the existing 400kV overhead line to the south of Twinstead Tee. To facilitate the 132kV overhead line removal, a new grid supply point (GSP) substation is proposed at Butler’s Wood, east of Wickham St Paul, in Essex. The GSP substation would require some accompanying works, including replacement pylons, underground cables to tie the GSP substation into the existing 400kV and 132kV networks and a single circuit cable sealing compound.

1.4.4 Other ancillary activities would be required to facilitate construction and operation of the project. These include, but are not limited to, the following:

- modifications to, and realignment of sections of the existing 400kV overhead line;
- temporary land to facilitate construction activities including working areas for construction equipment and machinery, site offices, welfare, storage and access; and
- land required for mitigation, compensation and enhancement of the environment as a result of the environmental assessment process and Biodiversity Net Gain.

## 1.5 Structure of this Report

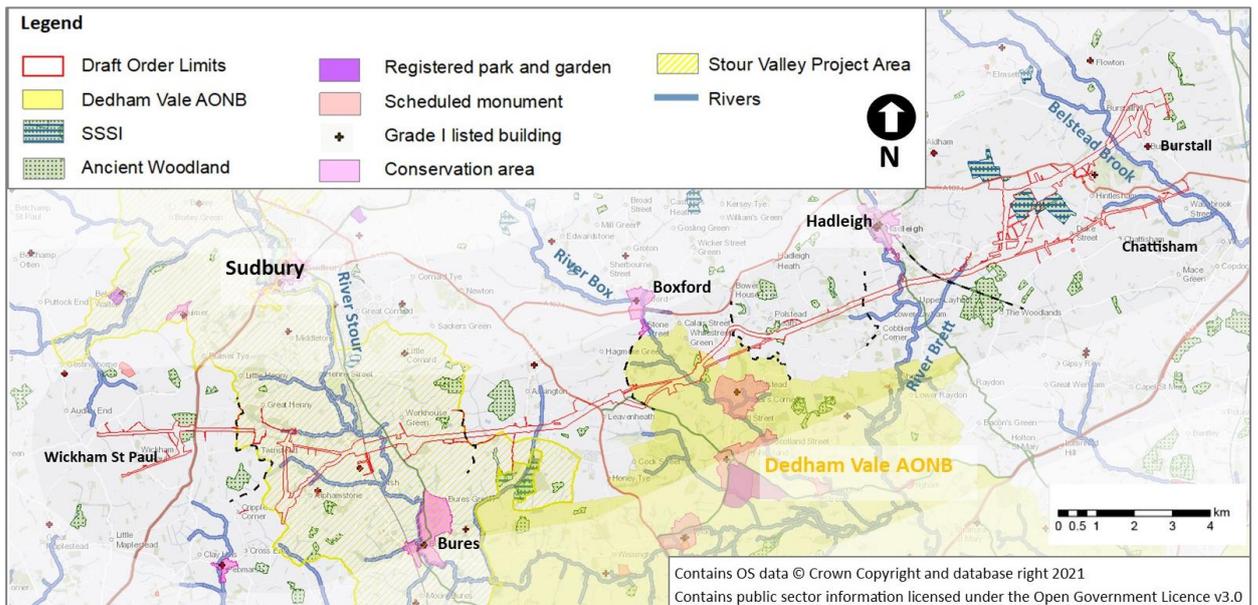
1.5.1 The rest of this report is structured as follows:

- Chapter 2 – Baseline Environment: This provides a description of the current baseline environment, including existing environmental features and constraints;
- Chapter 3 – National Grid Approach to Options Appraisal: This summarises the option appraisal process that National Grid follows when identifying options on their projects. It also outlines the key policy that governs decisions in relation to the design of new transmission routes;
- Chapter 4 – Development of the Bramford to Twinstead Project: This provides a summary of the option appraisal work that was undertaken up until project pause;
- Chapter 5 – 2021 Non-Statutory Consultation: This presents the work that has occurred since the non-statutory consultation held in spring 2021 and summarises the design changes as a result of consultation feedback;
- Chapter 6 – Current Proposals and Next Steps: This provides a description of the proposed design and sets out the next steps on the project as it moves towards submitting an application for development consent.

## 2. Baseline Environment

- 2.1.1 The project spans two counties and three local planning authority districts. The existing Bramford Substation lies within the county of Suffolk and the local planning authority of Mid-Suffolk District. The majority of the study area lies within Babergh District, and crosses its boundary with Braintree District, in the county of Essex, at the River Stour close to Twinstead Tee.
- 2.1.2 There is an existing 400kV overhead line between Bramford and Twinstead which is operated by National Grid. There is also a 132kV line which is operated by the local Distribution Network Operator (DNO). The DNO in East Anglia is UK Power Networks (UKPN). UKPN distributes electricity at lower voltages to factories, offices and homes.
- 2.1.3 The local area is predominantly rural, with much of the land used for arable crop production. Sudbury and Hadleigh lie to the north of the project and the county town of Ipswich is located to the east (Figure 2.1). There are a number of villages and hamlets dispersed within the surrounding area, including Buxford and Leavenheath. The main roads include the A1071 running roughly east west between Ipswich and Sudbury; the A134 running roughly north south between Sudbury and Colchester; and the A131 between Sudbury and Halstead.

Figure 2.1: Baseline Features and Key Constraints



- 2.1.4 The project would pass through the Dedham Vale Area of Outstanding Natural Beauty (AONB), the majority of which lies to the south of the project, as shown in Figure 2.1. It is designated as an exceptional example of a lowland river valley. Picturesque villages, rolling farmland, slow meandering rivers, water meadows and ancient woodlands combine to create an example of the traditional English lowland landscape. The area has a rich history and has been the inspiration for many writers and painters, notably Constable.
- 2.1.5 The surrounding landscape comprises a broadly flat plateau dissected by several river valleys (the River Stour, River Box, River Brett and Flowton/Belstead Brook). These

give rise to lower lying valley areas surrounded by areas of higher ground. The river valleys run in a broadly northwest–southeast direction with the Rivers Stour, Box and Brett joining together to the south, to give rise to the important lowland river valley landscape designated as the Dedham Vale AONB.

2.1.6 The existing 132kV and 400kV overhead lines pass through approximately 3km of Dedham Vale AONB, to the northwest of Polstead.

2.1.7 The Stour Valley Project Area lies upstream of the Dedham Vale AONB. While it is not a designated landscape in its own right, it is considered to have '*similar picturesque landscape qualities to Dedham Vale*' (Land Use Consultants, 2018), sharing the same essential character of gently undulating river valleys with medieval settlement patterns and rural characteristics. Whilst the Stour Valley Project Area does not have the same level of protection as the AONB, the local authorities manage it alongside the AONB and share a desire to protect it from inappropriate development. The existing 132kV and 400kV overhead lines pass through the Stour Valley Project Area.

2.1.8 The draft Order Limits include parts of Hintlesham Woods Site of Special Scientific Interest (SSSI), which is crossed by the existing 400kV overhead line between Bramford and Twinstead. The SSSI is one of the largest remaining areas of ancient coppice-with-standards woodland in Suffolk. A variety of birds breed in the woods, including woodcock, nightingale, tawny owl, nuthatch and whitethroat.

**Figure 2.2: Existing 400kV overhead line passing through Hintlesham Woods (left) and both the existing 400kV and 132kV lines near the River Box (right)**



2.1.9 Scheduled monuments are nationally important sites designated for their archaeological interest. There is a number of scheduled monuments close to the project. Many of these are isolated moated sites, such as at Moat Farm (Milden), Naughton Hall and Great Bricett, or the remains of castles, such as at Offton, Lindsey and Wenham. The closest scheduled monument to the project is 'Moated Site at Moat Farm, 450m south of Cobbler's Corner' (NHLE 1019889). There are also many listed buildings close to the project, which are often associated with town and village centres. Grade I listed buildings (the highest grading) include Hintlesham Hall and churches at Burstall, Polstead Hall, Lamarsh and Alphamstone.

### 3. National Grid Approach to Options Appraisal

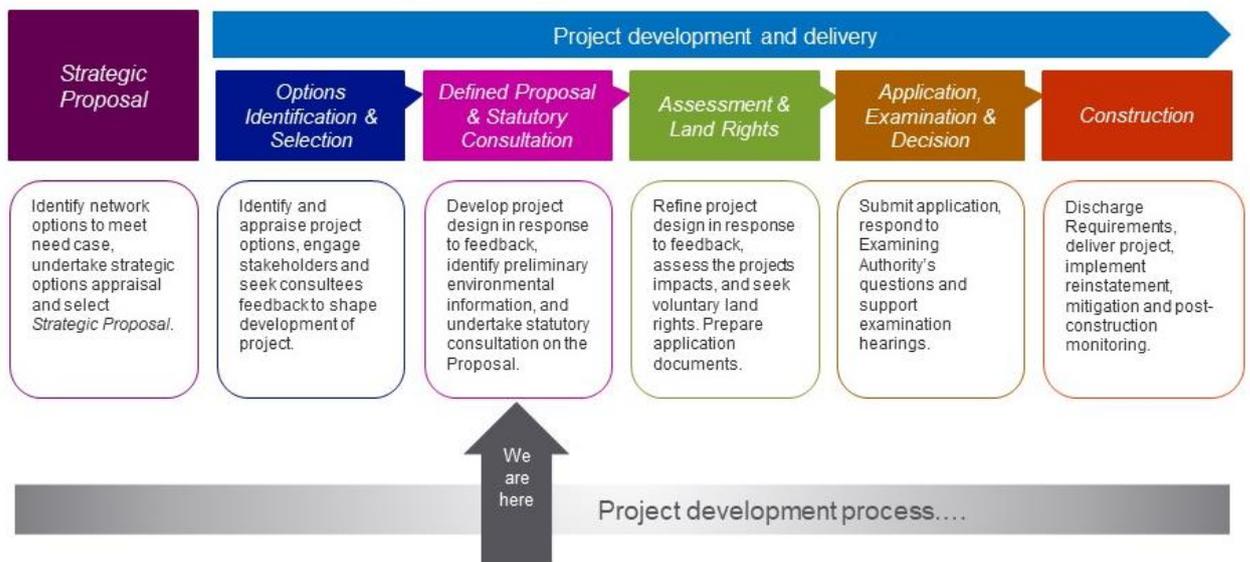
#### 3.1 Introduction

3.1.1 National Grid undertakes options appraisal on each new project. There are often a number of different ways that a project could be developed, perhaps involving different locations, technologies or designs. Each project will require judgements and decisions about the best way to achieve the required outcome. The option appraisal process provides information to help inform those judgements.

3.1.2 Options appraisal is a robust and transparent process that is used to compare options and to assess the positive and negative effects they may have, across a wide range of criteria including environmental, socio-economic, technical and cost factors. The aim is to find a balanced outcome, bearing in mind the range of National Grid’s statutory duties. The assessment is documented to provide in a transparent manner, the information on which decisions are based. Further details on the option appraisal process can be found in Our approach to Options Appraisal (National Grid, 2012b).

3.1.3 The development of the project is following a staged approach as set out in Figure 3.1. This began by establishing the need for the project and considering a range of strategic options for satisfying the identified need (strategic optioneering). Having concluded that the most appropriate strategic option was to reinforce the network between Bramford and Twinstead, consideration was then given to the merits of different route corridors. Following the selection of a preferred corridor, different options and alignments were considered. A summary of the option appraisal process and project decisions for the project can be found in Chapter 4 of this report.

Figure 3.1: National Grid Project Development Staged Process



3.1.4 At each stage in the option appraisal process, transparent methods have been used to inform decision-making. This has included technical inputs from engineers and environmental consultants to inform the decisions and design. The assessment has drawn on data and evidence collected from both desk studies and field work. Decision-making has also taken (and will continue to take) account of feedback from both

prescribed bodies and the local community through an extensive programme of engagement and consultation. In addition, the project has been (and will continue to be) subjected to periodic internal back checking, challenge and review to ensure the robustness of the proposal in the light of a changing environment (including technical, physical and costs).

## 3.2 General Duties

3.2.1 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;...'*.

3.2.2 Section 38 and Schedule 9 of the Electricity Act 1989 requires 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'*.

3.2.3 National Grid's Schedule 9 Statement sets out how the company will meet the duty placed upon it by the aforementioned legislation. This includes:

- only seeking to build new lines and substations where the existing transmission infrastructure cannot be upgraded to meet transmission security standards;
- seeking to avoid nationally and internationally designated areas where new infrastructure is required; and
- minimising the effects of new infrastructure on other sites valued for their amenity.

3.2.4 The duties set out in the Electricity Act 1989 have been followed during the options appraisal on the project. The Planning Statement, which will be submitted with the application for development consent, will also set out how these duties have been met on the project.

## 3.3 Other Guidance

3.3.1 The options appraisal process has also considered other policy and guidance when making judgements and decisions on the project. This has included consideration of the relevant National Policy Statements (NPS), the Holford Rules (which apply to the routing and design of overhead lines) and the Horlock Rules (which apply to the location and design of substations). The Planning Statement will set out how the NPS, the Holford Rules and the Horlock Rules have been considered through the development of the project. Further details on these policies and guidance can be found below.

### National Policy Statements

3.3.2 Decisions on NSIPs are made based on the relevant NPS. In the case of Bramford to Twinstead, the relevant NPS are the Overarching NPS for Energy (EN-1) and the NPS for Electricity Networks (EN-5). The project will set out how it has met the policies set

out in the NPS within the application for development consent and also during the Examination and Decision-Making process. The policies set out within the relevant NPS have been considered when making judgements and decisions on the project.

3.3.3 The government has recently finished consulting on draft replacements of the Energy NPS, including EN-1 and EN-5, which are the main policy documents relevant to the project (Department for Business, Energy and Industrial Strategy, 2021a and 2021b respectively). The NPS are likely to be designated prior to submission of the application for development consent for the project. If this were to occur, then the newly designated NPS would form the policy basis for project decisions presented within the application.

3.3.4 This Project Development Options Report continues to reference the 2011 NPS, as they currently remain the relevant government policy. National Grid has reviewed the consultation drafts of the replacement NPS and does not consider that the wording of these would materially change the decisions presented within this report with regard to the selection of the route corridor or the Draft Alignment (presented at the statutory consultation). National Grid will continue to review policy changes, including the final wording of the adopted NPS, and will review and back check whether this would affect project decisions up to the point of application. This will be reported as part of the application.

### **Holford Rules**

3.3.5 The Holford Rules are guidelines which form the basis for decisions of siting overhead transmission lines. They were set out in 1959 but remain a valuable tool in selecting and assessing potential route options as part of the environmental assessment process. A summary of the Holford Rules can be found in Box 1. These have been an important consideration during the development of the Draft Alignment and have informed decisions on whether certain parts of the project should be undergrounded.

### **Horlock Rules**

3.3.6 National Grid devised the Horlock Rules in 2003, and these were subsequently updated in 2009. The Horlock Rules provide guidelines for the siting and design of new substations, or substation extensions, to avoid or reduce the environmental effects of such developments. In summary, like the Holford Rules, they facilitate consideration of environmental and amenity considerations within the design and siting of new substation infrastructure. These were considered during the identification of potential locations for the proposed GSP substation near Twinstead.

### **Box 1: The Holford Rules**

**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.

**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.

## **3.4 Overhead or Underground Transmission**

3.4.1 National Grid's high voltage electricity transmission network is mostly an overhead line network. National Grid owns and operates approximately 7,200km of overhead lines and approximately 675km of underground cables in England and Wales. Overhead lines are normally less disruptive to construct than underground cables, for example that can pass over the top of sensitive features such as rivers and hedgerows. They are also cheaper to install and easier to maintain. However, overhead lines can have a visual impact, particularly in areas of high landscape value.

3.4.2 Underground cables by comparison, have higher construction and operational costs compared to overhead lines. They have a greater risk in the event of faults, as faults need to be discovered, excavated and repairs made to circuits below ground. High voltage underground cables can cause temporary disturbance to large areas of land with potential for adverse effects on land use during installation and subsequent operation. The draft Order Limits are typically 100m wide through the underground cable sections and within this the working footprint would be 80m wide on average and 20m have been allowed for the Limits of Deviation. See Figure 3.2 below and also Figure 3.3.6: Typical Design and Layout Plans: Cable Working Cross Section in the drawings provided with the Statutory Consultation material.

Figure 3.2: A Typical Cable Working Footprint During Construction



3.4.3 There can also be potential impacts to areas of ecological and archaeological sensitivity during installation of underground cables, whereas technical feasibility may be constrained by features such as built form or unsuitable ground conditions. Further details on the merits and challenges of undergrounding can be found in National Grid (2015) Undergrounding High Voltage Electricity Transmission Lines.

3.4.4 When deciding whether to construct a new overhead line or underground cable National Grid would consider relevant policy, which includes NPS EN-5 paragraph 2.8.8 which states:

*'Although Government expects that fulfilling this need through the development of overhead lines will often be appropriate, it recognises that there will be cases where this is not so. Where there are serious concerns about the potential adverse landscape and visual effects of a proposed overhead line, the IPC will have to balance these against other relevant factors, including the need for the proposed infrastructure, the availability and cost of alternative sites and routes and methods of installation (including undergrounding).'*

3.4.5 As part of the decision, National Grid needs to consider the landscape in which the proposed line will be set, the additional cost to the consumer of any undergrounding and the environmental consequences (paragraph 2.8.9 of EN-5).

## 3.5 Consultation

3.5.1 Under Section 38 and Schedule 9 of the Electricity Act 1989, National Grid has a duty, when putting forward proposals for new development, to have regard to the desirability of the preservation of amenity: the natural environment, cultural heritage, landscape and visual quality, as well as the impact of the works on communities. Section 49 of the

Planning Act 2008 places a duty on the applicant to have regard to relevant consultation responses before deciding whether or not the application should be made in the same terms as the proposed application.

- 3.5.2 During the previous stages of the project, National Grid has endeavoured to engage with interested stakeholders during the optioneering process before making decisions. Statutory consultees include the relevant planning authorities and environmental bodies such as Historic England (formerly English Heritage), the Environment Agency and Natural England. These organisations have been consulted to seek their views on the project including through thematic sub-group meetings for ecology, landscape, traffic and transport and heritage. There has also been engagement with parish councils, the wider public and potentially affected landowners.
- 3.5.3 The project has previously held a number of public events, open to all and at venues in the local area. Feedback from the consultation events has been used to develop and refine the proposed project.
- 3.5.4 Since restarting the project, National Grid has re-commenced engagement with the consultees listed above and undertook a non-statutory consultation in Spring 2021. The aim of the non-statutory consultation was to provide an overview of the project and to gather feedback on the proposals to inform how the project develops going forward. Details of how the feedback from the non-statutory consultation has informed the designs is set out in Chapter 5 of this report. Further details on the consultation process and the responses received can be found in the Non-statutory Consultation Summary Report (National Grid, 2022a).

## 4. Development of the Bramford to Twinstead Project

### 4.1 Strategic Options

- 4.1.1 National Grid commenced the project in 2009, following previous studies which had concluded that there needed to be reinforcement of the network between Bramford substation and Twinstead Tee. The project started by considering strategic options that could deliver the reinforcement. A list of 18 strategic options were identified to reinforce the network, including options involving no physical works e.g. Do Nothing.
- 4.1.2 The strategic options were evaluated against the key criteria (as set out in National Grid's statutory and licence obligations) of economy, efficiency, and co-ordination (including system compliance and deliverability) and amenity. The cost of each option was estimated using generalised unit costs for the key elements of the option and reflecting recent contract values. Amenity impacts were based on a desk study of key environmental constraints, such as high level nature conservation, heritage and landscape designations and the definition of major urban areas. Options were either discounted, parked or taken forward for further investigation based on the assessment.
- 4.1.3 The study recommended that Options S6 (Bramford to Twinstead Tee – not using the corridor of the existing distribution line) and S7 (Bramford to Twinstead Tee – using the corridor of the existing distribution line) were taken forward, as these provided the appropriate reinforcement to the transmission network. These options would provide a relatively direct and efficient route, which would achieve a balance between National Grid's technical, economic and environmental obligations. However, it was recognised that some parts of the option may need to be placed underground to reduce visual and amenity impacts.
- 4.1.4 National Grid reviewed and updated the strategic optioneering following recommencement of the project in 2020. The review included looking at whether there were any new options that should be assessed and whether the previous option appraisal remained valid. Table 4.1 includes the list of the options considered. Two options were progressed for further consideration; PSO 19 Bramford to Twinstead as an overhead connection; and PSO 22 Bramford to Twinstead as an underground connection.
- 4.1.5 An options appraisal comparison of PSO 19 and PSO 22 showed that whilst environmental effects of the options vary, both PSO 19 and PSO 22 could deliver solutions that were expected to be acceptable in policy terms and would meet network reinforcement requirements. However, there would be a considerable cost differential, with PSO 22 being more than five times the capital and lifetime cost of PSO 19. Therefore, the 2020 SOR came to the same conclusion as the original SOR, that a predominantly overhead line from Bramford substation to Twinstead Tee, would be the preferred strategic proposal and best fulfils National Grid's various duties and obligations.
- 4.1.6 A further review has been undertaken prior to statutory consultation, which has confirmed that although the proposed dates of connections for some customers may have changed, there would be no change to the strategic option choice presented within the SOR.

Table 4.1: Summary of Strategic Options

Option	Reason
<b>Doing no physical works</b>	
PSO 1 Do nothing	Option would be a breach of National Grid's licence obligation to provide connections. DISCOUNTED
PSO 2 Constraints payments to generators to reduce their output, therefore reducing the flows across the region.	This would be expensive and would make it difficult to meet the Government's legislated target of net zero carbon emissions by 2050. DISCOUNTED
<b>Re-directing potential connections</b>	
PSO 4 Upgrading 275kV lines to operate at 400kV	There are no 275kV lines within the region. DISCOUNTED
PSO 5 and PSO 6 Upgrading existing 400kV lines to operate at 800kV	The UK does not currently have equipment approved for use to operate at this voltage. This would also require new pylons, substations and other equipment designed to operate at the higher voltage. DISCOUNTED
PSO 7 Replace the conductors to the highest rated system	This is already a commitment in accordance with National Grid's commitment to maximise the capability of existing routes before building new ones and does not alone generate enough capacity. DISCOUNTED
PSO8 Add further circuits to transmission pylons	Whilst four circuit pylons have been built elsewhere in the world, no such pylons are approved for use in the UK. This option would also fail to address planning standards, which require that the network is designed to withstand the loss of a transmission route. DISCOUNTED
<b>Northward reinforcement with new 400kV infrastructure</b>	
PSO 9 New connection from the Bramford to Norwich Main Overhead Line.	This does not provide any additional circuits from Bramford and therefore would not resolve the current technical constraints on the network. DISCOUNTED.
PSO10 New double circuit connection from Bramford to Burwell Main.	The new connection would be approximately 60km in length and would require additional work to the network from Burwell Main. This would result in high capital costs and potential high environmental effects. DISCOUNTED.
<b>Southwards reinforcement with new 400kV infrastructure</b>	
PSO 11 Southwards extension of the double circuit connection from Bramford to Rayleigh Main.	This new connection would be approximately 80km in length and would require additional work to the network between Rayleigh and Tilbury. This would result in high capital costs and potential high environmental effects. DISCOUNTED.

Option	Reason
PSO 12 Connect to Rayleigh Main via Bradwell.	This is associated with a likely requirement for a tunnel under the River Blackwell and would still require work to be completed between Bramford to Twinstead. This would result in high capital costs and potential high environmental effects. DISCOUNTED.
PSO 13 and PSO 14 Connection at Tilbury.	This new connection would be approximately 90km in length and would require a tunnel beneath the River Blackwater. This would result in high capital costs and potential high environmental effects. DISCOUNTED.
<b>Bypassing Bramford with new 400kV infrastructure</b>	
PSO 15 to PSO 17 all sought to bypass Bramford and connect sources to locations beyond Bramford.	These new connections would range between 45-70km in length and would require additional reinforcement works to maintain the network. This would result in high capital costs and potential high environmental effects. DISCOUNTED.
<b>Westwards reinforcement with new 400kV infrastructure</b>	
PSO 18 Providing an additional single circuit from Bramford to Twinstead Tee.	A single circuit does not increase boundary capability sufficiently enough to avoid overloads from Bramford under fault conditions. DISCOUNTED.
PSO 19 Providing an additional double circuit between Bramford and Twinstead Tee.	This meets the need and the identified technical constraints. It has a lower cost than other options and the shorter length is likely to result in lower environmental effects. This was recommended for further consideration.
Providing an additional double circuit between Bramford and Pelham (PSO 20) and Braintree (PSO 21) substations.	Both would require the same infrastructure as PSO 19 but require additional infrastructure at a higher cost and with additional environmental effects. DISCOUNTED.
PSO 22 Providing an additional connection between Bramford and Twinstead Tee that is fully undergrounded.	Although an underground option is more expensive, this could have lower visual effects than an overhead line. This was recommended for further consideration.
PSO 23 Providing a new connection between Bramford and Waltham Cross.	This new connection would be approximately 85km in length and work to substations in urban areas. This would result in high capital costs and potential high environmental effects. DISCOUNTED.

## 4.2 Corridor Options

4.2.1 Having identified that a network reinforcement was needed, National Grid went on to consider potential route corridors between the connection points at Bramford Substation and Twinstead Tee.

**Route Corridor:** A defined linear shape identified on a map which may be of variable width and whose extent at any point is typically defined by constraints or differentiation from other route corridors.

4.2.2 Desk based assessment was supplemented with site visits to identify route corridors which sought to avoid the areas of greatest environmental constraint. The existing 132kV and 400kV overhead lines offered the potential to be used as 'opportunity corridors', where a new overhead line, in addition to or replacing the existing, could lead to a lower magnitude of change than a new overhead line in a location where no line presently exists.

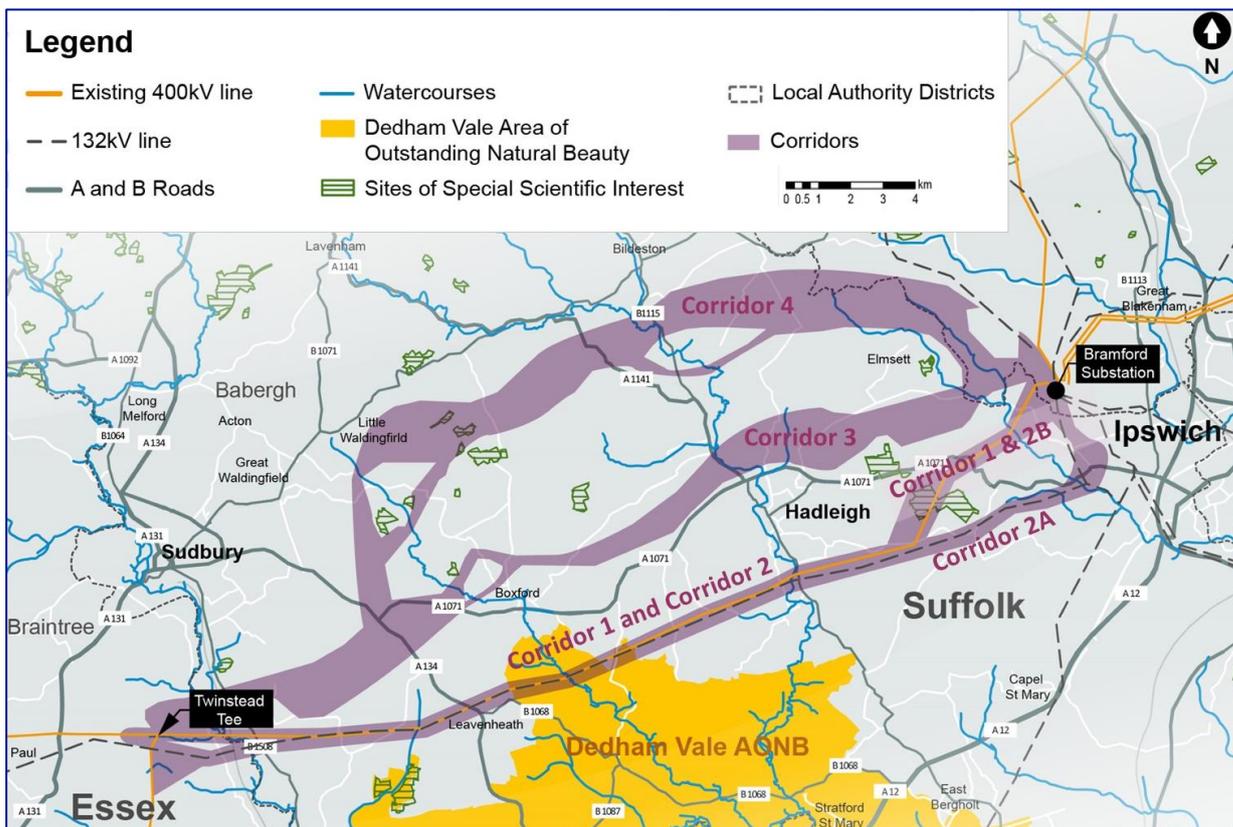
4.2.3 Four route corridors were identified, all of which would be technically feasible, and all would have connection points at Bramford Substation and the existing tee at Twinstead. These are shown in Figure 4.1 and comprised:

- **Corridor 1: A new line parallel to the existing 400kV overhead line between Bramford and Twinstead c. 26km in length.** The overhead line would exit Bramford Substation in a westerly direction lying to the north of Hintlesham village. It would parallel the existing 400kV overhead line through Hintlesham Woods SSSI before continuing to the south of Hadleigh and Polstead Heath. It would pass through approximately 3km of Dedham Vale AONB, in the vicinity of the Box Valley. This corridor would result in an additional 400kV line in this designated landscape. The line would continue to the south of Assington and Sudbury before crossing the B1508, the railway and the River Stour valley and connecting at Twinstead. The existing 132kV line between Bramford and Twinstead Tee would remain.
- **Corridor 2: This corridor proposes the removal of the existing 132kV overhead line between Burstall and Twinstead and the adoption of its route for a new 400kV overhead line c 29km in length.** The existing 132kV overhead line runs to the south of Bramford Substation and runs close to the existing 400kV overhead line for the majority of the route from a point to the south of Hintlesham Wood where they align, separating only as the 400kV overhead line approaches Twinstead Tee. Like Corridor 1, this option would pass through approximately 3km of Dedham Vale AONB, in the vicinity of the Box Valley. This corridor would require an additional GSP substation close to Twinstead, which would allow the DNO to continue to operate its network in this area. Two alternative options were identified at the eastern end of Corridor 2 (shown on Figure 4.1 below);
  - Corridor 2A: This would follow the corridor of the vacated 132kV line to the south of Hintlesham; and
  - Corridor 2B: This would parallel the existing 400kV line to the north of Hintlesham rather than following the 132kV line.
- **Corridor 3: New Route Corridor (Direct Option to the North of Hadleigh) c. 26.5km in length.** Corridor 3 sought to take the most direct route between Bramford Substation and Twinstead Tee to the north of Hadleigh, whilst avoiding the key environmental constraints such as the Dedham Vale AONB. The corridor leaves

Bramford Substation in a westerly direction. It continues to the north of Hintlesham Woods and Hadleigh. The corridor crosses the River Brett in the vicinity of the A1141. Corridor 3 narrows in the vicinity of Groton and Boxford to avoid these settlements before splitting to negotiate the linear development of Sherbourne Street. These corridor sub-options would then re-join to the west of Boxford in the vicinity of the River Box. The corridor continues to the west, avoiding settlements including Newton and Little Conrad. It drops in elevation towards the River Stour valley where it crosses the B1508, the railway and River Stour close to the flat valley floor. It then takes to slightly higher ground to approach Twinstead Tee 2km to the west.

- Corridor 4: New Route Corridor (Northerly Option) c. 30km in length.** Corridor 4 sought a route that avoided key environmental constraints, such as the Dedham Vale AONB. It was designed to take a more northerly route to largely avoid the Special Landscape Areas defined in the Local Plan. This corridor runs in a northwest direction from the substation at Bramford. It splits to avoid Flowton before re-joining to run westwards through open land between Naughton and Whatfield. The corridor splits again around Semer and it continues westwards to the River Box. The corridor continues to the west, avoiding settlements including Newton and Little Conrad. It drops in elevation towards the River Stour where it crosses the B1508, the railway and River Stour close to the flat valley floor. It then takes to slightly higher ground to approach Twinstead Tee 2km to the west.

Figure 4.1: The Four Route Corridors



4.2.4 Statutory consultees including environmental bodies and the relevant planning authorities were consulted on the route corridors in 2009. The feedback received during these events was taken into account when developing and refining the corridors. The

consultation responses include noting the potential visual implications of the proposals, especially on iconic views, and the need to consider undergrounding as part of the project development.

- 4.2.5 Each route corridor was assessed against how it performed against National Grid's obligations set out in Sections 9 and 38 and Schedule 9 of the Electricity Act 1989 and also how well each route corridor performed against the Holford Rules (a summary of National Grid's obligations is provided in Section 3.2 and 3.3 of this report). A high-level environmental assessment was undertaken on each of the four route corridors to support the options appraisal.
- 4.2.6 Corridors 1 and 2 were identified as 'opportunity corridors' as they use the existing overhead line routes which already pass through Dedham Vale AONB. Corridor 1 was considered to have the greatest effect on the AONB, as it would introduce an additional structure into the AONB. Corridor 2 would replace the existing 132kV overhead line with a new 400kV overhead line. Corridor 2 would give rise to a lower scale of effect on landscape and views than Corridor 1, however building a new 400kV overhead line on the existing 132kV route adjacent the existing 400kV overhead line would still give rise to notable effects.
- 4.2.7 Corridor 3 avoids the AONB and the potential for effects on views from within the AONB were considered to be limited. Corridor 4 also avoids the AONB and was considered to have the least effects on the AONB due to distance. However, it would introduce an overhead line into an area regarded locally as high quality landscape, albeit undesignated, where there is presently no existing electricity transmission infrastructure.

### **4.3 Route Corridor Consultation**

- 4.3.1 The Route Corridor Study (RCS) was published in October 2009 as part of a non-statutory consultation event. This described the four corridors (including Corridor 2A and Corridor 2B) and presented the assessment work that had been undertaken on this. Twenty public consultation events were held between the end of October 2009 and the end of February 2010 and National Grid received over 3,000 individual pieces of feedback during the consultation. The representations, and National Grid's responses to them, were set out in the Stage 1 Feedback Report.
- 4.3.2 There was little public support for Corridor 1, which would create an additional line through Dedham Vale AONB. The Suffolk planning authorities and Dedham Vale and Stour Valley AONB Partnership strongly recommended that Corridor 1 be ruled out and statutory bodies English Heritage and Natural England considered that they could not support the option because of significant adverse impacts on the AONB and the settings of listed buildings and conservation areas.
- 4.3.3 English Heritage and Natural England both considered that Corridor 2 would have the least environmental impact of all route corridors, as it was recognised that this route corridor presented an opportunity to minimise the overall scale of change that a new overhead line would bring. Natural England stated that more clarity was required on Corridors 2A and 2B around Hintlesham, particularly in connection with Hintlesham Woods SSSI, before being able to make an informed decision on the sub-route options.

- 4.3.4 Natural England and English Heritage both recommended that undergrounding be considered in the AONB. The Suffolk planning authorities also considered that Corridor 2 could lead to the least environmental impact particularly if undergrounding were employed. Other local bodies and the general public strongly supported the selection of Corridor 2, many adding the caveat that undergrounding should be considered.
- 4.3.5 The Suffolk planning authorities, English Heritage and Natural England all recommended that Corridor 3 and 4 be ruled out, the main reasons being the impact on unspoilt and historic character of the countryside, where there is presently no existing electricity transmission infrastructure. Both corridors received little support, with large numbers of the general public recording their objections to these corridors.
- 4.3.6 The consultation on the route corridors identified Corridor 2 as the least worst by a large proportion of the consultees, although in the majority of cases this was subject to the consideration of undergrounding of some or all of the entire route.

## **4.4 Identification of the Preferred Corridor**

- 4.4.1 The consultation feedback was used to review and validate the results of the Route Corridor Study and to confirm the preferred corridor that would be taken forward. The review considered the merits of the four route corridors taking into account National Grid's statutory duties (including cost comparison), compliance with planning policy, consultation representations, environmental impacts (including visual, historic environment, biodiversity, socio-economic and flood risk and climate change resilience) and engineering deliverability.
- 4.4.2 Wholly underground solutions were discounted based on cost and technical grounds. The review concluded that the basis of the project should be an overhead line connection between Bramford and Twinstead, but that the undergrounding of sections of the proposed overhead line, to mitigate the potential impacts of the project on sensitive locations, should be evaluated.
- 4.4.3 Corridor 1 was identified as being the lowest cost option, but the introduction of a third overhead line through Dedham Vale AONB was considered to weigh significantly against the option. The review concluded that Corridor 1 was not preferred.
- 4.4.4 Although Corridor 2 passes through parts of the Dedham Vale AONB, it also presented an opportunity to remove the existing 132kV overhead line. This would minimise the scale of change on the landscape and was a view supported by a number of statutory consultees. It was recognised that Corridor 2 offered the potential for achieving an acceptable reinforcement. However, given the policy background and the Holford Rules, it was important to review the merits of the route corridors which do not pass through the AONB, and the scope for mitigation of adverse effects.
- 4.4.5 Corridors 3 and 4 were considered in response to seeking to avoid impacts on the AONB. However, both would introduce a new overhead line into an area regarded locally as high quality landscape, where there is presently no existing electricity infrastructure, and both would involve a longer overhead line than Corridor 2. The review concluded that although the route corridors avoid the AONB, Corridors 3 and 4 were not unconstrained in terms of planning policy and environmental sensitivities and this

resulted in several of the statutory consultees and members of the public raising clear objections to these route corridors.

- 4.4.6 The review concluded that Corridor 2 was the preferred route corridor based on both previous assessment work and on the consultation responses, as it would result in the least scale of change to the existing environment. It was recognised that Corridor 2 would involve the removal of a section of the existing 132kV overhead line, which was seen as a benefit, and that a new 400kV/132kV substation may be required west of Twinstead Tee to maintain security of supply to the 132kV distribution network.
- 4.4.7 The decision to progress with Corridor 2 was presented in the Selection of Preferred Corridor Report, which was published in June 2011. This set out the reasons for the selection and rejection of the different corridors. This recommended that further work was undertaken to determine the treatment of the eastern portion of the route corridor (Corridor 2A and 2B) and that this would be subject to further consultation.
- 4.4.8 The work undertaken since the project re-start in 2020 has confirmed that Corridor 2 remains appropriate and no change to the route corridor option selected is proposed. Further details of work undertaken since to confirm this are presented in Chapter 5.

## 4.5 Alignment Options

### General Approach

- 4.5.1 In July 2011, National Grid announced its preferred route corridor (Corridor 2) for developing a project for a 400kV overhead line reinforcement between Bramford Substation and Twinstead Tee. This route corridor incorporates an existing 132kV overhead line, comprising part of the electricity distribution system under the control of UKPN, which would be partly removed as a result of the project.
- Alignment:** The proposed route for an overhead line and/or underground cable within a route corridor. A route corridor may contain a number of possible alignment options.
- 4.5.2 An important reason for selecting Corridor 2 was that there would be a smaller scale of change in taking down the existing 132kV overhead line and erecting a new 400kV overhead line in a similar area and close to the existing 400kV overhead line. This was an opinion that was given in many representations received during the consultation on the route corridor.
- 4.5.3 The next step was to identify overhead and underground indicative alignments within Corridor 2 and to appraise these. Indicative alignments were developed starting within a direct line between Bramford and Twinstead Tee, and then taking into account the Holford Rules, to avoid sensitive sites and residential areas as far as possible.
- 4.5.4 When developing the overhead line indicative alignments, the visual preference was for the existing 400kV overhead line and any proposed 400kV overhead line to run in parallel and close together, to avoid placing overhead lines in areas where there are currently no overhead lines. Health and safety requirements suggested that there should be a minimum separation distance of 85m between the two lines. The proposed

overhead line could therefore lie to the north (northern alignment) of the existing 400kV overhead line or lie to the south (southern alignment).

4.5.5 While a reinforcement solution involving overhead lines entirely to the north or to the south of the existing 400kV overhead line could be accommodated, it would be more difficult to adopt a solution which involved the project switching from one side of the existing 400kV overhead line to the other ('a transposition'). This is because its construction would involve additional structures, higher costs and could result in a complex programme of outages which would be difficult to accommodate given other constraints on the management of the electricity transmission system in East Anglia.

4.5.6 An appraisal was undertaken to make recommendations as to the extent of undergrounding for the Bramford to Twinstead project. Where an overhead line solution was considered appropriate, the least environmentally constrained interim alignment was identified. This information was presented within the Connection Options Report (COR) which was published in 2012 (National Grid, 2012a).

4.5.7 For ease of reference, the project was initially split into seven sections based on the landscape character areas and feedback from consultation. These were described in the COR (National Grid, 2012a). Sections A and B (eastern extent of the project) were subsequently combined as the landscape characteristics were considered similar. The sections presented within the COR were:

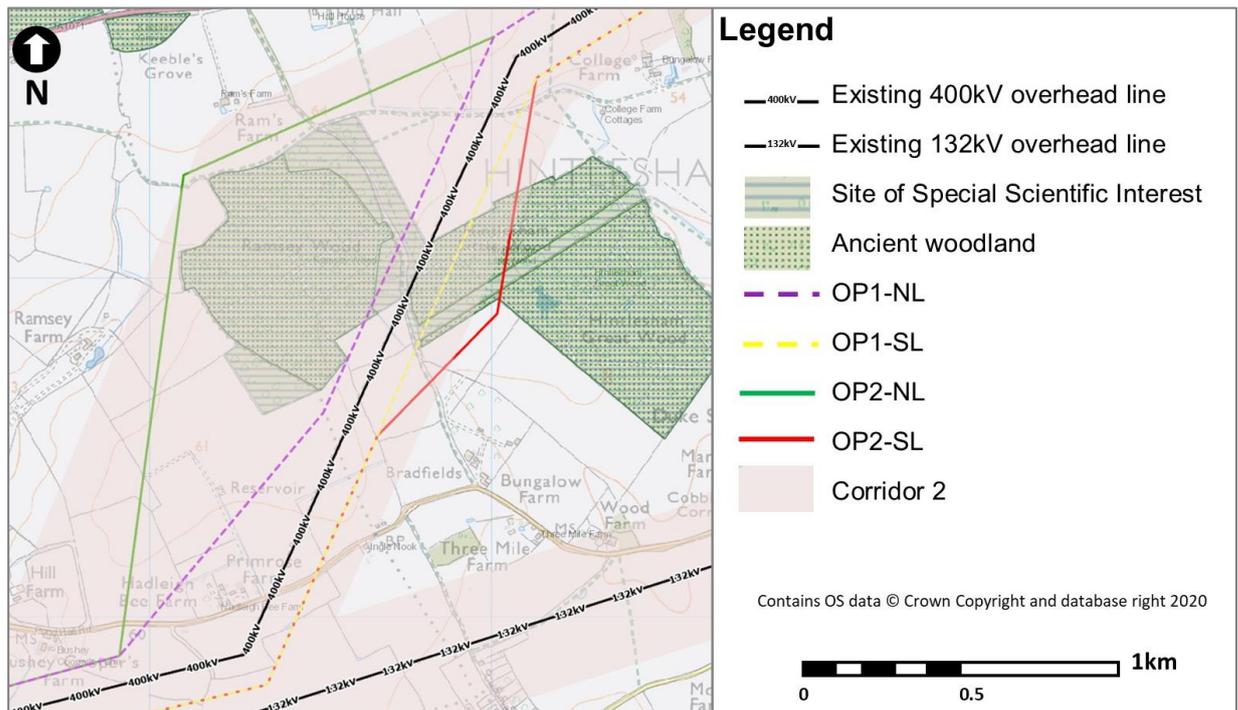
- Section AB: Bramford Substation to Hintlesham;
- Section C: Brett Valley;
- Section D: Polstead;
- Section E: Dedham Vale up to the AONB boundary;
- Section F: Leavenheath and Assington; and
- Section G: Stour Valley.

4.5.8 Section H: GSP Substation has been added since the non-statutory consultation to aid the description of the project at this location.

### **AB Bramford Substation/Hintlesham**

4.5.9 As noted in the Selection of Preferred Corridor Report (National Grid, 2011), further work was required in Section AB: Bramford Substation/Hintlesham, in order to determine whether to progress Corridor 2A or 2B. Given the sensitivity of the interaction with Hintlesham Woods and responses from consultees through thematic meetings, an options appraisal was undertaken in order to identify the least environmentally constrained overhead line interim alignment in Corridor 2B. This considered various options, including routes through and around the woods (see Figure 4.2).

Figure 4.2: Hintlesham Woods Options (based on Appendix A in the COR)



4.5.10 OP2-NL was chosen as the least environmentally constrained overhead line, as it would avoid impacts on the ancient woodland and on the conservation objectives of the SSSI. OP2-NL was also considered to have the least negative effect with regard to cultural heritage because it would avoid adverse effects on the historic woodland and would not give rise to any greater levels of effects on other cultural heritage assets than would arise with other options. OP2-NL was ranked as having the greatest effect on landscape character and also on visual amenity as it would be the greatest departure from the route of the existing 400kV overhead line route in Corridor 2B and so would give rise to the largest scale of change of the options.

4.5.11 OP2-NL was taken forward as the least environmentally constrained overhead line route in Corridor 2B. This was presented in the 'Preliminary Options Appraisal of Potential Overhead Alignments on Corridor 2B at Hintlesham Woods SSSI' which formed Appendix A of the COR. The COR presented a northern and southern version of this alignment comprising:

- **Corridor 2B northern alignment:** This used the existing 400kV alignment out of Bramford Substation, with the existing 400kV overhead line modified to accommodate this. The northern alignment would then parallel (with an 85m offset) to the north of the existing 400kV overhead line until Hintlesham Woods, where the new overhead line would divert around the north and western edge of Ramsey Wood, to avoid impacts on the woodland. The northern alignment would then continue in a southwest direction before continuing to parallel the existing overhead line to the north.
- **Corridor 2B southern alignment:** This would run southwest from Bramford Substation between Canes Farm and Walnut Farm and then take an 85m offset to the south of the existing 400kV overhead line from Mill Farm to College Farm. From here the new overhead line would take the route of the existing 400kV overhead line

through Hintlesham Woods and the existing 400kV overhead line would be routed around the northern and western edge of Ramsey Wood to avoid any effects on woodland. Further details on overhead line transposition can be found in paragraph 4.5.5. Both the existing and new 400kV overhead lines would converge to the east of Primrose Farm where the southern option would then run parallel to the existing overhead line at an 85m offset to the south.

## **Outcome of the COR (the '2012 Alignment')**

### **General Approach**

- 4.5.12 The COR was published in May 2012. It presented the results of the appraisal of the Corridor 2B northern and southern alignments against an overhead line in Corridor 2A and an underground cable route (including potential CSE compound locations) in Section AB. The COR concluded that in Section C: Brett Valley, Section D: Polstead and Section F: Leavenheath/Assington, a new overhead line should be constructed to the south of the existing 400kV overhead line. A southern alignment would result in a lesser scale of change to landscape and views than introducing a 400kV overhead line to the north where no line currently exists. A southern alignment would also have less of an effect on ecological or heritage features of interest.
- 4.5.13 In Section E: Dedham Vale, an underground cable was proposed given its nationally designated status as an AONB. Undergrounding was considered consistent with national policy, the Holford Rules and the views of statutory bodies. It would also avoid the direct impacts which overhead line options would have on commercial orchards important to the local economy. Undergrounding was also considered appropriate in Section G: Stour Valley, because of the particular qualities of the landscape and its cultural associations.

### **AB Bramford Substation/Hintlesham**

- 4.5.14 In Section AB, the COR concluded that Corridor 2B was preferred over Corridor 2A, as it would affect fewer visual receptors and would have a lower magnitude of effect on landscape and views. This was because Corridor 2A would result in a new overhead line to the north of Burstall Bridge, where there is currently no overhead line and it would result in an overhead line to the south of Hintlesham, with no overhead line to parallel. Instead, Corridor 2B would result in a minor positive effect on Corridor 2A, as it would allow approximately 4km of the 132kV overhead line to be removed and not replaced, which would benefit landscape and views and the setting of listed buildings to the south of Hintlesham. The COR concluded that there was little differentiation between Corridor 2A and 2B in terms of ecology, socio-economics and setting effects.
- 4.5.15 The COR identified that the benefits from the use of underground cables as an alternative to an overhead line in Section AB, which was assessed as not being particularly sensitive, would not clearly outweigh any extra economic, social and environmental impacts that would occur. The COR therefore concluded that undergrounding would not therefore be appropriate in Section AB.
- 4.5.16 The COR identified that the greater amount of close paralleling associated with a southern alignment in Corridor 2B would have a lower negative magnitude of effect on landscape and views overall compared to a more widely spaced northern alignment.

The overall effects on cultural heritage of a southern alignment would be greater than the overall effects of a northern alignment and both would affect a similar number of heritage assets of high significance. However, it noted that the southern alignment would also affect the setting of Hintlesham Hall, albeit that the magnitude of effects on the setting of Hintlesham Hall would be limited. The assessment concluded that there would be no significant difference in effect between the northern and southern alignments on ecology in general and Hintlesham Woods SSSI in particular. A northern approach to Bramford Substation would also be more difficult to engineer given the arrangement of overhead line entries to the substation and the proposals of East Anglia Offshore Wind Ltd. The appraisal concluded that the southern alignment in Corridor 2B was preferred.

## 2012 Alignment

4.5.17 Reflecting on the above, the COR recommended that the following indicative alignments were taken forward to public consultation. These are referred to in the Project Development Options Report as the '2012 Alignment' and comprised:

- Section AB: Bramford Substation to Hintlesham –This would involve running a new overhead line from Bramford Substation to the south of the existing 400kV overhead line, then adopting the route of the existing 400kV overhead line to pass through Hintlesham Woods, before running again to the south of the existing line. In order to permit this a transposition of the 400kV overhead lines would need to take place (see paragraph 4.5.5 of this report), i.e. the existing 400kV overhead line would be routed onto a new alignment north of Ramsey Wood, re-joining the existing 400kV overhead line near Clay Lane (i.e. the Corridor 2B southern alignment).
- Section C: Brett Valley - a new overhead line alignment to the south of the existing 400kV overhead line;
- Section D: Polstead - a new overhead line alignment to the south of the existing 400kV overhead line;
- Section E: Dedham Vale AONB – an underground cable section from Heath Road, Polstead Heath to Leavenheath (4.2km);
- Section F: Leavenheath and Assington - a new overhead line alignment to the south of the existing 400kV overhead line; and
- Section G: Stour Valley - an underground cable section from west of Dorking Tye to the Bramford-Braintree-Rayleigh overhead line south of Twinstead Tee (3.8km).

4.5.18 The COR also identified the need for further work in the following locations:

- Specific consultation on options for Study Area AB before deciding which alignment to take forward.
- Further work to determine the final location of the CSE compounds (see Section 4.6 and further review following the 2021 non-statutory consultation in Section 5.4); and
- Further work to identify and confirm options for the new substation to west of Twinstead and to consult on these options (see Section 4.7).

4.5.19 Non-statutory consultation was undertaken in the summer of 2012 to obtain comments on the 2012 Alignment set out in the COR. Many site or area specific representations

were received, including feedback from English Heritage (now Historic England) requesting further consideration of the Corridor 2B southern alignment on the setting of Grade I listed Hintlesham Hall.

4.5.20 In the main, the issues raised had already been taken into account in the appraisal included in the COR and had already influenced the decision-making process. A summary of the issues raised in the consultation and National Grid's response were presented in the COR Consultation Feedback Report, which was published in October 2012. The responses were taken into account and in October 2012 National Grid confirmed the 2012 Alignment as its preferred alignment and confirmed the proposed locations of undergrounding (Dedham Vale and Stour Valley). The alignment in Section AB was not confirmed in the Feedback Report, as it was subject to further discussions with English Heritage (see Section 4.6).

## **4.6 Further Work Undertaken Following the COR**

### **Introduction**

4.6.1 The COR identified areas where further work was required as part of the project development. Responses received during the 2012 non-statutory consultation also identified areas where further work was required to confirm the alignment in a specific location. A summary of these studies is set out in the following sections.

### **Section AB Bramford Substation/Hintlesham**

4.6.2 During consultation on the COR, English Heritage and other parties made representations regarding the potential for harm to the setting to Hintlesham Hall, a Grade I listed building. Feedback suggested further reassessment was required of the COR indicative alignments and also the consideration of full and partial underground cable options in Corridor 2A and 2B. The COR Consultation Feedback Report (2012) concluded that further work should be undertaken to provide English Heritage with additional information in relation to the potential effects on Grade I listed Hintlesham Hall before making a decision on the alignment in Section AB.

4.6.3 As a result of this feedback, National Grid undertook further assessment work in 2013 before selecting the preferred alignment in Section AB. This reaffirmed the appraisal presented within the COR that the landscape and visual effects of an overhead line in Corridor 2A would be greater than Corridor 2B. The assessment also reaffirmed that Corridor 2B southern alignment was the preferred alignment, as Corridor 2B northern alignment would result in the overhead line passing much closer to residential properties and would have a negative effect on the setting of several Grade II listed buildings, including Norman's Farm, Park Farm and Burstallhill Cottages.

4.6.4 The assessment concluded that the full and partial underground options would have adverse effects on ecology and archaeology which would outweigh the benefits on landscape, views and setting. The underground options would also cost significantly more than an overhead line solution. National Grid published the outcomes of this work in 2013 in a report called Study Area AB Preferred Alignment. This concluded that Corridor 2B southern alignment should be taken forward as the preferred alignment.

- 4.6.5 National Grid re-commenced discussions with Historic England (formerly English Heritage) in 2021 to review the preferred alignment to take account of any changes since 2013. These discussions are ongoing however Corridor 2B southern alignment remains National Grid's preferred alignment.

### **Location Specific Requests**

- 4.6.6 Following the announcement of the 2012 Alignment, National Grid continued to review the designs. Representations were received from some property owners who proposed localised changes to the 2012 Alignment in specific areas. These were subjected to further assessment by the engineering and environmental teams and compared to the 2012 Alignment to see whether the suggested alternative or the 2012 Alignment should be taken forward. These led to minor changes to the 2012 Alignment at Kate's Hill and Pipkin Lodge near Layham.

### **Cable Sealing End Options**

- 4.6.7 The COR concluded that there was a case for undergrounding certain sections of the project in Section E (Dedham Vale) and Section G (Stour Valley). Each of the underground sections would require a CSE compound at each end to connect it to the adjacent overhead line. The COR identified indicative locations where the CSE compounds could be located. This included environmental studies to consider the potential effects on landscape, visual amenity, biodiversity and cultural heritage. Further work was undertaken after the COR was published looking at the detailed location for each CSE compound. This included a back check and review in 2020 to check that the CSE compounds were in suitable locations given the time that had elapsed from the original assessment.

#### **Section E: Dedham Vale East CSE Compound (Dollops Wood)**

- 4.6.8 A large number of options were developed for the Dedham Vale East CSE compound, which was located close to Dollops Wood, which lies in Dedham Vale AONB. The majority of these assumed the use of horizontal directional drilling (HDD) under Dollops Wood – an approach responding to representations from the public in order to reduce impacts to the woodland. Options that required the CSE compound to be located within Dedham Vale AONB were ruled out on the grounds of conflict with national policy as there were alternative locations outside the AONB boundary.

- 4.6.9 The study concluded that the preferred option would be to locate the Dedham Vale East CSE compound to the southeast of Sprott's Farm, east, and outside of the AONB boundary. This location was chosen as it lay outside of Dedham Vale AONB and the existing woodland provided natural screening of the site. This CSE compound has been subject to further review and assessment following the 2021 non-statutory consultation, see Section 5.4 for further details.

#### **Section E: Dedham Vale West CSE Compound (Boxford Fruit Farm)**

- 4.6.10 Three options were initially considered for the Dedham Vale West CSE compound and a fourth was later added as a result of discussions with individual landowners and land agents. The study concluded that the preferred option was to locate the Dedham Vale West CSE compound to the immediate west of Boxford Fruit Farm, as this location

offered separation from the AONB to the east, and the existing tree planting along the boundary to the orchard would provide natural screening.

### Section G: Stour Valley East CSE Compound (Sawyers Farm)

- 4.6.11 The initial studies concluded that the Stour Valley East CSE compound could be located to the south of Sawyer's Farm and west of Upper Road, as this location took advantage of a natural depression on the edge of the Stour Valley and the presence of existing vegetation to screen the site. It was noted that the location would fall within the setting of the listed building at Sawyer's Farm and would result in negative effects which could not be mitigated entirely. However, the setting was considered to be already influenced by the presence of overhead lines and the magnitude of effect on this listed building would be minor.
- 4.6.12 Following recommencement of the project in 2020, the back check and review highlighted the need for further work to verify the undergrounding and the location of the CSE compound in this location. This work also considered sites located outside of the Stour Valley Project Area. The list of options was screened from a technical and environmental perspective and the study concluded that the 2012 option remained the preferred option, as it reduces the length of cable required and the existing woodland would partly screen the compound site.

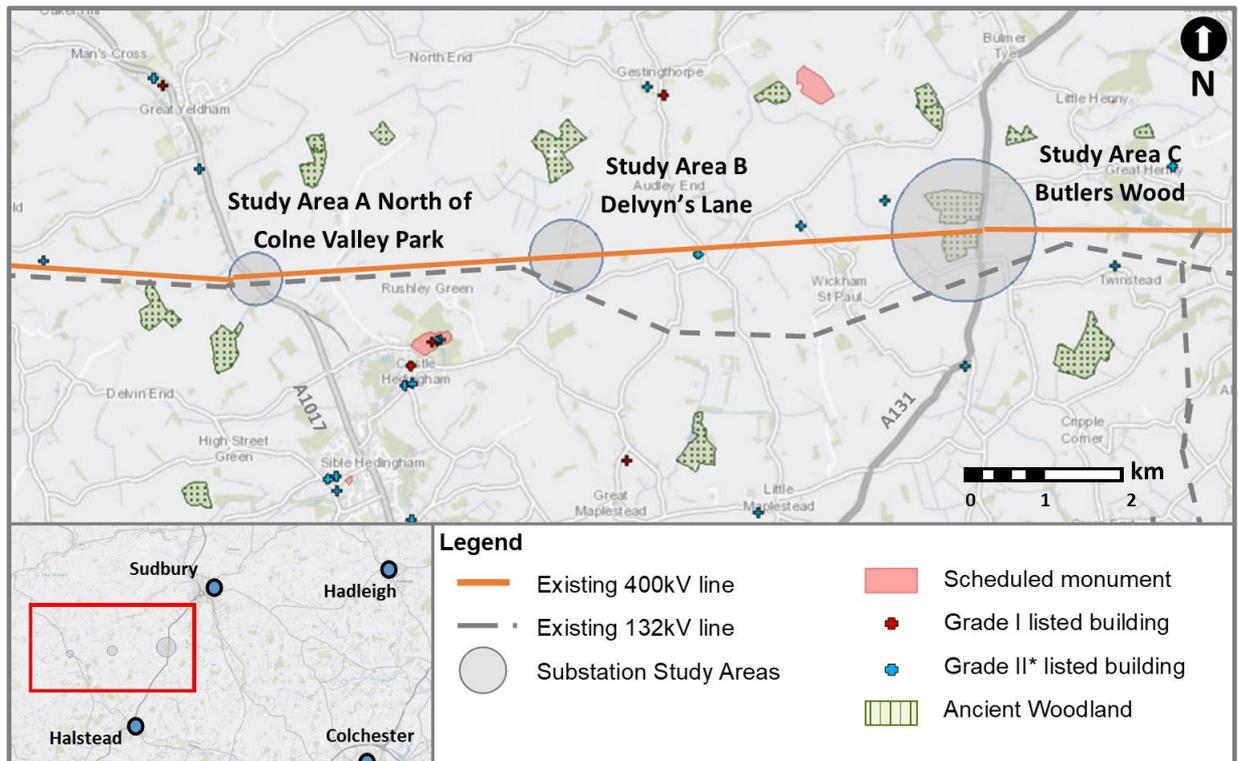
### Section G: Stour Valley West CSE Compound

- 4.6.13 The COR suggested that the Stour Valley West CSE compound could be located adjacent to the Bramford–Braintree–Rayleigh overhead line, near Loshhouse Farm. This location was chosen as it lay within a natural valley, with an existing mature hedgerow and woodland screening. The location would fall within the setting of the listed buildings at Sparrow's Farm, particularly the barn to the west of Sparrow's Farm, which is Grade II listed.
- 4.6.14 National Grid received a number of comments on the Stour Valley West CSE compound during consultation on the COR, including representations from Braintree District Council, who suggested that the CSE compound could be relocated to a site 1km further south, near Henny Back Road. National Grid responded to these representations by undertaking a further study into the location of the CSE compound. The study considered two alternative locations for relocating the CSE compound. Both of these alternative options reduced the impacts on the setting of Sparrow's Farm and on views from public rights of way. The new options also resulted in the removal of additional spans of the existing 400kV line to the north. The study concluded that a CSE compound in the vicinity of Henny Back Road should be taken forward instead of the COR option.
- 4.6.15 The option appraisal was presented in the Western CSE End Compound study, published in November 2012. A further consultation invited the views of the planning authorities and local communities and the feedback generally supported the change of location. The Stour Valley West CSE compound has been subject to further review and assessment following the 2021 non-statutory consultation, see Section 5.4 for further details.

## 4.7 Distribution Network Options

- 4.7.1 The project incorporates the route of a 132kV overhead line comprising part of the electricity distribution system owned and operated by UKPN. This 132kV overhead line runs from Burstall Bridge, 2.5km to the south of Bramford Substation, to the vicinity of Twinstead Tee. The project would involve removing the existing 132kV overhead line in order to accommodate the 400kV network reinforcement. Following the removal of the 132kV overhead line, additional work would be required to maintain the local connection and the current security of supply to local homes and businesses.
- 4.7.2 An initial study was undertaken by UKPN in July 2012, which identified eight options to maintain the security of local electricity supplies. These included options to replace the 132kV circuits between Twinstead and Burstall Bridge, extending the 132kV overhead line from Twinstead, reinforcing Braintree GSP substation and strategic locations for a new GSP substation. The UKPN report concluded that Option 6, developing a GSP substation in the vicinity of Twinstead Tee (Option 6) was the preferred option for replacing the capacity lost following the removal of the existing 132kV overhead line.
- 4.7.3 This UKPN report was reviewed by National Grid, who also carried out further analysis of the 132kV connection options in accordance with its own options appraisal methods, including assessing lifetime cost and environmental and socio-economic issues. The assessment also considered the Holford Rules and the Horlock Rules and likely compliance with NPS EN-1 and EN-5.
- 4.7.4 The National Grid work concurred with the work undertaken by UKPN by confirming that the preferred option was to develop a new GSP substation to the west of Twinstead Tee. The report concluded that this represented the most efficient, coordinated and economical option, whilst giving rise to fewer overall environmental effects than the other options considered.
- 4.7.5 National Grid also included further appraisal work to identify potential sites for the GSP substation. An initial desk based study identified eight potential sites within the study area, which extended from Twinstead Tee to Thaxted and was focused along the 400kV overhead line. Three were taken forward for further investigation (Figure 4.3). National Grid identified individual locations within each of the Substation Study Areas for more detailed options appraisal. These were:
- Study Area A: Land north of Colne Valley Farm Park (Site A1)
  - Study Area B: Land at Delvyn's Lane (Sites B1-B5);
  - Study Area C: Land at Butlers Wood and Waldegrave Wood (Sites C1-C4).

Figure 4.3: GSP Substation Study Areas



- 4.7.6 In each Study Area location, further consideration was given to options which involved constructing an entirely Air Insulated Switchgear (AIS) solution (400kV and 132kV elements) and options that considered constructing a 400kV AIS element with a 132kV Gas Insulated Switchgear (GIS) element.
- 4.7.7 All options were assessed against the following criteria: technical implications; environmental effects; socio-economic impacts; and cost. The study concluded that a substation between Butler's Wood and Waldegrave Wood (Study Area C) was preferred, as it would have the least impact on the landscape character of the area, visual amenity, ecology and the historic environment. This option would also be the least constrained from a technical perspective and have the shortest access road.
- 4.7.8 National Grid consulted on these options in early 2013. A Consultation Feedback Report was published in August 2013. The majority of representations agreed that Study Area C was the most suitable and all but one of the representations received relating to Study Area C agreed that Location C2 was the best location. A number of detailed concerns were raised, mainly related to landscape impact, which would be addressed through the detailed design of the project and associated mitigation measures.
- 4.7.9 National Grid reviewed the representations and concluded that the previous selection of Location C2 remained robust. National Grid also determined that the design should adopt AIS, a position supported in representations. In confirming this as the preferred option, National Grid acknowledged the need for further consideration of mitigation at the site, including both the design of the access road and junction with A131 and the management of construction traffic on the local highway network.

- 4.7.10 Since restarting the project in 2020, National Grid has recommenced discussions with UKPN to ensure the previous proposals are still appropriate. UKPN has now confirmed a requirement for two transformers at the GSP substation site (the original 2012 work assumed one transformer). This would require a larger footprint than assumed within the Substation Options Appraisal Study. National Grid has undertaken further consideration during 2020 to back check the options appraisal work. This has confirmed that the preferred substation site is still Butler's Wood and that this site can accommodate the larger footprint associated with the two transformers. The results of this work have shown that the site can accommodate two transformers, within the existing woodland screening.
- 4.7.11 The GSP substation preliminary design has been included within the statutory consultation material.

## 4.8 Pylon Design Assessment

- 4.8.1 Assessment of pylon design was undertaken in 2013, which considered different designs of pylons that could be used on the project and the potential effects of each. Three types of pylon were considered and the dimensions of each are set out in Table 4.2. The T-pylon and the low height steel lattice pylon are wider than the standard steel lattice pylon. There is little difference between the construction work involved in the pylon types.

Table 4.2: Comparison of Pylon Designs

Suspension Pylon Type	Height	Base at Widest Point	Number of Cross Arms	Width of Widest Cross Arm	Number of Earth Wires
Standard steel lattice pylon	49.95m	9.3m	3	20.8m	1
Low-height steel lattice pylon	35.3m	7m	2	29.2m	1
T-pylon	34.5m	2m	1	22.4m (31m including insulators)	2

- 4.8.2 The assessment considered the potential environmental effects of each pylon type, including landscape and visual, ecology and historic environment. It considered the effects in terms of visibility alongside the existing 400kV overhead line, which comprises steel lattice pylons.
- 4.8.3 The assessment concluded that although the low-height steel lattice pylon and the T pylon would be lower in height (with potential benefits on distant views), introducing a notably different pylon design to the existing 400kV standard steel lattice pylons would have greater adverse effects on close views. The standard steel lattice pylons would also have a greater span which would allow the design to pass over sensitive features more easily, resulting in less habitat loss than low-height steel lattice pylons or T-pylons. The assessment concluded that the standard steel lattice pylon would be the preferred pylon design.

4.8.4 Since the pylon design was considered in 2013, T-pylons have been constructed on other projects. The results from these projects have shown that T-pylons take longer to construct, require additional abnormal indivisible loads and require more concrete for the foundations than standard lattice pylons. This reinforces the previous assessment that standard steel lattice pylons would be the preferred pylon design.

## **5. 2021 Non-Statutory Consultation**

### **5.1 Material Presented at the Non-Statutory Consultation**

5.1.1 The project recommenced in 2020 and following initial review work to confirm that the designs and previous decisions remained valid, National Grid decided to undertake a non-statutory consultation on the project in March 2021. The Indicative Alignment that was presented at the non-statutory consultation was the 2012 Alignment with the subsequent changes noted in Section 4.6.

5.1.2 The purpose of the consultation was to gather feedback on the proposals, particularly the proposed extents of the overhead line and underground cables and also to seek feedback on two options at Dollops Wood (see below). In addition, the non-statutory consultation provided an opportunity to seek up to date feedback on the designs and any proposed changes in advance of the statutory consultation. This was particularly appropriate given the project pause and the potential that there may be new landowners and consultees with an interest in the project.

#### **Extent of Undergrounding**

5.1.3 Although Dedham Vale AONB is covered by a national designation, the Stour Valley is not designated and could therefore be considered to not warrant undergrounding, based on cost and the potential adverse effects on archaeology, habitats, drainage, landscape character and agriculture.

5.1.4 In preparation for the non-statutory consultation, National Grid undertook a review of the cost of the project, including a review of the comparative cost of overhead line and underground cables. National Grid was confident that the project maintained the right balance between the policy requirements and meeting National Grid's duty to be economic and efficient. However, National Grid wanted to seek external feedback during the non-statutory consultation on whether undergrounding in the Stour Valley remained appropriate.

5.1.5 The feedback from the consultation demonstrated that the majority of respondents supported undergrounding in the Stour Valley, given the benefits it would have on the landscape and views compared to an overhead line solution. A number of representations noted that although the Stour Valley is not currently designated, it is an important and valuable landscape in its own right. The Natural England response also noted that the Stour Valley forms part of the setting of Dedham Vale AONB and is managed in a similar way through a combined management plan.

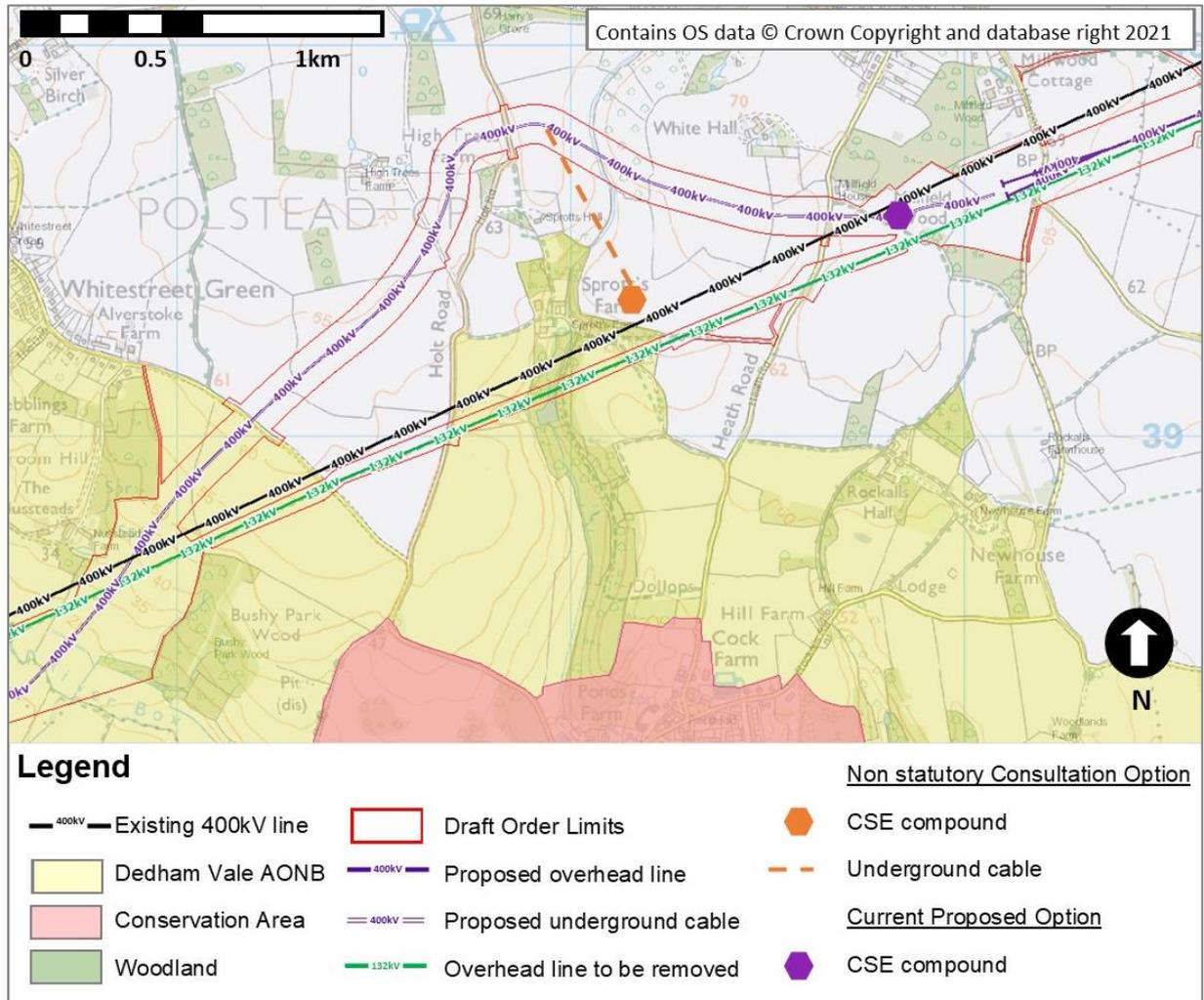
5.1.6 National Grid listened to the feedback provided during the non-statutory consultation and can confirm that it intends to pursue an underground cable option through the most sensitive parts of the Stour Valley.

#### **Alternative Option at Dollops Wood**

5.1.7 National Grid presented two options at Dollops Wood within the non-statutory consultation. The first option was based on the 2012 Alignment, which proposed a trenchless crossing underneath the woodland. However, initial ground investigations suggested that a trenchless crossing at this location could have high construction and

environmental risks due to the topography and the ground conditions. Following work undertaken in 2020, a second option was identified that would involve a direct burial route around the woodland to the north of Sprott's Farm with the Dedham Vale East CSE compound located adjacent to the AONB boundary (Figure 5.1).

Figure 5.1: Alternative Option at Dollops Wood



5.1.8 The majority of the non-statutory consultation responses acknowledged a preference for the route to the north around the woodland, as this would avoid impacts to the woodland. National Grid has decided to take forward the northern option around the woodland. Feedback received during the non-statutory consultation identified potential effects from the location of the proposed Dedham Vale East CSE compound on the setting of the AONB and on the setting of Polstead conservation area to the south.

5.1.9 National Grid undertook further environmental and technical assessment regarding the siting of the Dedham Vale East CSE compound, including considering the effects on the setting of the AONB. The review work concluded that the Dedham Vale East CSE compound should be relocated to a position between two existing blocks of woodland at Millfield Wood, which provide visual screening (Figure 5.1). This would reduce impacts on the setting of the AONB and also would avoid potential effects on Polstead conservation area, a concern raised by Historic England in their response.

- 5.1.10 Further work was also undertaken looking at the underground cable route and this has also been amended based on seeking a more direct route (shorter) between the CSE compound and a position to the north of Sprott's Hall (as shown on Figure 5.1).

## 5.2 Further Work Following the Non-Statutory Consultation

5.2.1 The non-statutory consultation provided an opportunity for National Grid to seek up to date feedback on its proposals. The Non-Statutory Consultation Report summarises the responses received and how the project is responding to these. The sections below outline the responses that have prompted a review of the Indicative Alignment in key areas and what the outcomes of the follow on studies have concluded. This is split into the following themes:

- Alternative technology: This describes alternative technologies that were raised during the non-statutory consultation or through design development and whether they would be appropriate for the project.
- Dedham Vale and the Stour Valley: This describes the various responses received raising matters around Dedham Vale AONB, including consideration of the setting and the potential extension to the AONB boundary.
- Location specific design changes: This describes the main location specific requests that were raised during the non-statutory consultation or through ongoing design development and whether they have been taken forward on the project.
- Options at Hintlesham Woods SSSI: This describes the two potential options at Hintlesham Woods SSSI and the potential impacts. As part of the statutory consultation National Grid is seeking feedback on each option before deciding which option to take forward.
- Environmental gains: This describes National Grid's commitment to delivering environmental gain as part of the project and the work that is being undertaken in this area.

## 5.3 Alternative Technology

### Cable Technology

5.3.1 Responses were received proposing new and different technologies that are available for constructing high voltage power lines as alternatives to an overhead line. National Grid reviewed the alternatives proposed to see if they would be suitable on the Bramford to Twinstead project.

### Alternating Current (AC) High Temperature Superconductors (HTS)

5.3.2 High temperature superconductors are named due to their ability to demonstrate superconducting properties at temperatures above Absolute Zero Kelvin. However, they operate at a temperature of circa -140°C and require cooling by liquid nitrogen. At present the power carrying capacity available using this technology is relatively low.

5.3.3 National Grid is actively involved in the development of AC superconducting technology and National Grid USA owns a superconductor circuit in Albany, New York. This AC superconductor is 350m long and operates in a very congested urban area, helping to supply power to local demand.

5.3.4 AC HTS are currently being used to provide power transfer over short distances in urban constrained environments. They are operating at voltages well below 400kV and the highest rated scheme, in Munich, provides 500MW of power capacity, which is 13.5 times smaller than the capacity required for Bramford to Twinstead. The limited capacity of AC HTS technology makes it currently unviable for major transmission projects such as Bramford to Twinstead.

### High Voltage Direct Current (HVDC)

5.3.5 HVDC is an expensive option due to the cost of the cable and the need for a converter station at each end to connect the DC cables into the AC transmission system. This generally makes HVDC technology of any kind uneconomic for distances less than 100km, as is the case for Bramford to Twinstead. This technology is significantly more expensive than the proposed technology on the Bramford to Twinstead project and would not meet National Grid's statutory duty to be economic and efficient. The converter stations would also have potential for landscape and visual effects depending on where these are located.

### Underground Cable Installation Using Ducting

5.3.6 Based on lessons learnt from other projects, National Grid has considered different approaches to installing the underground cables. It was originally assumed that the cables would be installed in open cut trenches. The trenches would remain open for a period of time, while the cables were laid. National Grid is now proposing to construct the underground cables using a ducted solution, where a trench is dug and a duct is placed into the trench, the cable can then be pulled through the ducts. The ducted solution has engineering advantages over the standard open cut method, as the trenches can be back filled quicker compared to standard open cut techniques. This means that reinstatement can commence sooner than would happen with a standard open trenching technique.

5.3.7 There will be some locations where ground conditions or other site constraints may mean that ducted solutions cannot be used. However, National Grid has decided to use the ducted approach to the majority of the installation of the underground cables.

### Full Line Tension Gantries

5.3.8 A review of the design identified that there would be benefits in using full line tension gantries at some locations on the project. The full line tension gantries would be approximately 15m in height and would have landscape and visual benefits compared to a terminal pylon alternative, which would be c. 50m in height.

5.3.9 Full line tension gantries are now proposed at the CSE compounds, except Stour Valley East. This will remove the need for three terminal pylons across the project. Full line tension gantries cannot be used at Stour Valley East CSE compound, as it would not be possible to achieve the electrical safety clearances required at this location.

## 5.4 Dedham Vale AONB and the Stour Valley

5.4.1 National Grid received a number of comments relating to the extent of undergrounding and potential setting effects on Dedham Vale AONB. National Grid has undertaken a

review of the extent of undergrounding in light of current (and emerging) policy, environmental designations and feedback from consultees, bearing in mind National Grid's duty to be economic and efficient.

### **Alternative Corridor Fully Outside of Dedham Vale AONB**

- 5.4.2 National Grid has back checked and reviewed the previous work and decisions made during the Route Corridor Study to see whether there were options to avoid Dedham Vale AONB. At the time of the Route Corridor Study, National Grid received a significant number of consultation responses against the selection of Corridor 3 or 4 (which avoided the AONB). This was because the areas to the north of Dedham Vale AONB are currently without existing electricity transmission infrastructure and introducing a new overhead line in this area was considered to have a greater magnitude of impact than within the existing corridor (Corridor 2). Further details can be found in Section 4.2 and 4.3.
- 5.4.3 The back check and review work undertaken following the non-statutory consultation has concluded that the decisions made during the Route Corridor Study, including that Corridor 2 was preferred over Corridors 3 and 4 outside of the AONB, are robust and that the justification presented in Section 4.2 of this report remains valid.

### **Potential Extension to Dedham Vale AONB**

- 5.4.4 Feedback from Suffolk County Council suggested that the Stour Valley should be treated as if it was designated as an AONB. This was in response to a request made by Dedham Vale AONB and the Stour Valley Partnership to Natural England proposing that the boundary of the Dedham Vale AONB be extended westwards towards Sudbury.
- 5.4.5 At this time, Dedham Vale AONB has not been extended and there is no defined boundary of what any future extension (if determined) would look like. National Grid is also aware that previous applications for designation of the Stour Valley as an AONB have been refused (Alison Farmer Associates, 2016). Natural England will not comment on any potential future designation or the boundary of such a potential designation at this time, as it is too early in the process. Natural England also stated that any potential future designation would be their responsibility to determine.
- 5.4.6 Natural England has advised the project that decisions should be based on the effects on the existing Dedham Vale AONB and its setting as currently designated (in line with the current NPS). Natural England also advised that it recognises that parts of the Stour Valley will have a role as part of the setting of the AONB.
- 5.4.7 As the status of the request to extend the AONB remains undecided and based on discussions with Natural England, National Grid is not proposing to treat any area outside of the existing Dedham Vale AONB boundary as designated within its application for development consent but will be considering the setting of the AONB, including the contribution that the Stour Valley makes to this.

### **Extending Underground Cables into Section F: Leavenheath/Assington**

- 5.4.8 The Dedham Vale AONB and Stour Valley Partnership asked for consideration of extending the underground cable through Section F: Leavenheath/Assington, as this could benefit the setting of the AONB through lessening visual impacts of overhead lines

when viewed from the AONB. National Grid has undertaken a back check and review to see if there was justification to extend the underground cable through Section F: Leavenheath/Assington.

5.4.9 Section F is not designated and therefore there is no policy justification for undergrounding in this section, although it could be considered as part of the setting of the Dedham Vales AONB; this will be determined as part of the Environmental Impact Assessment. In addition, there is the existing 400kV overhead line which the proposed 400kV overhead line would parallel through this section and the existing 132kV overhead line would be removed. This would result in a low magnitude of change from the baseline in this section. National Grid has concluded that when taking into account all of their duties and the baseline environment in this section, that overhead lines should remain the preferred approach in Section F.

### Consideration of the Stour Valley as Part of the Setting of Dedham Vale AONB

5.4.10 Feedback during the non-statutory consultation, including from Natural England, suggested that parts of the Stour Valley should be considered as within the setting of Dedham Vale AONB. Dedham Vale AONB and Stour Valley Partnership, in their response on the non-statutory engagement also support the view that parts of the Stour Valley fall within the setting of the AONB.

5.4.11 In response to this feedback, National Grid has reviewed the designs in the context of impacts on the setting of the AONB to see if this would change project decisions. This has included a more detailed study looking at the potential effects that the CSE compounds would have on the setting of Dedham Vale AONB. A summary of the outputs of this work can be found in Table 5.1. The study concluded that the proposed CSE compounds are considered to have limited effects on the setting on the AONB or key views at their proposed locations and they are not likely to significantly impact on the special qualities of the AONB.

Table 5.1: Review of CSE Compounds on the Setting of Dedham Vale AONB

<b>CSE compound and Non-Statutory Consultation Location</b>	<b>Review</b>	<b>Conclusion</b>
Dedham Vale East CSE (Section D): During the non-statutory consultation, this CSE was located immediately to the east of the AONB boundary. (see Section 5.1).	The review work concluded that the proposed CSE compound should be relocated further to the east from the AONB boundary (see Section 5.1). The site chosen is between two existing blocks of woodland at Millfield Wood, which provide visual screening. This would reduce impacts on the setting of the AONB and also would avoid potential effects on Polstead conservation area, a concern raised by Historic England in their response.	The location of the CSE compound has been moved in response to feedback (see Section 5.1).
Dedham Vale West CSE (Section F): During the non-	The review work concluded that the is adjacent to a large commercial fruit farm with associated infrastructure which locally reduces landscape sensitivity and helps to screen	The CSE compound has remained in

<b>CSE compound and Non-Statutory Consultation Location</b>	<b>Review</b>	<b>Conclusion</b>
statutory consultation, this CSE was located c. 400m west of the AONB close to a fruit farm.	views from the AONB. The CSE compound would be visible from outside the AONB in the context of the fruit farm which also contains some prominent built form. Dedham Vale West CSE compound could be considered to be within the setting of the AONB due to its proximity, but it is not likely to significantly impact on the special qualities and designation or views from the AONB because existing vegetation and built form would help screen and filter views from the majority of the AONB.	approximately the same location as presented at the non-statutory consultation.
Stour Valley East CSE (Section F): During the non-statutory consultation, this was located c. 2.1km north of the AONB and within the Stour Valley Project Area.	The review work concluded that the CSE compound is unlikely to be visible from the AONB itself, and as such, there is less chance that it would detrimentally impact on the special qualities and designation. The existing landform and vegetation supplemented by new planting would help screen views from the Stour Valley.	The CSE compound has remained the same as presented at the non-statutory consultation.
Stour Valley West CSE (Section G): During the non-statutory consultation, this CSE was located c. 5km to the west of the AONB and within the Stour Valley Project Area (see Section 5.5).	The review work concluded that the CSE compound is unlikely to be visible from the AONB and as such there is less chance that it would detrimentally impact on the special qualities and designation itself. Existing landform and vegetation supplemented by new planting would help screen views from much of the Stour Valley.	The location of the CSE compound has since moved due to further feedback. This move was not due to effects in the AONB(see Section 5.5).

5.4.12

In general, the setting review concluded that close views from within the AONB are often filtered by vegetation. There are longer distance views from the AONB towards the project but they are at a distances over 4.5km and at this distance, effects on views would be unlikely to be significant. The adverse effects of the increase in height in new pylons in the setting of the AONB would be offset by the benefits of removal of the 132kV overhead line within the AONB and removal of sections of the 132kV and 400kV overhead lines within the setting of the AONB in the Stour Valley. Therefore, no change to the alignment or the extent of undergrounding has been proposed as a result of the review and National Grid is of the view that the extent of undergrounding proposed is the right balance.

## 5.5 Location Specific Design Changes

5.5.1 National Grid has reviewed the responses received during the non-statutory consultation. A number of responses identified potential design changes that have been reviewed by the engineering, land and environmental teams. The proposed design changes are summarised in this section, along with the reasons why they were taken forward or discounted.

5.5.2 Other design changes have occurred as a result of ongoing engineering, landowner discussions and environmental assessment work. These include adjusting the draft Order Limits to avoid known sensitive features such as a Source Protection Zone 1, ancient woodland and to accommodate temporary soil stockpiles outside of the floodplain. The draft Order Limits have also been widened at key areas to accommodate land for environmental mitigation and environmental gain, for example landscape and visual screening at the GSP substation and CSE Compounds and identifying areas where habitats could be improved and enhanced.

### Section AB: Bramford Substation/Hintlesham

#### Bramford Approach

5.5.3 The proposed alignment of the new 400kV overhead line into Bramford Substation has been altered slightly, to connect into the western boundary of the substation (the drawings presented at the non-statutory consultation, although not showing the substation footprint or layout in any detail, identified the new overhead line as connecting into the southwest corner of the substation). The new alignment will better accommodate the various works required within the substation to connect the new overhead line and has therefore been taken forward as part of the Draft Alignment.

5.5.4 The alignment of the existing 400kV overhead line is also proposed to be altered, which would allow the majority of the configuration works within the substation to be undertaken offline (i.e. while the existing 4YL overhead line remains in operation). This would reduce the need for outages required to undertake the work and reduce the constraints on the system. The new alignment would also allow the removal of three existing 400kV pylons, to be replaced by a single new pylon. This would reduce landscape and visual impacts to the areas around the substation.

#### Hintlesham Hall

5.5.5 The 2013 design has been retained where agreements had been previously made with Historic England in relation to Hintlesham Hall. National Grid is in the process of agreeing a mitigation strategy for the hall including additional planting proposals and seeking to position the new pylons in locations that reduce the effects on the setting.

#### Hintlesham Woods

5.5.6 Two options are being considered at Hintlesham Woods based on feedback received during the 2021 non-statutory consultation. See Section 5.6 for further details.

## **Section D: Polstead and Section E: Dedham Vale AONB**

- 5.5.7 Following feedback from key stakeholders, National Grid can confirm its commitment to underground the new 400kV transmission line through Dedham Vale AONB. In addition, National Grid intends to pursue the alternative cable route that was set out during the non-statutory consultation to the north of Dollops Wood (see Section 5.1). The alternative route to the north would avoid Dollops Wood and avoid the need for a trenchless crossing beneath the woodland, which carries engineering and environmental risks.
- 5.5.8 National Grid has also moved the location of Dedham Vale East CSE Compound to between two parts of Millfield Wood (see Table 5.1). The combination of choosing the option to the north of Dollops Wood and relocating Dedham Vale East CSE compound means that there would be potentially three less pylons and up to 1km less overhead line at this location.

## **Section F: Leavenheath/Assington**

- 5.5.9 No specific changes have been made in this section, although further work was undertaken in response to the non-statutory consultation (see Section 5.4).

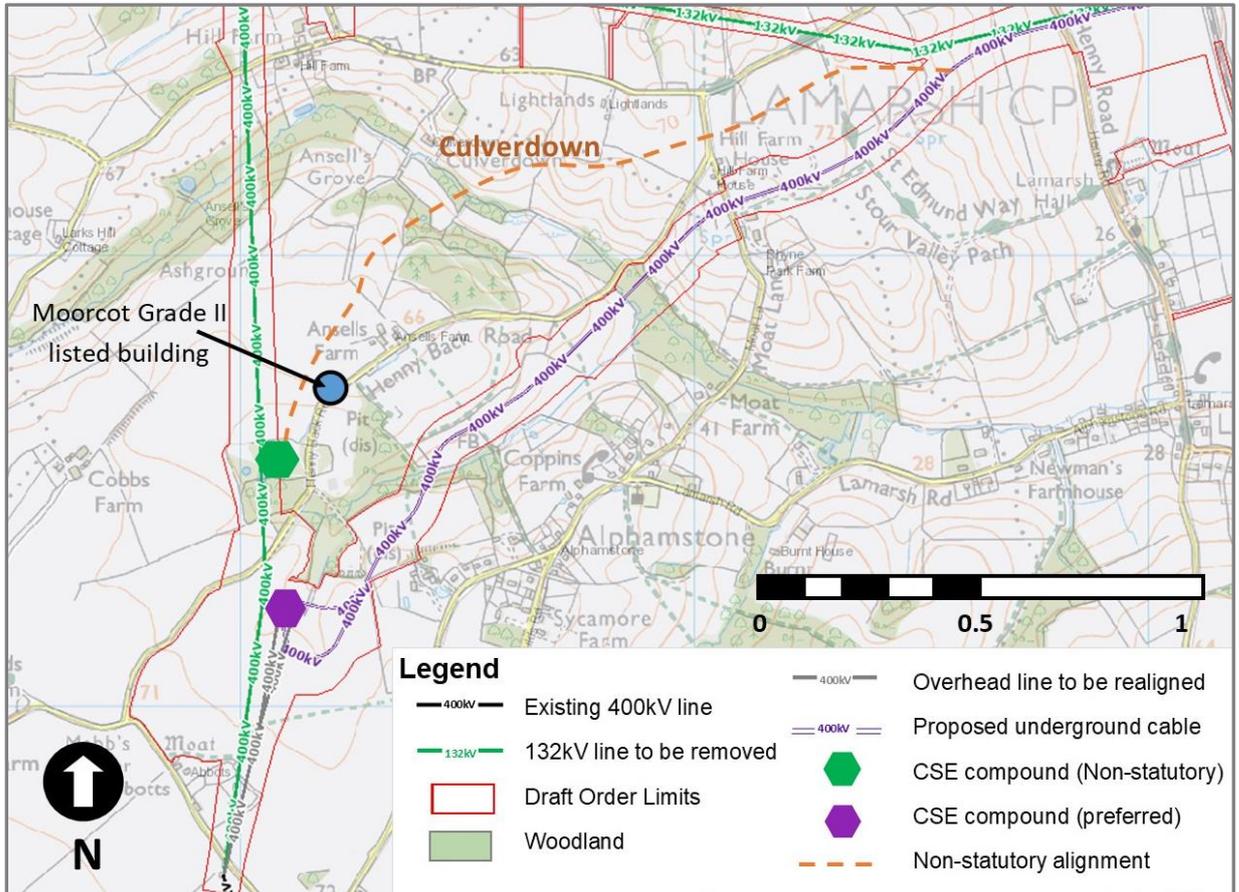
## **Section G: Stour Valley**

- 5.5.10 Following feedback from key stakeholders, National Grid can confirm its commitment to undergrounding the new 400kV transmission line in the Stour Valley from the western side of Alphamstone to south of Workhouse Green. National Grid has also extended the trenchless crossing at the River Stour to the east across the B1508 (St Edmund's Hill). This will reduce the effects on the floodplain at this location and also retain an area of recent planting along the river.
- 5.5.11 Feedback was received during the non-statutory consultation regarding the location of the Stour Valley West CSE compound and the landscape and visual effects on properties in the vicinity, including Moorcot, a grade II listed building. The feedback suggested an alternative location to the south of Henny Back Road (Figure 5.2).
- 5.5.12 National Grid undertook a study of this location and confirmed that this site would have additional benefits to the previous location due to the removal of an extra section of the existing 400kV overhead line between Stour Valley West CSE Compound and Twinstead Tee (2.5km in total).
- 5.5.13 At the same time as the proposed alternative location for the Stour Valley West CSE compound, National Grid also looked at the alignment of the underground cables between Henny Road and the alternative Stour Valley West CSE compound. The Indicative Alignment presented at the non-statutory consultation included a underground cable across Culverdown, which is a steep sided valley. A trenchless crossing was proposed in the COR, to reduce effects on sensitive habitats within the base of the valley. Engineering and design work undertaken since, has shown that a trenchless crossing would be technically challenging at this location given the ground conditions.

5.5.14

National Grid has therefore explored alternative options to the north of Alphamstone to see if there was a preferable route between Henny Road and the alternative Stour Valley West CSE compound. The review looked at what would be the most direct route between the two points, as this would provide the most efficient route alignment. The route was then refined to avoid larger areas of woodland and existing buildings, such as Hill Farm House and Rhyne Park Farm. The proposed route would also avoid the underground cable crossing Henny Back Road (a Protected Lane).

Figure 5.2: Stour Valley West CSE Compound and Culverdown



5.5.15

The proposed relocated Stour Valley West CSE compound and the alternative route would offer benefits compared to the Indicative Alignment and have therefore been taken forward as part of the Draft Alignment. National Grid is undertaking further engineering and environmental surveys of this route to inform the route refinement and potential mitigation going forward.

### Section H: GSP Substation

5.5.16

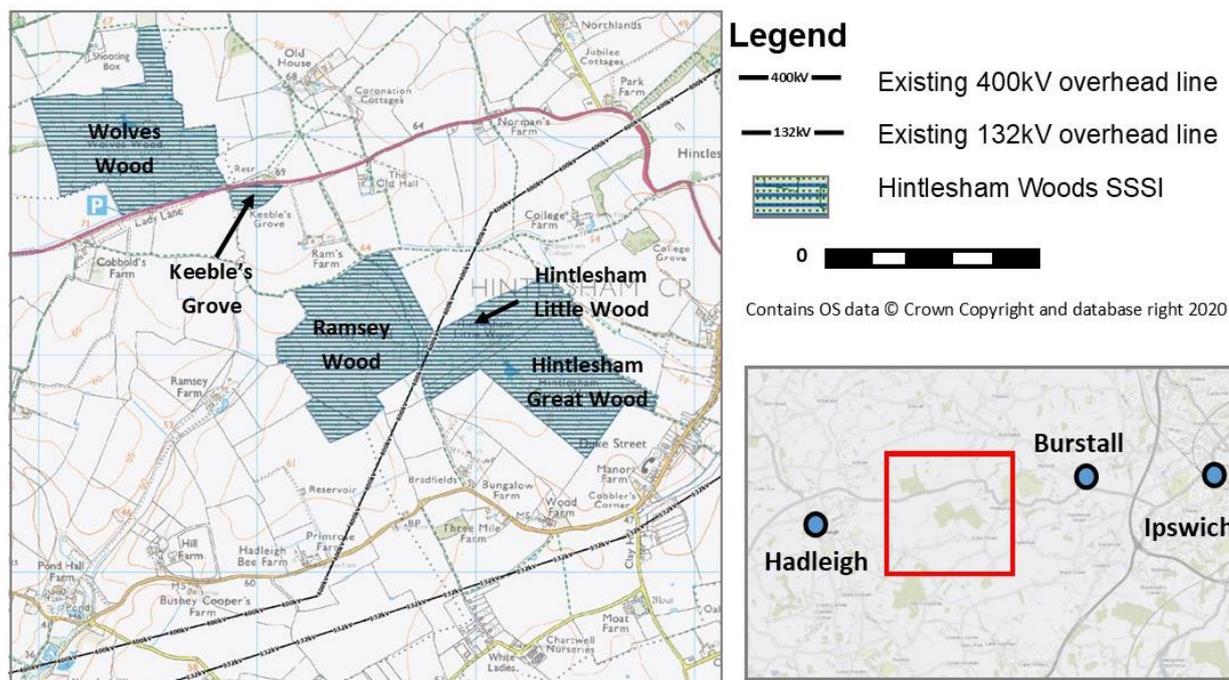
No specific changes have been made in this section. However, following further engineering work and discussion with UKPN, a greater degree of design detail is now available regarding the scale and appearance of the GSP substation and other related works. This is presented in the statutory consultation material.

## 5.6 Options at Hintlesham Woods SSSI

### Existing Features

- 5.6.1 Hintlesham Woods SSSI comprises two contiguous woodlands; Hintlesham Woods (Hintlesham Little Wood and Hintlesham Great Wood) and Ramsey Wood; and further woodland separate from these called Wolves Wood and Keeble's Grove. The latter two are further north, on either side of the A1071 (Figure 5.3).
- 5.6.2 Hintlesham Woods SSSI is designated for its ancient woodland habitats and breeding bird assemblage. It is also a Royal Society for the Protection of Birds (RSPB) Reserve. The Ancient Woodland is also recorded by the Suffolk Historic Environment Record (HER) and is therefore a non-designated heritage asset.
- 5.6.3 The existing 400kV overhead line runs along the western edge of Hintlesham Little Wood and within the adjoining Ramsey Wood before continuing to Twinstead Tee. Ancient woodland habitat beneath the existing overhead line was impacted during its construction in the 1960s and the land beneath is currently managed to prevent re-establishment of tall woodland habitat to ensure electrical safety clearances are maintained.

Figure 5.3: Hintlesham Woods SSSI Units



### 2021 Non-statutory Consultation and Response to Feedback

- 5.6.4 During the 2021 non-statutory consultation and ongoing discussions with neighbouring landowners; some landowners and the public have highlighted concern regarding the Indicative Alignment to the north and west of Ramsey Wood and expressed a preference for a parallel alignment to the existing 400kV overhead line through Hintlesham Woods. This was because of concerns raised regarding the impact it would

have on their properties and the effects it could have on the landscape and views in the local area.

- 5.6.5 In addition, RSPB and Natural England raised questions about the duration of the proposed construction works both within and adjacent to the woodland and have requested that the project seeks to undertake works outside of bird nesting season. Due to the required transposition of the overhead lines (see paragraph 4.5.5), some of the works to the existing 400kV overhead line would need to be undertaken during periods of planned electricity outages. The outages are usually timed for the spring and summer months when electricity demand is at its lowest. There is therefore the potential for a proportion of the works to take place within the breeding nesting season.
- 5.6.6 In response to the feedback received, at and since non-statutory consultation in 2021, the options presented in Appendix A of the COR (see Section 4.5) were backchecked and reviewed, taking into account all salient factors including environmental considerations, to confirm the most appropriate alignment. At this stage in the design process, National Grid is able to feed into the optioneering process a more detailed understanding of the construction methodology required in this location, requirements for temporary pylons and overhead lines, duration of construction activities and outage requirements compared with what was known at the time of writing the COR.
- 5.6.7 The results of this work are presented in Table 5.2. Options previously considered within Appendix A of the COR, that would have a pylon within the woodland (OP1 – NLb and OP1 – SLb) were discounted at the initial screening stage, due to the area of vegetation removal that would be required for pylon construction within the ancient woodland and for the permanent footprint of the pylon.

**Table 5.2: Review of the Alternative Options At Hintlesham Woods**

Option and Description	Reason for Selecting/Discounting
OP1-NL: A parallel overhead line to the north of the existing 400kV through the wood (OP1 – NL) with pylons located outside of the woods.	<p>As work would be required to the existing 400kV overhead line, it would require some aspects to be constructed during planned outages. A proportion of the works would also need to take place during the bird breeding/nesting season.</p> <p>It would not be possible to parallel the existing overhead line entirely, without oversailing a residential property at Primrose Farm. Therefore, the alignment would deviate northward away from the existing 400kV overhead line before re-joining a parallel alignment to the south of Bushey Cooper’s Farm.</p> <p>This option also involves crossing the SSSI designation and would have a resultant impact on ancient woodland habitats and SSSI interest features. This option was <b>discounted</b> due the impacts on the SSSI and the complexities associated with the crossing (transposition) of the existing overhead line.</p>
OP2-NL: The existing 400kV overhead line would be re-routed to the north and west of the woods on newly constructed pylons. The proposed 400kV overhead line	<p>This option would not result in impacts to ancient woodland habitat or SSSI interest features, other than the management that would be required to facilitate works to the existing 400kV overhead line. This option was the least favoured option on landscape and visual grounds in the COR (National Grid, 2012a).</p>

Option and Description	Reason for Selecting/Discounting
<p>would use the route and pylons of the existing 400kV overhead line through the woods.</p> <p><b>This is the option that was presented at the 2021 non-statutory consultation.</b></p>	<p>As work would be required to the existing 400kV overhead line, it would require some aspects to be constructed during planned outages. A proportion of the works would also need to take place during the bird breeding/nesting season.</p> <p><b>This is included within the statutory consultation documents as Option 1.</b></p>
<p>OP1-SL: This overhead alignment option parallels the existing 400kV overhead line to the south through the woods. In this option pylon positions have been adjusted to allow a span through the woods that would avoid the need to place a pylon (and access route and construction area associated with the pylon) in the woods.</p> <p>The distance between the centre lines of the existing and proposed overhead lines would be c. 85m.</p>	<p>This option involves the conductors crossing the SSSI designation and ancient woodland habitat. As the pylons would be located outside of the SSSI boundary there would be no permanent loss of ancient woodland habitat. National Grid has recent experience of crossing ancient woodland with overhead lines; mitigation would aim for no ancient woodland habitat loss by managing trees (coppiced, pollarded or pruned) to enable construction and operational clearances as opposed to complete felling.</p> <p>As this would not involve works to the existing 400kV overhead line and associated outages, the construction programme would be shorter than alternative options and works could be conducted outside of bird nesting season.</p> <p><b>This is included within the statutory consultation documents as Option 2.</b></p>
<p>OP2-SL: This option deviates south from the existing 400kV overhead line to take the shortest available route to cross the woods (no pylons in the wood) before re-joining a southern and closely paralleled alignment to the southwest of the woods.</p>	<p>This option would introduce a greater landscape and visual magnitude of effect (scale of change) than the OP1-NL and OP1-SL options, as this option does not closely parallel the existing 400kV overhead line and would require additional angle pylons. This will extend the effect of overhead lines on this landscape. This option would not address the concerns raised as part of 2021 feedback and has been <b>discounted</b>.</p>

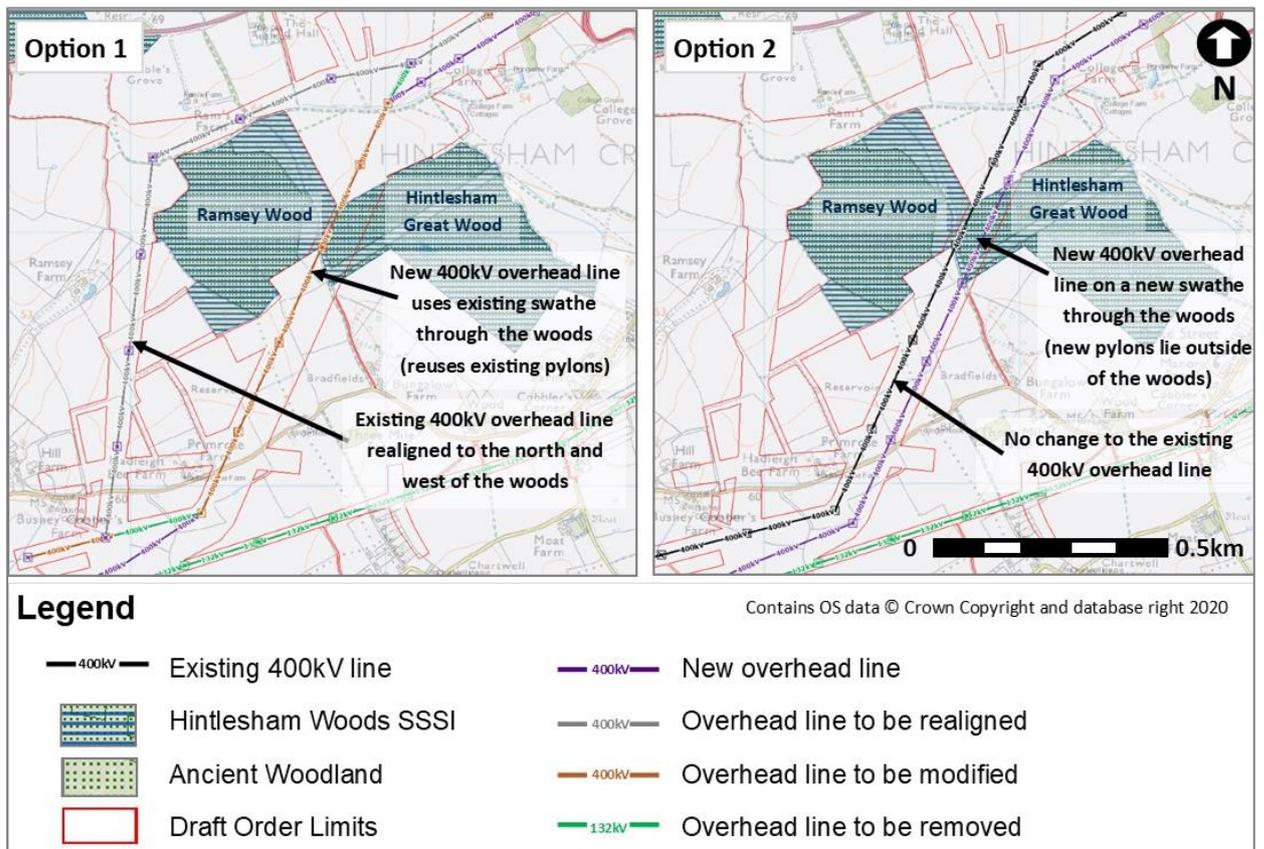
## Consultation on the Hintlesham Woods Options

5.6.8

National Grid is presenting two options (as shown on Figure 5.4) during the statutory consultation in order to seek feedback before deciding which option to take forward. In both cases, the new 400kV overhead line lies to the south of the existing 400kV overhead line. The draft Order Limits include the combined Order Limits of both options so that either option could be taken forward:

- **Option 1 (formerly OP2-NL):** North and west of Ramsey Wood- The existing 400kV overhead line would be diverted on new pylons to the north and west of the woodland. The proposed 400kV overhead line would use the existing pylons through the woodland.
- **Option 2 (formerly OP1-SL):** A parallel overhead line south of the existing 400kV- The existing 400kV overhead line would remain in situ. The proposed 400kV overhead line would be constructed parallel to the existing overhead line to the south on new pylons located outside of the woodland.

Figure 5.4: Hintlesham Woods Options



- 5.6.9 Option 1 would avoid direct impacts on Hintlesham Woods SSSI and ancient woodland habitat, whereas Option 2 would have a span of overhead line conductors crossing the designated site. New land rights would be required for the new 400kV overhead line (and maintained for the existing 400kV overhead line route) to ensure electrical safety clearances are maintained for Option 2.
- 5.6.10 Option 2 would reduce landscape and visual effects to that experienced in Option 1, as the line would be paralleled; although Option 2 would require slightly taller, but fewer pylons in the vicinity of Hintlesham Woods. Unlike Option 1, Option 2 would not require the use of temporary pylons and overhead lines during construction. Option 2 would reduce impacts on the setting of historic assets to those experienced in Option 1, for similar reasons to landscape and visual.
- 5.6.11 National Grid has also reviewed its construction programme in relation to the two options. National Grid has a responsibility to maintain the electricity transmission network in a safe, reliable and efficient way. By its very nature, this project is required to reinforce the network in this area, and hence there is currently limited spare capability for exporting power out of the region. Therefore, any work to the existing 400kV overhead line (required for Option 1) would need to take place during a programme of planned outages in the electricity system to ensure continuity and resilience of supply.
- 5.6.12 The construction programme for Option 1 would be approximately 12 months in 2024 to 2025 and would require multiple visits and durations during 2027 to work within and comply with the planned outages. As much of the work as possible would be completed

outside of the bird nesting season. However, the timing of outages would mean that some works adjacent to the woods would likely to take place within bird nesting season.

5.6.13 Initial appraisal has identified that Option 2 would offer a much shorter construction programme within the woodland as it would not require any works to the existing 400kV overhead line and would not be constrained by outages. Therefore, National Grid is of the view that Option 2 can be fully constructed outside of the bird nesting season, although this may be spread over more than one year. National Grid has recent experience of preparing mitigation when installing overhead lines over ancient woodland which would be used to inform mitigation strategies should Option 2 be taken forward.

5.6.14 National Grid is seeking feedback on the two options at Hintlesham Woods before deciding which option to take forward. This feedback will be used, along with further engineering and environmental assessment, to identify the preferred option which will be presented as part of the application for development consent. Further details on the potential effects of the two options can be found in the PEI Report (National Grid, 2022b).

## 5.7 Environmental Gains

5.7.1 National Grid has developed a new Environmental Action Plan (2021-2026), which sets firm targets for the five-year period (National Grid 2021b). These are focused on four priority areas:

- net zero carbon emissions;
- minimising waste and sustainable use of materials;
- caring for the natural environment; and
- leading the way.

5.7.2 With regard to the natural environment, National Grid will value nature, and will protect and enhance it where possible using 'natural capital' and 'net gain' principles (National Grid 2021b). National Grid has made a commitment to deliver biodiversity net gain (BNG) on this project and it is working with appointed technical specialists, environmental organisations and landowners to identify potential opportunities for delivering environmental gains.

5.7.3 Preliminary 'Environmental Areas' have been identified for potential mitigation and enhancement (including BNG) through a desk based search and habitat condition survey site visits. These are shown on Figure 5.5 and described in Table 5.3.

5.7.4 As further baseline data is collected, and initial discussions take place with consultees and landowners, the Environmental Areas will be refined. In addition, the biodiversity baseline will be quantified during the EIA and design process using the Biodiversity Metric 3.0 (Defra, 2021). This information will be used to calculate the loss in biodiversity units as a result of construction of the project, as well as the number of biodiversity units which will need to be created to achieve a 10% BNG. This will also determine the land required to achieve those gains on the project. Therefore, some of the initial identified Environmental Areas may not be taken forward or only a proportion of the site used. Final proposals will be included as part of the application for development consent.

Figure 5.5: Preliminary Environmental Areas

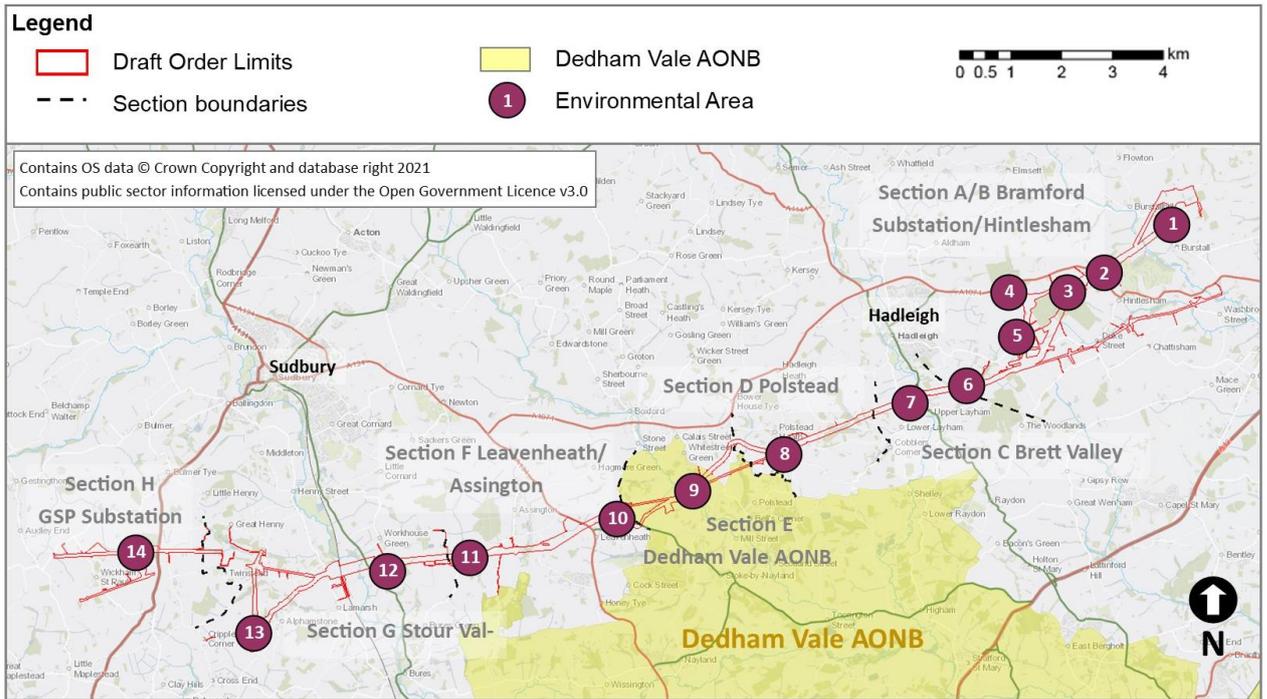


Table 5.3: Summary of the Preliminary Environmental Areas

Env. Area	Description	Reason for Considering This Location
<b>Section AB Bramford Substation/Hintlesham</b>		
ENV01 South of Bramford Substation	Land providing opportunities for biodiversity and landscape and visual mitigation and/or enhancements.	Mitigation planting/hedgerow thickening (either by natural regeneration or planting) may be beneficial to help filter and screen views of the project for PRoW users. In addition, enhancement planting along the watercourse may enhance the experience of users of PRoW and improve habitat connectivity.
ENV02 Hintlesham Hall	Area identified for proposed planting for heritage, biodiversity and landscape and visual mitigation and/or enhancements.	Hintlesham Hall was historically set in an area of parkland with a tree lined avenue leading from the hall through the former parkland. The former parkland has largely been eroded and put over to agricultural use. Mitigation planting could include planting thin strips of land adjacent to the driveway and strengthening planting around the pond to the north. In addition, enhancement planting along the historical avenue could help improve and enhance the parkland outside of the house to reflect the original design intent.
ENV03 Hintlesham Woods (North)	Area identified for biodiversity and landscape and visual purposes, situated to the north of Hintlesham Woods.	The area is adjacent to the SSSI, ancient woodland and RSPB reserve. There is the potential to use natural regeneration to establish planting to help filter and screen views. This would also help extend the existing habitats and improve habitat connectivity.

<b>Env. Area</b>	<b>Description</b>	<b>Reason for Considering This Location</b>
ENV04 Hintlesham Woods (West) to Wolves Wood	Area identified for biodiversity and landscape and visual purposes, situated to the northwest of Ramsey Wood and extending up towards Wolves Wood.	The area is adjacent to the SSSI, ancient woodland and RSPB reserve. Mitigation planting may be beneficial to help filter and screen views of the project. In addition, enhancement planting/natural regeneration would help extend the existing habitats and enhance the habitat connectivity in the landscape. This also supports an aspiration from RSPB to reconnect habitats in Hintlesham Woods and Wolves Wood.
ENV05 Hintlesham Woods (South)	Area identified for biodiversity and landscape and visual purposes, situated to the southwest of Ramsey Wood.	Mitigation planting/hedgerow strengthening may be beneficial to help filter and screen views, especially where the overhead lines converge. In addition, enhancement planting/ natural regeneration could provide an opportunity to strengthen field boundaries, extend existing habitats, enhance habitat connectivity and enhance the experience of users of PRow.
ENV06 Townhouse Fruit Farm	Area identified for biodiversity and recreation purposes near Hadleigh Railway Walk.	There is also an opportunity to enhance existing habitats at this location and to enhance PRow connections with Hadleigh Railway Walk.
<b>Section C Brett Valley</b>		
ENV07 Brett Valley	Area identified for biodiversity and landscape and visual purposes at the River Brett.	Grassland regeneration of the watercourse and wetland habitats.
<b>Section D Polstead</b>		
ENV08 Dedham Vale East	Area identified for biodiversity and landscape and visual purposes at the CSE compound.	Land would be used for landscape planting to soften the effects of the Dedham Vale East CSE compound and to mitigate habitat loss.
<b>Section E Dedham Vale AONB</b>		
ENV09 River Box	Area identified for biodiversity and landscape and visual purposes at the River Box.	Enhancement planting would provide an opportunity to improve habitat connectivity with existing habitats between Broom Hill and Bushy Park Wood, both identified as ancient woodland. There is also an opportunity to enhance habitats along the River Box.
<b>Section F Leavenheath/Assington</b>		
ENV10 Dedham Vale West	Area identified for biodiversity and landscape and visual purposes at the CSE compound.	Land would be used for landscape planting to soften the effects of the Dedham Vale West CSE compound and to mitigate habitat loss.

<b>Env. Area</b>	<b>Description</b>	<b>Reason for Considering This Location</b>
		Enhancement planting would provide an opportunity to improve habitat connectivity between two disjointed parts of Millfield Wood, identified as ancient woodland.
ENV11 The Painters Trail.	Length of the Painter's Trail identified for both landscape and visual and historic environment purposes.	The Painter's Trail is a 69 mile (111km) long cycle trail across the region, linking sites with associations with famous artists. There is an opportunity to plant strategically positioned trees/hedgerows to soften and filter views of the project from the trail where this lies within or adjacent to the draft Order Limits.
<b>Section G Stour Valley</b>		
ENV12 Stour Valley East	Area identified for biodiversity and landscape and visual purposes at the CSE compound.	Land would be used for landscape planting to soften the effects of the Stour Valley East CSE compound and to mitigate habitat loss.
ENV13 Stour Valley West	Area identified for biodiversity and landscape and visual purposes at the CSE compound.	Land would be used for landscape planting to soften the effects of the Stour Valley West CSE compound and to mitigate habitat loss. In addition, enhancement planting could provide an opportunity to improve habitat connectivity between Pebmarsh House County Wildlife Site (CWS) and south of Alphamstone Complex CWS.
<b>Section H GSP Substation</b>		
ENV14 GSP Substation	Area identified for biodiversity and landscape and visual purposes at the GSP substation site.	The GSP substation is situated between Butler's Wood and Waldegrave Wood, both of which are ancient woodland and Essex CWS. Enhancement planting could provide an opportunity to reconnect the two woodlands, as well as providing landscape and visual screening to the PRoW to the west of the GSP substation.

## 6. Current Proposals and Next Steps

### 6.1 Introduction

6.1.1 National Grid has published this report to support the statutory consultation in 2022. The consultation is designed to provide an update to existing and new consultees about the project and to provide an opportunity to feedback on the emerging proposals. This report includes a summary of the project development and options appraisal process to date, including an assessment of the changes that have occurred as a result of feedback from the non-statutory consultation held in spring 2021.

6.1.2 National Grid has worked closely with stakeholders to understand the feedback provided and has updated the project reflecting these comments. This process has ensured that National Grid has a robust understanding of the project and has confidence in its ongoing validity and appropriateness for progressing further. The updated project design is presented within the statutory consultation materials.

6.1.3 National Grid considers that the current project proposals, with an overhead line and two sections of underground cable (in the Dedham Vale AONB and the Stour Valley), strikes the right balance between all of its statutory duties.

### 6.2 Current Proposals

6.2.1 The emerging proposals are set out in the General Arrangement Plans provided as part of the statutory consultation. These show the Draft Alignment and draft Order Limits, which have been developed as a result of ongoing engineering design, landowner discussions and environmental assessment work.

6.2.2 The project comprises approximately 19km of overhead line (consisting of approximately 55 new pylons and conductors in between) and 10km of underground cable system (consisting of 20 cables with associated joint bays and above ground link pillars). Four CSE Compounds would be required to facilitate the transition between the overhead and underground cable technology. The CSE compounds would be fenced and contain electrical equipment, support structures, a small control building and a permanent access track.

6.2.3 It is proposed that approximately 27.5km of existing overhead line and associated pylons would be removed as part of the proposals (25km of existing 132kV overhead line between Burstall Bridge and Twinstead Tee, and 2.5km of the existing 400kV overhead line to the south of Twinstead Tee). To facilitate overhead line removal, a new GSP substation is required at Butler's Wood, east of Wickham St Paul, in Essex. The GSP substation would include accompanying works, including replacement pylons and underground cables to tie the substation into the existing 400kV and 132kV networks and a single circuit cable CSE compound.

6.2.4 Other ancillary activities would be required to facilitate construction and operation of the project, including (but not limited to):

- modifications to, and realignment of sections of the existing 400kV overhead line;

- temporary land to facilitate construction activities including working areas for construction equipment and machinery, site offices, welfare, storage and access;
- temporary infrastructure to facilitate construction activities such as amendments to the highway including bellmouths for site access, pylons and overhead line diversions, scaffolding to safeguard existing crossings, watercourse crossings and diversions of PRoW;
- diversion of third-party assets and land drainage from the construction and operational footprint; and
- land required for mitigation, compensation and enhancement of the environment as a result of the environmental assessment process, and National Grid's commitments to Biodiversity Net Gain.

## 6.3 Next Steps

- 6.3.1 Feedback received during the statutory consultation will be considered by National Grid when developing the final proposals for the application for development consent. National Grid is also seeking specific feedback on two options at Hintlesham Woods as part of the statutory consultation (as set out in Section 5.6). This feedback will be used, along with further engineering and environmental assessment, to identify the preferred option which will be presented within the application for development consent.
- 6.3.2 National Grid is proposing to submit the application for development consent in winter 2022/2023. This will include the ES, which will set out the likely significant effects of the project. The application will be submitted to the Planning Inspectorate, requesting consent for the reinforcement and associated development and seeking the necessary powers and provisions, including powers of compulsory purchase of land and rights, as necessary.

# References

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- National Grid (2009a) Horlock Rules: National Grid Company substations and the environment – guidelines on siting and design.
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