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Bramford to Twinstead Reinforcement

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1. Introduction

1.1 Overview

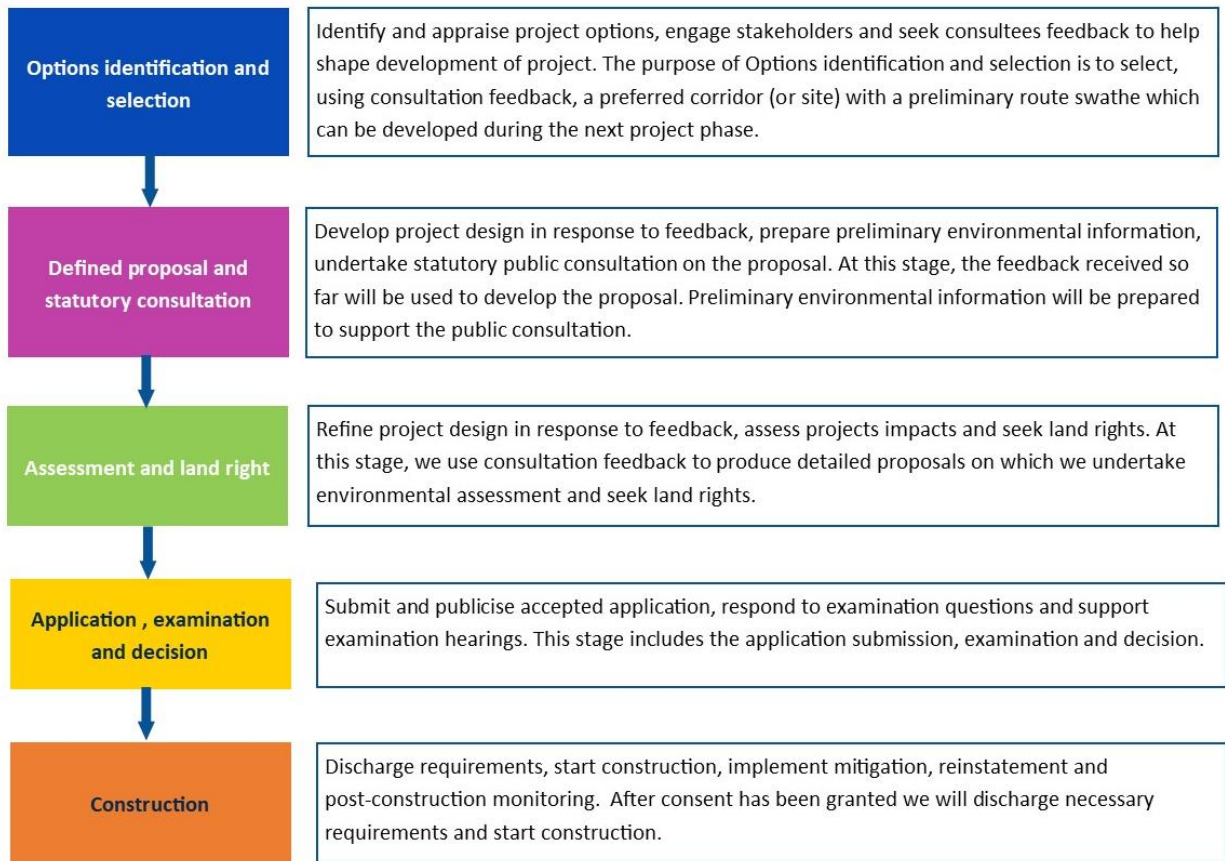
- 1.1.1 This document accompanies National Grid Electricity Transmission plc's (here on referred to as National Grid) application for development consent to reinforce the transmission network between Bramford Substation in Suffolk, and Twinstead Tee in Essex. The Bramford to Twinstead Reinforcement ('the project') would be achieved by the construction and operation of a new electricity transmission line over a distance of approximately 29km comprising of overhead lines, underground cables and a grid supply point (GSP) substation. It also includes the removal of 25km of the existing distribution network and various ancillary works. A full description of the project can be found at Environmental Statement (ES) Chapter 4: Project Description (**application document 6.4.2**).
- 1.1.2 The design of the project is the result of an iterative process that commenced when the need for the reinforcement was originally identified in 2009. Environmental, engineering, and economic considerations as well as numerous rounds of consultation and the consideration of national and local policy, have all influenced the optioneering and design evolution process. The network itself has not changed during the period since 2009.
- 1.1.3 The purpose of this document is to set out when key design decisions have been made, and the options appraisal and subsequent process of ongoing back check and review that those decisions were based on. This demonstrates, in a narrative sense, how the project has evolved from its initial inception in 2009. It acts as a signposting document that identifies how various other submission documents feed into the consideration of key decisions. This document does not go into any detail as to the reasoning behind key decisions, other than their substantive outcome.
- 1.1.4 This document should be read alongside ES Chapter 3: Alternatives Considered (**application document 6.2.3**), which documents the main alternatives considered by National Grid and the main environmental effects and considerations associated with these. This document does not seek to duplicate the assessments presented in the ES Chapter 3: Alternatives Considered (**application document 6.2.3**) but instead seeks to summarise the optioneering and design evolution process undertaken in relation to the project.
- 1.1.5 How consultation has shaped the project is set out in the Consultation Report (**application document 5.1**). Chapter 5 of the Planning Statement (**application document 7.1**) highlights how planning policy and material planning considerations have influenced the design and siting of the project.

1.2 Published Guidance

- 1.2.1 There are often several different ways that a project could be developed, perhaps involving different locations, technologies, or designs. 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.

1.2.2 National Grid’s latest published guidance on its options appraisal process is ‘Our approach to consenting (2022)’ (National Grid, 2022), which sets out a process for developing projects. While the project has been developed in accordance with various earlier iterations of this guidance, the key principles and milestones remain broadly consistent. National Grid’s current published approach to the design and routing of new electricity lines is as follows:

Figure 1.1: Project Development Staged Process (National Grid, 2022)



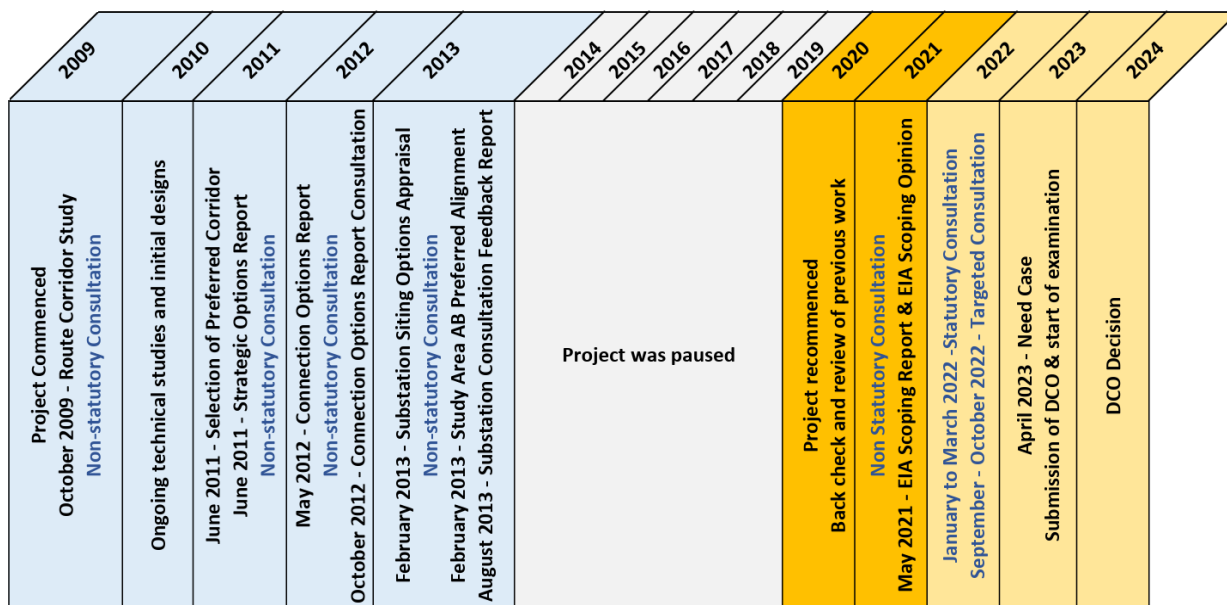
1.2.3 The guidance has been written to assist with the understanding of the process through which National Grid progress new transmission projects, in compliance with the requirements of the Electricity Act, national planning policy and the principles of the Holford and Horlock Rules.

1.2.4 How the project meets national planning policy, the legislative provisions of the Electricity Act and the principles of the Holford and Horlock Rules is set out in detail in Chapter 5 of the Planning Statement (**application document 7.1**).

2. Project History

- 2.1.1 Work on the project first commenced in 2009. The project was progressed through various stages of options appraisal between 2009 and 2013. A project design was iteratively developed during this period. Several public consultations were held, which are documented in more detail in the Consultation Report (**application document 5.1**), alongside ongoing stakeholder engagement, to further shape the emerging proposals.
- 2.1.2 Changes to when the planned new generation would come online in East Anglia meant that work was paused at the end of 2013. By 2020, network studies showed that the reinforcement was needed before the end of the decade, and accordingly the project was re-launched.
- 2.1.3 Prior to the project re-launch in 2020, the work undertaken between 2009 and 2013 was reviewed to consider whether it remained relevant and suitable for taking forward. This process considered all elements of the project and concluded that the assumptions remained broadly valid.
- 2.1.4 The iterative process of project design that has moved the project on since it was re-launched has been based on the options appraisal, and ongoing back checking of earlier conclusions.
- 2.1.5 Furthermore, these processes have resulted in a suite of design changes to the project. Where changes have not been made, these processes have re-affirmed design decisions based on robust and up-to-date justification.

Figure 2.1: Project Timeline



- 2.1.6 The following sections of this document present the key project stages and the chronology of the decision making. This is in order to demonstrate how the project has evolved and how the process of ongoing back check and review has been applied, to ensure that all assumptions on which the project is based are up-to-date and robust.

3. Need Case

- 3.1.1 The project need case was first identified prior to the first iteration of the project being launched in 2009.
- 3.1.2 The need case at that time was based on the amount of generation capacity that was scheduled to connect into East Anglia, and the timing of that contracted generation. The transmission network did not have the capacity to accommodate all of the anticipated connections in accordance with the required standards. Accordingly, additional transmission capacity was required.
- 3.1.3 Changes to the needs case, primarily delays to the delivery and connection of anticipated generation, led to the project being paused in 2013.
- 3.1.4 The re-launch of the project in 2020 was triggered by further changes to the project need case, primarily driven by the anticipated rapid growth of interconnection and generation connecting to the network in East Anglia, and the limited capacity of the transmission network to accommodate it. The project was progressed on the basis of this needs position, although the needs case was kept under review (including of anticipated customer connections, potential wider network reinforcements, and other factors).
- 3.1.5 The up-to-date 2023 drivers for the project are presented in the Need Case (April 2023) (**application document 7.2.1**). This document concludes that whilst the transmission system in East Anglia has been sufficient until today, it will soon exceed its current capability. This includes its thermal boundary capability (the physical capacity of the circuits to carry power) and transient stability (the ability to accommodate faults without damaging generators or the network).
- 3.1.6 Increased transmission capability is therefore required in the East Anglia region, to allow National Grid to maintain a robust network, remain in accordance with its licence obligations, and to allow new sources of electricity generation to connect. This is vital to facilitate the ambitious targets set by the Government, for secure, clean and affordable energy for the long term.

4. Strategic Options

- 4.1.1 This stage aligns with the 'strategic proposal' of the National Grid options appraisal process, summarised at Figure 1.1
- 4.1.2 The strategic options were first considered when the project was first launched in 2009. At this time, 18 potential options for addressing the identified need case were considered. Two options were identified for further consideration. These both comprised 400kV overhead line reinforcements between Bramford and Twinstead, with one option adopting the existing 132kV distribution network operator (DNO) route alignment.
- 4.1.3 The conclusions of this work were subsequently reviewed and discussed with stakeholders in 2011. The Strategic Options Report (June 2011) (**application document 7.2.2**) considers a short list of four options drawn from a long list of 18 strategic options identified by the 2009 work. The four options include various sub-options reflecting the potential use of alternative technologies. The outcome of this review was that a 400kV overhead reinforcement between Bramford and Twinstead remained the most appropriate strategic option.
- 4.1.4 Prior to the re-launch of the project in 2020, a new strategic optioneering exercise was carried out from first principles. This was to ensure that the outcomes took due consideration of the changes in the generation background that had occurred since 2013 and reflected up-to-date project development principles. The outcome was that a predominantly overhead line 400kV reinforcement between Bramford and Twinstead remained the preferred strategic proposal.
- 4.1.5 A new 400kV predominantly overhead transmission line between Bramford and Twinstead best achieves the balance between National Grid's technical, economic and environmental obligations. This is taking account of National Grid's statutory obligations, its licence requirements, and all other relevant considerations.

4.2 Route Corridors

- 4.2.1 This stage aligns with the 'options identification and selection' stage of the National Grid options appraisal process, summarised at Figure 1.1.
- 4.2.2 The route corridors were first considered prior to the first iteration of the project being launched in 2009, based on the needs case and strategic optioneering work also undertaken at that time.
- 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. Of these four, one corridor was identified as the preferred option. This corridor, referred to as Corridor 2, uses the route of the existing distribution network 132kV overhead line which runs broadly parallel to the existing 400kV overhead line between Bramford and Twinstead. This corridor included two options for routing through the Hintlesham area near Bramford, referred to as Corridor 2A (south from Bramford substation towards Burstall, then west using the route of the existing 132kV overhead line to the south of Hintlesham) and Corridor 2B (west out of Bramford substation to the north of Hintlesham, paralleling the existing 400kV overhead line to a greater extent).

- 4.2.4 The original assessment work considering the four potential corridor options is set out in the Route Corridor Study (October 2009) (**application document 7.2.3**). The selection of Corridor 2 was subsequently reviewed and confirmed in 2011, in the context of the Strategic Options Report (June 2011) (**application document 7.2.2**).
- 4.2.5 Prior to the re-launch of the project in 2020, the baseline environment, planning policy, and National Grid's guidance which could affect the choice of Corridor 2 were reconsidered. This process concluded that previous appraisal work remained robust and that no changes had occurred since 2013 to suggest that the corridor choice needed to change.
- 4.2.6 Corridor 2 is the preferred route corridor as it would result in the least scale of change to the existing environment (amongst other considerations) and is the most direct route of the corridors considered. Corridor 2 would involve the removal of a section of the existing 132kV overhead line, which was seen as a benefit in terms of landscape and visual impact.
- 4.2.7 The environmental rationale for the choice of Corridor 2 is set out in ES Chapter 3: Main Alternatives Considered (**application document 6.2**), and the planning policy drivers for the corridor decisions are set out in the Planning Statement (**application document 7.1**).

4.3 Routeing and Siting

- 4.3.1 This section presents the evolution of the routeing and siting of the project, beginning with initial iterations before moving on to consider certain key project elements in turn. This section moves through both the 'defined proposal and statutory consultation' and 'assessment and land rights' stages of the National Grid options appraisal process, summarised at Figure 1.1.
- 4.3.2 The first iteration of the routeing and siting was considered and consulted on publicly in May 2012. This was based on an assessment of both indicative overhead and underground alignments in study areas identified based on landscape characteristics (referred to as 'Section A' in the east at Bramford, running westwards to 'Section G' in the west at Twinstead, with Sections A and B being combined due to similarities). Overhead alignments on both the north and the south of the existing 400kV overhead line were considered.
- 4.3.3 This work proposed a part-overhead, part-underground indicative alignment running to the south of and largely parallel to the existing 400kV overhead line. It included undergrounding in two sections, in the Dedham Vale Area of Outstanding Natural Beauty (AONB) and part of the Stour Valley, along with indicative cable sealing end (CSE) locations.
- 4.3.4 The 2012 work proposed an interim alignment within Corridor 2B based on this being the least constrained. This was on the basis of a specific alignment within Corridor 2B that was identified following assessment work in the vicinity of Hintlesham Woods SSSI.
- 4.3.5 The work undertaken at this time, including the discrete assessment that informed the alignment past Hintlesham Woods SSSI, is set out in the Connection Options Report (COR) (2012) (**application document 7.2.4**).
- 4.3.6 Prior to the re-launch of the project in 2020, the baseline environment, planning policy, and National Grid's guidance, which may affect the indicative route alignment or the

extent of undergrounding, was reconsidered. This concluded that previous appraisal work remained generally robust.

- 4.3.7 The following sections specifically address those key elements of the routeing and siting design on which initial decisions were made prior to project pause in 2013. This is to demonstrate how and when key design decisions were made and, where necessary, back checked and reviewed throughout the development of the project.
- 4.3.8 More detailed elements of the design, for example smaller refinements to the alignment, the location of temporary construction accesses and laydowns, environmental mitigation and gain areas, and the details of the Order Limits and Limits of Deviation (LoD) are not addressed here. These were all developed, iteratively and based on options appraisal, from first principles after the project re-launched in 2020.

Section AB

- 4.3.9 Corridor 2 included two alternative alignment options to the east of the route in Section AB, referred to as 2A and 2B. Corridor 2A is longer, less direct, and would not benefit from the paralleling of the existing 400kV overhead line. Corridor 2B would require a new line in the vicinity of Hintlesham Woods SSSI.

Hintlesham Woods Alignment

- 4.3.10 In order to inform the consideration of these corridor options, an assessment was undertaken as part of the 2012 work to consider the least environmentally constrained alignment in the vicinity of Hintlesham Woods SSSI in Corridor 2B. The initial appraisal considered six options, comprising routes through and around the woodlands. The original assessment is appended to the Connection Options Report (May 2012) (**application document 7.2.4**) and summarised in Table 3.4 of ES Chapter 3: Main Alternatives Considered (**application document 6.2**), including the key environmental factors considered within the appraisal.
- 4.3.11 The north of Ramsey Wood option (referred to as OP2-NL in the 2012 assessment) was identified as the least environmentally constrained overhead line route in Corridor 2B due to it avoiding direct and significant impacts on Hintlesham Woods SSSI. Based on this alignment, Corridor 2B was taken forward. This was reaffirmed following further consideration in 2013 of the setting of Hintlesham Hall and remained the preferred alignment following the back check and review work in 2020.
- 4.3.12 During the 2021 non-statutory consultation concerns were raised regarding the alignment to the north of Ramsey Wood with preferences expressed for a parallel alignment to the existing 400kV overhead line through Hintlesham Woods.
- 4.3.13 Accordingly, a review was undertaken of seven options, comprising routes through and around the woodland, including the options that had been discounted in the initial 2012 appraisal. This was based on an up-to-date understanding of the technical engineering requirements, construction methodology and programme. This review resulted in two primary alternatives, Option 1 (formerly OP2-NL, comprising new overhead line passing around the north and west of the woods, the original option) and Option 2 (formerly OP1-SL, comprising a new overhead line passing through the woods).
- 4.3.14 Both options were taken forward to the 2022 statutory consultation to gather feedback. Option 1 was considered the least environmentally constrained option.

- 4.3.15 Overall, National Grid decided to not take forward Hintlesham Woods Option 2 in the application for development consent. The decision to remove Option 2 was based on several factors including the avoidance of direct and significant effects on the ancient woodland (irreplaceable habitat) and on the conservation objectives of the SSSI (national designation). This was in addition to consultation feedback, engagement with stakeholders and landowners, the findings of environmental surveys, planning policy considerations and further design and engineering studies.
- 4.3.16 The environmental rationale for these decisions is also set out in ES Chapter 3: Main Alternatives Considered (**application document 6.2**) and the planning policy drivers for the decisions are set out in the Planning Statement (**application document 7.1**).

Corridor 2A and 2B

- 4.3.17 The preference for an alignment through Corridor 2B over Corridor 2A was identified following the original work prior to the project pause in 2013. This decision was subsequently reviewed following the re-launch in 2020.
- 4.3.18 This considered the review of alignments in the vicinity of Hintlesham Woods SSSI (summarised above), alongside the outcome of ongoing assessment and design work (including that relating to ecology at Hintlesham Woods and the setting of the Grade I Hintlesham Hall). It also took account of updates to environmental policy since 2013, including the increased weight given to ancient woodland in planning policy and updated guidance on the appraisal of the setting of listed buildings, and discussions with stakeholders.
- 4.3.19 It was considered that an alignment in Corridor 2B remained the preferred choice. This is because an alignment in Corridor 2A would involve constructing approximately 2km of new 400kV overhead line in an area where there is currently no existing line (between Bramford substation and Burstall). It would also be longer than an alignment in Corridor 2B, and in passing close to the village of Hintlesham it would affect more visual receptors. There are also technical constraints in this corridor associated with an existing 132kV underground cable.
- 4.3.20 An alignment in Corridor 2B would also allow a greater degree of paralleling with the existing 400kV overhead line and is the more direct alignment. There would be no direct significant effects on the interest features of Hintlesham Woods SSSI, and no significant effects on the Grade I Hintlesham Hall.
- 4.3.21 The environmental rationale for the choice of Corridor 2A/2B is set out in ES Chapter 3: Alternatives Considered (**application document 6.2.3**), and the planning policy drivers are set out in the Planning Statement (**application document 7.1**).

Cable Sealing End Compounds and Undergrounding

- 4.3.22 The 2012 work, presented in the Connection Options Report (May 2012) (**application document 7.2.4**) concluded that there was a case for undergrounding in the Dedham Vale AONB and part of the Stour Valley. Initial locations were identified for CSE compounds. Further work was subsequently undertaken which proposed an alternative location for the Stour Valley West CSE.

Cable Sealing End Compounds

- 4.3.23 Following the recommencement of the project in 2020, the locations of the four CSE compounds was kept under review and further options appraisal on alternative locations undertaken. This provided up-to-date reappraisal of previous assumptions, and changes were introduced where appropriate including to the location of the Dedham Vale East CSE compound (moved further away from the AONB) and the Stour Valley West CSE (moved to an alternative location to the south of Henny Back Road).
- 4.3.24 The assessment of each of the four CSE compound locations considers the relevant factors in each case. Largely, the locations of the four CSE compounds have been selected, in part, to take advantage of the existing landform and existing landscape features to help screen them, but to also avoid as far as possible, significant impacts to environmental receptors such as the AONB and designated heritage assets.
- 4.3.25 The environmental rationale for the locations chosen for the CSE compounds is set out in ES Chapter 3: Alternatives Considered (**application document 6.2**) and the policy drivers in Chapter 5 of the Planning Statement (**application document 7.1**).

Extent and Route of Undergrounding

- 4.3.26 Following the recommencement of the project in 2020, the extent and route of undergrounding was kept under review.
- 4.3.27 Overall, as the project would pass through Dedham Vale AONB, undergrounding was considered appropriate in the AONB in accordance with planning policy. It was also considered that undergrounding was appropriate in parts of the Stour Valley, because of the particular qualities of the landscape and its cultural associations.
- 4.3.28 The options considered are also summarised in Table 3.9 of ES Chapter 3: Main Alternatives Considered (**application document 6.2**) alongside the key environmental factors that were considered in the appraisal of these options.

Grid Supply Point Substation

- 4.3.29 When Corridor 2 was selected, it was understood that additional works would be required to the 132kV distribution network to make the route available to National Grid, and that this would likely comprise a GSP substation to the west of Twinstead. This assumption, and the requirement to assess this further, was reflected in the Connection Options Report (May 2012) (**application document 7.2.4**).
- 4.3.30 Eight options for maintaining the security of local electricity supplies were considered in 2012 by UKPN (the owner and operator of the 132kV distribution network) and National Grid. This concluded that developing a GSP substation (originally anticipated to comprise a single super grid transformer) in the vicinity of Twinstead Tee was the preferred option.
- 4.3.31 The outcome of this exercise was presented publicly and consulted on in 2013, alongside work considering potential alternative locations for the GSP. This is set out in the Substation Siting Study (February 2013) (**application document 7.2.5**). This considered three potential sites, from an initial shortlist of eight, and concluded that a location between Butlers Wood and Waldegrave Wood (referred to as location C2) was preferred, whilst benefitting from advantageous existing vegetation screening and having good connection opportunities to the existing 400kV and 132kV networks.

- 4.3.32 Following the project re-launch in 2020, further dialogue with UKPN confirmed the technical requirement for two super grid transformers (and a consequently larger footprint for the GSP substation). The preferred site between Butlers Wood and Waldegrave Wood was reconsidered in this context, and it was confirmed that the preferred site had the capacity to accommodate two super grid transformers and remained suitable.
- 4.3.33 A summary of the GSP options and the key environmental factors that were considered in the appraisal is presented in Table 3.7 of ES Chapter 3: Main Alternatives Considered (**application document 6.2**).
- 4.3.34 National Grid obtained planning permission from Braintree District Council for the GSP substation under the Town and Country Planning Act (TCPA) in October 2022 (Application Reference: 22/01147/FUL) in advance of the application for development consent. However, as a consenting fall-back position, the GSP substation is also included in the application for development consent.

5. Conclusion

- 5.1.1 The Proposed Alignment and its LoD is to be progressed through the ‘application, examination and decision’ project stages, and ultimately through to construction.
- 5.1.2 The Proposed Alignment is described in ES Chapter 4: Project Description (**application document 6.2.4**), which describes the design submitted within the application and is the result of a robust and iterative options appraisal, which has responded to stakeholder feedback and the physical context and constraints of the project. Project decisions have been subject to ongoing back check and review.
- 5.1.3 The project delivers the project need in a way that conforms with planning policy and delivers on National Grid’s duties to develop and maintain an efficient, co-ordinated and economical system of electricity transmission, whilst doing what it can to mitigate the effects which the project would have on the environment.
- 5.1.4 National Grid will now follow the process set out for applications under the Planning Act 2008 in respect to the examination of the project for the remaining stages of the project development and delivery.

6. References

National Grid (2022) *Our Approach to Consenting*. April 2022. (National Grid, 2022)

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