The Great Grid Upgrade

North Humber to High Marnham

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Appendix A Good Design Issues to Consider

Executive summary

This Design Approach Document (DAD) accompanies the Development Consent Order (DCO) application for the North Humber to High Marnham Project (the Project). It explains the overarching design approach, key principles that have guided the development of the Project, and how the design has evolved through a structured, iterative and transparent process in response to technical requirements, environmental and socio-economic considerations, and stakeholder engagement.

The Project comprises a new 400 kilovolt (kV) overhead line and associated infrastructure, together with temporary construction works. The Project forms part of the reinforcement of the national electricity transmission network and is required to support future electricity demand and the connection of new, low-carbon electricity generation. The proposed substations at either end of the route are not forming part of the DCO application and are subject to separate consents.

The Project has been developed in accordance with statutory duties under the Electricity Act 1989, including the requirement to develop and maintain and efficient, coordinated and economical system of electricity transmission, while having regard to the desirability of perservring natural beauty, conserving biodiversity, and protecting cultural heritage and amenity. In line with this, the design process has sought to balance the need for a safe, secure and reliable network with environmental protection, socio-economic considerations and cost efficiency.

The approach to routeing and siting has followed a structured options identification and selection process, consistent with National Grids Approach to Consenting. This has included the consideration and appraisal of reasonable alternatives, informed by environmental, technical, socio-economic and cost factors, and guided by established routeing principles, including the Holford Rules. This process culminated in the identification of a preferred alignment which seeks, where practicable, to minimise environmental and community effects, including through the use of close parallel routeing with existing overhead lines where this represents the most appropriate balance of considerations.

The design has evolved through ongoing engagement and consultation, including both non-statutory and statutory stages. Feedback from local communities, landowners, statutory consultees and other stakeholders has been carefully considered alongside environmental assessments and engineering studies to inform refinements to routeing, siting, access arrangements and construction methodology.

The DCO secures the key design parameters and Limits of Deviation required to deliver the Project, while allowing appropriate flexibility for detailed design to respond to site-specific conditions, ongoing technical engagement, and the implementation of environmental mitigation.

Overall, this DAD demonstrates that the Project has been developed through a proportionate, transparent and evidence-based process. The resulting design represents a balanced solution that seeks to meet the identified need for network reinforcement in a manner that is technically feasible, economically efficient, and has regard to environmental protection and the interests of communities and stakeholders.

1. Introduction

1.1 Overview

1.1.1 National Grid Electricity Transmission plc (National Grid) owns and maintains the national high voltage electricity transmission network throughout England and Wales.

1.1.2 The transmission network connects the power from where it is generated to the regional distribution network operators who then supply businesses and homes.

1.1.3 National Grid holds the Transmission Licence for England and Wales, and its statutory duty is to develop and maintain an efficient, coordinated and economical system of electricity transmission and to facilitate competition in the generation and supply of electricity, as set out in the Electricity Act 1989 (HM Government, 1989).

1.1.4 National Grid has developed plans for the North Humber to High Marnham Project (the Project). The Project would support the UK government's net zero target through the connection of new low carbon energy generation and by reinforcing the transmission network.

1.1.5 The Project would establish a new 400 kV transmission connection approximately 90 kilometres (km) in length between a new substation to be built in the vicinity of Birkhill Wood, located to the north of Hull near Creyke Beck in the East Riding of Yorkshire, and a new substation at High Marnham in Nottinghamshire.

1.1.6 The reinforcement is needed because the existing transmission network, even with current upgrading, will not have sufficient capacity for the new renewable energy (a substantial proportion of which would be generated by offshore wind) that is expected to connect to the network over the next 10 years and beyond. Completion of the Project, together with other new reinforcements across the country, will meet this future energy transmission demand across the UK.

1.1.7 The Project is a Nationally Significant Infrastructure Project (NSIP), and National Grid is seeking development consent under the Planning Act 2008 (HM Government, 2008). NSIPs require a type of planning permission known as a Development Consent Order (DCO). Instead of applying to the local authority for planning permission, the developer must apply to the Secretary of State via the Planning Inspectorate for a DCO.

1.1.8 The Project is EIA development for the purposes of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations), which means that the process of environmental impact assessment (EIA) must be undertaken. To inform that process, the application for development consent is accompanied by an environmental statement that provides information on likely significant environmental effects of the Project.

1.1.9 National Grid has submitted an application for development consent to the Planning Inspectorate for the Project. The Examining Authority (consisting of one or more examining inspectors), after a period of public examination, will make its recommendation to the Secretary of State for Energy Security and Net Zero, who in turn will decide on whether development consent should be granted.

1.1.10 The Project has been identified as being critical to delivering a network which supports the clean power pathways for 2030 delivery.

1.2 Purpose of this Document

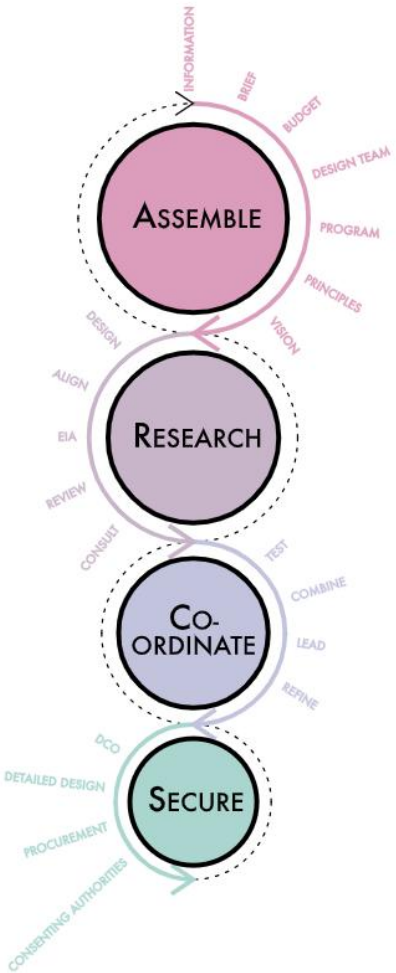
1.2.1 This DAD has been prepared by National Grid to support the DCO application for the Project.

1.2.2 This DAD sets out the vision and principles which have guided the design approach for the Project. It explains how the Project has evolved through each stage of the design process and how it has responded to environmental constraints and opportunities, as well as consultation feedback.

1.2.3 The development of a DAD is a mandatory requirement for projects that are following the enhanced service tier of the Planning Inspectorate's pre-application service. Whilst the Project is following the standard tier service offered by the Planning Inspectorate, National Grid considers that a DAD is a clear means of demonstrating how the design has developed and how design-related policy requirements established in the relevant National Policy Statements (NPSs) have been met.

1.2.4 The Planning Inspectorate's Nationally Significant Infrastructure Projects: Advice on Good Design (Planning Inspectorate, 2024) advises that the elements shown in Image 1.1 should form part of the overall design process.

Image 1.1 – Design process (Planning Inspectorate, 2024)



1.2.5 This document will demonstrate how the above process has been adapted and applied by National Grid on this Project to drive the principles of good design.

1.3 The Need for the Project

1.3.1 With growing renewables integration into the National Electricity Transmission System, such as offshore wind and interconnectors[1], an anticipated tripling of wind generation connected across the Scottish networks by 2030, and the government's increased ambition to connect 50 GW of offshore wind by 2030, north–south power flows are set to increase.

1.3.2 The existing electricity transmission network in the Yorkshire and Humber region was initially developed in the 1960s and has historically been able to meet demand. It was designed to connect the large, inland coal-fired power stations in the region with changes occurring in the later parts of the century, in order to connect gas-fired power stations and offshore wind.

1.3.3 However, due to the changes noted above in terms of delivering net-zero emissions, the existing network in this area does not have the capability to reliably and securely transport all the energy that will be connected by 2030, whilst operating to the standards it is required to.

1.3.4 The existing transmission infrastructure in this area requires reinforcement for the following main reasons:

- The existing transmission network was not designed to transport electricity from where it is increasingly being generated (largely offshore).
- The growth in offshore wind, interconnectors and onshore generation, such as battery and solar means that more electricity will be generated in the years ahead than the current network is able to securely and reliably transport.
- In the UK, electricity demand is forecasted to at least double by 2050, increasing the amount of energy we need to transport to homes and businesses.
- Upgrading the existing network as it is today (such as through replacing cables to carry more power) will not be enough to carry the amount of future power whilst operating to required standards.
- The need to increase boundary transfer capability in order to reduce wider network generator constraint costs.

1.3.5 The Project would support the UK's net-zero target by reinforcing the electricity transmission network between the North of England and the Midlands, and facilitate the connection of planned renewable energy projects, such as offshore wind generation and interconnectors, and increase boundary transfer capability. The Project would help meet future energy requirements.

1.3.6 For further information, please refer to the 'Needs Case' section contained within **Application Document 7.17 Strategic Options Report Including Needs Case**.

[1] Interconnectors are high voltage cables that are often used to connect the electricity systems of neighbouring countries.

1.4 Overview of the Project

1.4.1 The Project is a new 400 kV electricity transmission connection of approximately 90 km in overall length between two proposed new substations: the 400 kV Birkhill Wood Substation and 400 kV High Marnham Substation.

1.4.2 The proposed new substations are subject to separate planning applications. For more information, see **Application Document 5.4 Consents and Licences Required Under Other Legislation**.

1.4.3 The Project comprises:

- Approximately 90 km of new overhead line (Route Code 4AF) between the proposed new 400 kV Birkhill Wood Substation and 400 kV High Marnham Substation;
- Replacement and re-alignment of a section of the existing 400 kV overhead line (Route Code 4ZQ) between Brantingham and east of Broomfleet;
- Replacement and re-alignment of a section of the existing 400 kV overhead line (Route Code ZDA) between Ealand and west of Keadby;
- Line entry connections to a proposed new 400 kV Birkhill Wood Substation;
- Line entry connections to a proposed new 400 kV High Marnham Substation; and
- The Project would include other required works, for example, temporary diversions for works on existing overhead line routes, temporary access roads, highway works, temporary works compounds, work sites and ancillary works. The Project would also include utility diversions and drainage works. There would also be land required for environmental mitigation, offsetting, compensation and Biodiversity Net Gain (BNG).

1.4.4 A full description of the Project is provided in **Application Document 6.4 Environmental Statement Chapter 4 Description of the Project**.

1.5 Substations Update

1.5.1 Following statutory consultation on the Project in 2025, a decision was taken to remove both the proposed 400 kV Birkhill Wood Substation and 400 kV High Marnham Substation and associated works from the Project.

1.5.2 Separate planning applications for the 400 kV Birkhill Wood Substation (25/01898/STPLF), and 400 kV High Marnham Substation (25/01302/FUL) were submitted by National Grid in July and November 2025 to the local planning authorities of East Riding of Yorkshire Council and Bassetlaw District Council, respectively. The planning applications have subsequently been approved in 2026. Alongside these planning applications, National Grid published a Compulsory Purchase Order (CPO) for acquisition of the land, to enable the delivery of each of the substations. Negotiations with landowners to acquire by agreement are still ongoing, and the CPO is forecast to be confirmed in late 2026.

1.5.3 A full description of the design evolution of the Project is provided in **Application Document 5.9 Design Development Report**.

1.6 Geographic Context of the Project

1.6.1 The Project connects the proposed 400 kV Birkhill Wood Substation in the East Riding of Yorkshire (adjacent to the existing Creyke Beck Substation) with the proposed 400 kV High Marnham Substation in Bassetlaw, Nottinghamshire.

1.6.2 The location of the Project is defined by the geographic position of the new substations within the existing transmission network. As a result, the proposed overhead line extends across a wide area and passes through a range of geographic, landscape and settlement contexts – see Image 1.2 and Image 1.3.

Image 1.2 – Emerging preferred corridor and graduated swathe presented at the Non-Statutory Consultation 2023 (Source: Figure 3.1 – Application Document 7.20 Design Development Report - 2025)

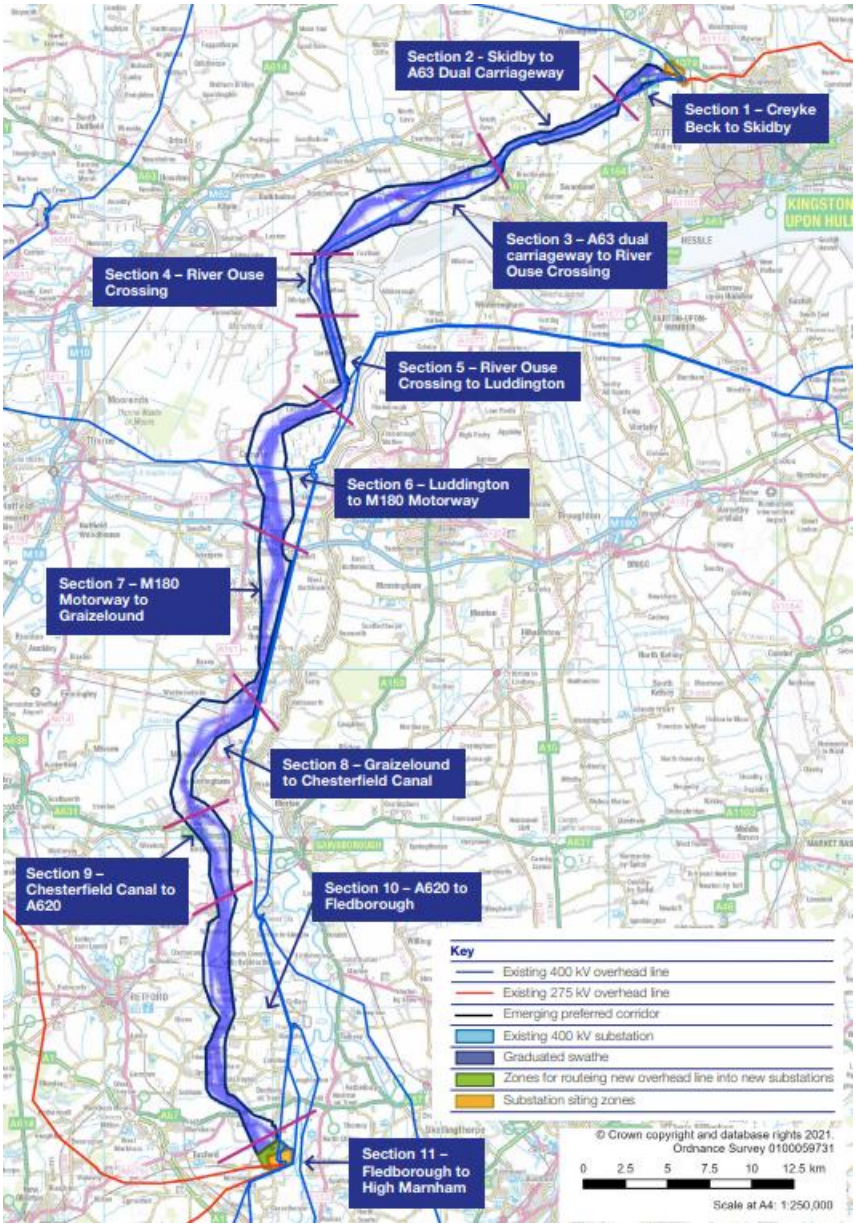
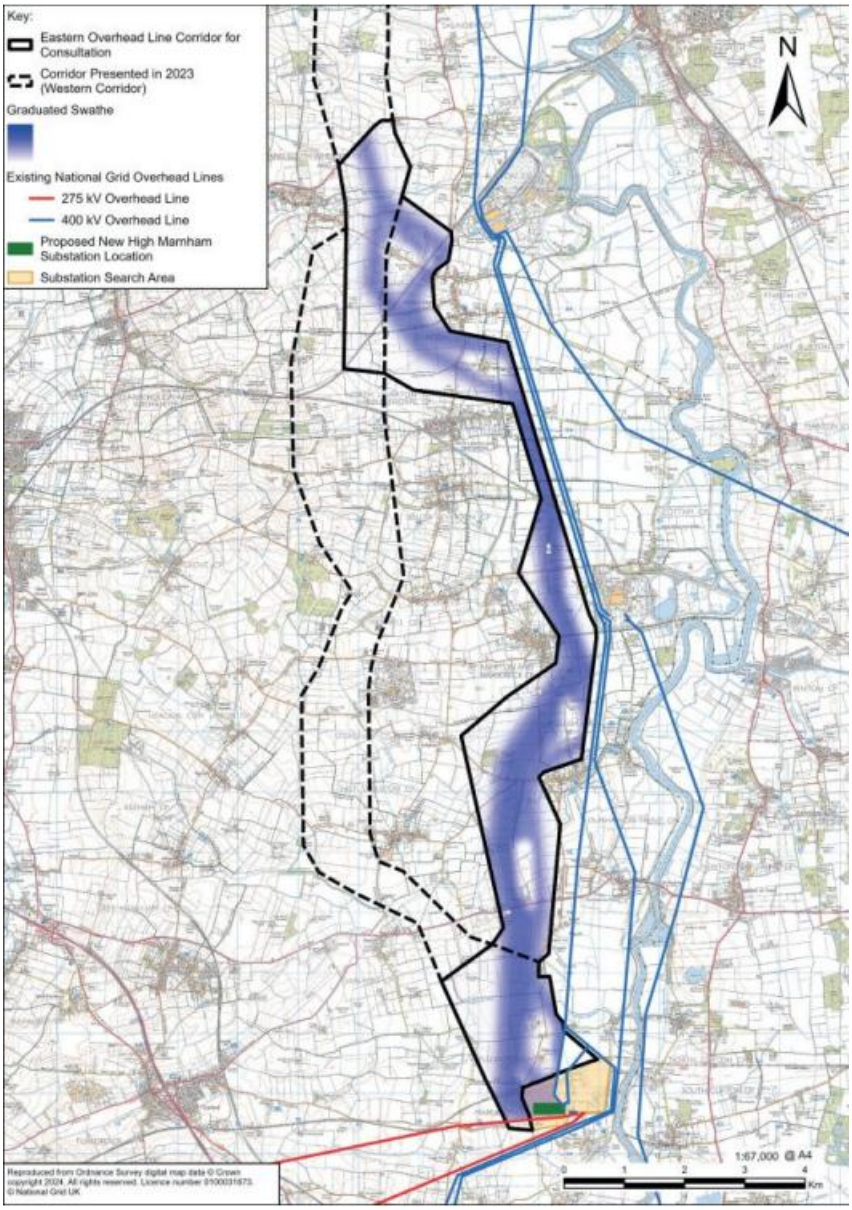


Image 1.3 – Eastern corridor option and graduated swathe between South Wheatley and High Marnham presented at the localised Non-Statutory Consultation 2024 (Source: Figure 3.13 – Application Document 7.20 Design Development Report - 2025)



1.6.3 The overhead line route crosses the administrative areas of:

- East Riding of Yorkshire;
- North Lincolnshire; and
- Bassetlaw, Nottinghamshire.

1.6.4 Land use across the route is predominantly rural, although the corridor also includes areas influenced by settlement edges and existing infrastructure.

1.6.5 The route corridor is largely rural in character and is principally defined by agricultural land uses. The Project crosses landscape typical of eastern England. This includes open, low-lying agricultural landscapes, gently undulating farmland and some areas more enclosed by woodland, hedgerows or localised changes in landform.

Topography along the route is generally low-lying with local variations associated with river corridors and subtle landform features.

1.6.6 Settlement along the corridor is generally dispersed and the route has been designed to avoid larger established settlements.

1.6.7 For much of its length, the route broadly follows or is influenced by an existing overhead line. This has resulted in the new infrastructure being located in areas that already accommodate transmission assets and limits the introduction of new linear features into the landscape.

1.7 Structure of this Document

1.7.1 The remainder of this DAD is structured as outlined below and reflects the principles of the good design process shown in Image 1.1. Sections 2 to 6 of this DAD provide the 'Assemble' and 'Research' components of Image 1.1, explaining the context for the Project as well as how the design team has been structured and evolved over time. Sections 7 to 10 provide the 'Co-ordinate' evidence, explaining how the Project has evolved in an iterative manner through the various stages of the Project design process. Section 11 provides the 'Secure' evidence, explaining how the design details are secured and how the design will evolve post-consent. Further details on each section are summarised below:

- Section 2: Legislative and Policy Context – this provides an overview of the relevant legislation and policy context, as well as relevant guidance, including that produced by the National Infrastructure Commission (NIC) and the Planning Inspectorate.
- Section 3: Overview of National Grid Approach to Project Development and Project Design – this outlines the stages in the National Grid project development process and how they have been applied to this Project.
- Section 4: The Design Approach on this Project – this section provides the details related to the 'Assemble' and 'Research' parts of Image 2.1, outlining aspects such as how the team has been structured and the use of digital tools, as well as how preparation of the Environmental Statement and stakeholder engagement has informed the design evolution.
- Section 5: Context of the Project – This sets out the context for the Project's development and the considerations that have influenced its evolution.
- Section 6: Design Principles – this outlines the Project Design Vision, the critical design constraints that have influenced the design, and how design principles have been developed and applied to this Project.
- Section 7: Summary of the Strategic Proposal Stage – this provides a summary of the Strategic Proposal options developed and appraised, and the reasons for the selection of the preferred option.
- Section 8: Summary of the Options Identification and Selection Stage – this provides a summary of the options identified and appraised, and the rationale for selecting the preferred option.
- Section 9: Evolution of the Project Design – this summarises how the Project design has evolved following non-statutory consultation through to the submission

of the DCO application. It includes cross-references to the Design Development Report, as required, to support the narrative.

- Section 10: Evolution of Temporary/Construction Works Design – this summarises how the temporary/construction works design has evolved following non-statutory consultation through to the submission of the DCO application.
- Section 11: Approach to Design Post-Consent – this explains how the design details are secured in the DCO, and how detailed design and stakeholder engagement will be undertaken and managed post-consent.

1.8 Interactions with Other Documents

1.8.1 The DAD includes references to other consultation documents and DCO application documents that provide further design-related information. Table 1.1 provides details of these other documents and a short summary of their contents.

Table 1.1 – Other relevant consultation documents and DCO Application Documents

Document	Description
Application Document 5.1 Consultation Report	Provides details of the pre-application consultation, engagement and publicity that National Grid undertook, and sets out how the Project has evolved in response to feedback received during the pre-application consultation.
Application Document 5.5 Planning Statement	Presents the relevant national and local policy and explains how the Project performs against policy.
Application Document 5.6 Policy Compliance Document	Presents information about how the Project meets policy requirements from NPSs through to local planning policy.
Application Document 7.17 Strategic Options Report inc needs case	Presents the Need Case for the Project and details the strategic options appraisal that was undertaken and the reasons for selection of the preferred strategic option.
Application Document 7.18 Corridor Preliminary Routeing and Siting Study (CPRSS)	Explains how the routeing and siting of the Project was undertaken and the reasons for the selection of the emerging preferences that were consulted on during non-statutory consultation.
Application Document 7.19 Supplementary Corridor and Routeing Report	Documents the outcome of a localised corridor and routeing study for the southernmost section of the proposed overhead line which has was carried out following non-statutory consultation held in June and July 2023. The report is presented as a supplement to the CPRSS 2023 and was published to support and inform localised non-statutory consultation on the eastern corridor.
Application Document 5.9 Design Development Report	This reports the design change process and the evolution of the design following statutory consultation. It explains the updated design choices that have been made and demonstrates that the design has incorporated embedded mitigation to avoid or reduce significant environmental effects wherever practicable.

Document	Description
Application Document 7.20 Design Development Report - 2025	This reports the design change process and the evolution of the design since the 2023 non-statutory consultation. It explains the design choices that have been made and demonstrates that the design has incorporated embedded mitigation to avoid or reduce significant environmental effects wherever practicable. It was published during the 2025 statutory consultation.
Application Document 6.3 Environmental Statement Chapter 3 Main Alternatives Considered	Describes the main alternatives that were considered for the Project and the primary reasons for selecting the preferred option/s.
Application Document 5.1 Consultation Report	Describes the consultation process and how consultation feedback has been taken into consideration as the Project design has evolved.
Application Document 5.11 Interrelationship Document	Outlines the interrelationships with other projects in the geography and coordination that has been undertaken to minimise adverse impacts to the local environment and host communities.
Application Document 7.1 Biodiversity Net Gain Report	Presents how BNG will be delivered on the Project, as well as including the statutory biodiversity metric.
Preliminary Environmental Information Report (PEIR)	Presents the preliminary environmental assessment of the Project and measures proposed to avoid, reduce or offset potential environmental effects.

2. Legislative and Policy Context

2.1 Introduction

2.1.1 **Application Document 5.5 Planning Statement** provides a comprehensive review of relevant national and local planning policy. The sections below provide a summary of the legislation and policy relevant to the Project's design and considered throughout the process.

2.2 The Licence and Legislative Framework

2.2.1 Transmission of electricity is a licensable activity in Great Britain under the Electricity Act 1989 (HM Government, 1989).

2.2.2 National Grid owns and operates the transmission system within England and Wales and is licensed under s6(1)(b) of the Electricity Act 1989. As such, it is bound by legal obligations set out in the Electricity Act 1989 and the licence.

2.2.3 Under s9(2) of the Electricity Act 1989, National Grid has a duty:

- To develop and maintain an efficient, co-ordinated and economical system of electricity transmission; and
- To facilitate competition in the supply and generation of electricity.

2.2.4 Section 38 and Schedule 9 of the Electricity Act 1989 also require National Grid, when formulating proposals for new lines and other works, to:

'…have regard to the desirability of preserving natural beauty, of conserving flora, fauna, and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and shall do what [it] reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects.'

2.2.5 Licence Condition C17 (Transmission System security standard and quality of service) requires National Grid at all times to plan, develop and operate the transmission system in accordance with the National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS).

2.2.6 These legislative and licence requirements clearly establish the functional requirements that the transmission system must meet, as well as the need to mitigate potential effects on the built and natural environment where possible.

2.3 Planning Act 2008

2.3.1 The Project is defined as a Nationally Significant Infrastructure Project (NSIP) under s14(1)(b) and s16 of the Planning Act 2008 (HM Government, 2008) and the Planning Act 2008 (Nationally Significant Infrastructure Projects) (Electric Lines) Order 2013, as it involves the installation of an electric line above ground of more than 2 km, which will operate at 400 kV in England is an NSIP.

2.3.2 Pursuant to the Planning Act 2008, an applicant is required to secure a Development Consent Order (DCO) to construct, maintain and operate the Project, and it may include a range of consents and powers.

2.3.3 Other development, such as underground cables, may be granted development consent as associated development within the meaning of s115 of the Planning Act 2008.

2.4 Planning and Infrastructure Act 2025

2.4.1 The Planning and Infrastructure Act 2025 (HM Government, 2025) makes a number of changes to legislation relating to the DCO process, including key amendments to the Planning Act 2008 (HM Government, 2008) and wider legislative framework for electricity transmission.

2.4.2 Many of the provisions set out in the Planning and Infrastructure Act 2025 require the making of secondary legislation before they take effect. The Applicant has continued to monitor the publication of these and any subsequent amendments to existing regulations throughout the pre-application stage. **Application Document 5.5 Planning Statement** sets out the current position of the changing regulatory framework, and establishes the Applicant's position on amendments to regulations and legislation relating to the application.

2.5 National Policy Statements

2.5.1 National Policy Statements (NPSs) are produced by the government through a parliamentary approval process, and they present the planning policy framework for all decision making for NSIPs. They also include the government's objectives for the development of NSIPs and are produced for different types of infrastructure development.

2.5.2 In deciding an application for development consent, s104 of the Planning Act 2008 requires the Secretary of State for Energy Security and Net Zero to determine the application in accordance with any relevant NPS. The following NPSs, which came into force on 6 January 2026, are relevant to the Project:

- Overarching National Policy Statement for Energy (EN-1) (Department for Energy Security and Net Zero, 2025);
- National Policy Statement for Electricity Networks Infrastructure (EN-5) (Department for Energy Security and Net Zero, 2025); and
- National Policy Statement for Renewable Energy Infrastructure (EN-3) (Department for Energy Security and Net Zero, 2025).

2.5.3 A summary is provided below of the key design requirements of these NPSs.

Overarching National Policy Statement for Energy (EN-1)

2.5.4 Section 4.7 of EN-1 outlines the criteria for good design for energy infrastructure. Paragraph 4.7.1 states:

'The visual appearance of a building, structure, or piece of infrastructure, and how it relates to the landscape it sits within, is sometimes considered to be the most important factor in good design. But high quality and inclusive design goes far

beyond aesthetic considerations. The functionality of an object – be it a building or other type of infrastructure – including fitness for purpose and sustainability, is equally important.'

2.5.5 This paragraph, whilst highlighting the importance of visual appearance of the infrastructure and its siting within the receiving landscape, acknowledges the need to also consider functionality and fitness for purpose. This is particularly important to the electricity transmission network where there are specific licence requirements that must be achieved.

2.5.6 Paragraph 4.7.2 states:

'Applying good design to energy projects should produce sustainable infrastructure sensitive to place, including impacts on heritage, efficient in the use of natural resources, including land-use, and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible. It is acknowledged, however that the nature of energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area.'

2.5.7 Paragraph 4.7.3 identifies that good design can be a means of meeting many of the policy objectives, in particular, good siting decisions and the use of appropriate technologies. Paragraph 4.7.4 states that '*applicants should consider how good design can be applied to a project during the early stages of the project lifecycle*'.

2.5.8 Paragraph 4.7.7 identifies the need for the Applicant to demonstrate how the design process has been conducted and evolved over time:

'Applicants must demonstrate in their application documents how the design process was conducted and how the proposed design evolved. Where a number of different designs were considered, applicants should set out the reasons why the favoured choice has been selected.'

2.5.9 National Grid has embedded the principles of good design from the outset of the Project and has followed a structured, yet iterative approach to design development. From the Strategic Proposal stage, National Grid has considered the local context of the Project, to inform decisions about alternatives, seeking to avoid and minimise impacts of the Project from the outset. The concept of good design has therefore informed the selection of technologies and the routeing of the overhead line. Mitigation measures have been embedded into the design that will avoid, reduce or compensate for adverse effects, both during construction and operation. Further evidence of this approach is provided in later sections of this document.

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

2.5.10 Section 2.2 of EN-5, 'Factors Influencing Site Selection and Design', sets out the factors influencing the routeing and siting of new infrastructure and other matters specific to electricity networks infrastructure. In summary:

- Very significant amounts of new electricity networks infrastructure are required, including in areas with comparatively little build out to date.
- There is a requirement for applicants to consider and balance a range of site-selection considerations with constraints, including engineering, environmental, socio-economic and community factors, which are important in routeing and siting decisions.

2.5.11 Section 2.4 of this NPS addresses good design for energy infrastructure. Whilst reiterating the need for applicants to consider the criteria set out in Section 4.7 of EN-1, paragraphs 2.4.3 and 2.4.4 state:

'However, the Secretary of State should bear in mind that electricity networks infrastructure must in the first instance be safe and secure, and that the functional design constraints of safety and security may limit an applicant's ability to influence the aesthetic appearance of that infrastructure.

While the above principles should govern the design of an electricity networks infrastructure application to the fullest possible extent – including in its avoidance and/or mitigation of potential adverse impacts (particularly those detailed in Section 2.10 below) – the functional performance of the infrastructure in respect of security of supply and public and occupational safety must not thereby be threatened.'

2.5.12 As noted in EN-1, functional performance in respect of security of supply and safety requirements are highlighted as very important in EN-5. Throughout the design process we have followed the principles of avoidance and mitigation of potential effects on environmental and socio-economic receptors, which have been balanced alongside engineering as well as cost factors.

2.5.13 Section 2.9, 'Applicant Assessment', provides details of the specific factors by discipline, e.g. Biodiversity and Geological Conservation, that need to be considered by applicants.

2.5.14 EN-5 also makes it clear that the Holford Rules should be used for routeing new overhead lines (paragraph 2.9.16) and the Horlock Rules for the siting of new infrastructure associated with overhead lines (paragraph 2.9.18).

2.5.15 Paragraphs 2.9.21 and 2.9.22 address undergrounding and subsea cables. Paragraph 2.9.21 states:

'Although it is the government's position that overhead lines should be the strong starting presumption for electricity networks developments in general, this presumption is reversed when proposed developments will cross part of a nationally designated landscape (i.e. National Park, The Broads, or Area of Outstanding Natural Beauty).'

'In these areas, and where harm to the landscape, visual amenity and natural beauty … of these areas cannot feasibly be avoided by re-routing overhead lines, the strong starting presumption will be that the applicant should underground the relevant section of the line.'

2.5.16 However, EN-5 Paragraph 2.9.23 goes on to state that:

'…undergrounding will not be required where it is infeasible in engineering terms, or where the harm that it causes…is not outweighed by its corresponding landscape, visual amenity and natural beauty benefits. Regardless of the option, the scheme through its design, delivery, and operation, should seek to further the statutory purposes of the designated landscape. These enhancements may go beyond the mitigation measures needed to minimise the adverse effects of the scheme'.

2.5.17 These principles and the Holford Rules have informed the evolution of the Project Design at all stages of the optioneering as well as the development process, as outlined in subsequent sections.

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

2.5.18 EN-3 is of relevance as it gives support for the onshore infrastructure required to deliver new offshore wind developments.

2.5.19 The NPS also includes references to critical national priority infrastructure outlining that the assessment principles outlined in Section 4 of EN-1 remain applicable. Applicants must show how any likely significant negative effects would be avoided, reduced, mitigated or compensated for, following the mitigation hierarchy which is set out within NPS EN1: *'A term to incorporate the avoid, reduce, mitigate, compensate process that applicants need to go through to protect the environment and biodiversity'*. Early application of the mitigation hierarchy is strongly encouraged, as is engagement with key stakeholders.

2.6 National Planning Policy Framework (NPPF)

2.6.1 The National Planning Policy Framework (NPPF, published in August 2026) (Ministry of Housing, Communities and Local Government, 2026) sets out the government's national planning policies for England and how these should be applied in the development plan system and in the management of development. While the overall strategic aims of the NPPF and the NPSs are consistent, the NPPF is an important and relevant consideration in decisions on NSIPs, but only to the extent relevant to that project. In this regard, the NPPF does not contain policies specifically relating to NSIPs. The application for the Project was prepared in the context of the previous iteration of the NPPF, but has been reviewed in the light of the current iteration published in August 2026. The Project is consistent with that policy guidance.

2.6.2 The NPPF is supported by the National Planning Practice Guidance (Ministry of Housing, Communities and Local Government, n.d.).

2.7 Holford Rules

Holford Rules

2.7.1 The Holford Rules were first set out in 1959 and subsequently reviewed by National Grid in 1992 (National Grid, 1992). They have become accepted within the electricity transmission industry as the basis for overhead transmission line routeing. National Grid uses the Holford Rules to inform the design and routeing of all new overhead line projects. They have been applied from the outset of the Project and as required by NPS EN-5 (Department for Energy Security and Net Zero, 2025). A summary of the rules is provided in Table 2.1.

Table 2.1 – Holford Rules

Rule	Description
Rule 1	Avoid altogether, if possible, the major areas of highest amenity value, by so planning the general route of the first line in the first place, even if the total mileage is increased in consequence.
Rule 2	Avoid smaller areas of high amenity value, or scientific interests by deviation; if 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 must 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, 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.

2.7.2 Later sections of the document outline how the Holford Rules have been applied by the Project team and how they have informed the development of the Project design.

2.8 Local Planning Policy

2.8.1 The Project passes through the administrative areas of East Riding of Yorkshire Council, North Lincolnshire Council, and Bassetlaw District Council. Each authority's development plan contains policies that emphasise the importance of high-quality design, environmental integration, landscape character, and sustainable development. A comprehensive schedule of relevant local planning policies is provided in **Application Document 5.6 Policy Compliance Document** and those policies addressed in **Application Document 5.5 Planning Statement**. The Project design has evolved through ongoing engagement with local authorities, statutory consultees, landowners and communities, ensuring that local policy objectives and site-specific considerations have been taken into account as the design has developed.

2.8.2 The below section summarises the key design-related policies for each administrative area.

East Riding of Yorkshire Council

2.8.3 Relevant adopted local plans and Supplementary Planning Documents (SPD);

- East Riding Local Plan Update 2020–2039 including the Strategy Document (East Riding of Yorkshire Council, 2025), Allocations Document (East Riding of Yorkshire Council, 2025) and Policies Map (Adopted 2025) (East Riding of Yorkshire Council, 2025);
- East Riding Design Code SPD

2.8.4 Relevant policies in the East Riding Local Plan place strong emphasis on achieving high quality, sustainable design, climate resilience and the integration of green and blue infrastructure. In particular:

2.8.5 Policy S2 (Addressing Climate Change) establishes an overarching requirement for development to minimise greenhouse gas emissions and incorporate resilience to climate change. It promotes efficient use of land and resources, integration of renewable and low carbon energy, sustainable transport, and the strengthening of green infrastructure networks, alongside the use of sustainable drainage and avoidance of flood risk where possible.

2.8.6 Policy ENV1 (Integrating High Quality Design) provides the primary framework for achieving well-designed development that responds to local character and environmental context. It requires proposals to safeguard and respond the character and appearance of the area, optimise site potential, while protecting amenity and supporting healthy accessible environments. The policy also promotes energy efficiency and the integration of renewable and low carbon technologies.

2.8.7 Policy EC5 (Supporting the Renewable and Low Carbon Energy Sector) is of particular relevance, providing support for energy infrastructure where adverse impacts are appropriately addressed and outweighed by wider benefits. The policy requires careful consideration of cumulative effects, landscape sensitivity, amenity, biodiversity, heritage, infrastructure constraints and flood risk.

2.8.8 These policy principles have informed the design development of the Project within the East Riding of Yorkshire area.

2.8.9 The East Riding Design Code SPD is typically applied to residential and commercial developments, and is not considered directly applicable to the Project. However, it is National Grid's understanding that the design principles of the project align with the objectives of the SPD.

North Lincolnshire Council

2.8.10 Relevant adopted local plans;

- North Lincolnshire Local Development Framework Core Strategy (Adopted 2011) (North Lincolnshire Council, 2011); and
- North Lincolnshire Local Plan Saved Policies (Adopted 2003, Updated 2024) (North Lincolnshire Council, 2003)

2.8.11 The adopted North Lincolnshire Local Plan includes a number of policies relevant to design and infrastructure development. Policy DS1 (General Requirements) establishes the overarching requirements for a high standard of design in all development proposals and requirement developments to reflect or enhance the character, appearance and setting of the surrounding area. The Policy also requires

proposals to respect existing landform and landscape features, safeguard environmental assets, and ensure that development does not result in unacceptable impacts on amenity or the natural environment.

2.8.12 Specific guidance relating to electricity infrastructure is provided in Policy DS17 (Overhead Power Lines and High Powered Electrical Installations). This policy recognises the need for careful routeing of overhead lines in order to minimise environmental and visual impacts, while acknowledging the practical and technical limitations associated with undergrounding high voltage transmission lines.

2.8.13 These policy considerations have informed the design approach within the North Lincolnshire section of the route.

Bassetlaw District Council

2.8.14 Relevant adopted local plans and SPDs;

- Bassetlaw Local Plan 2020–2038 (Adopted 2024) (Bassetlaw Local Plan, 2024);
- Bassetlaw Design Code SPD

2.8.15 The Bassetlaw Local Plan contains several policies promoting high quality design, landscape integration and sustainable development. In particular, Policy ST33 (design Quality) requires development proposals to demonstrate a clear understanding of local context and character, and to respond positively to landscape, townscape, heritage and environmental assets. The policy also promotes well-integrated development layouts, high quality landscaping and the integration of green and blue infrastructure networks.

2.8.16 In addition, Policy ST48 (Reducing Carbon Emissions, Climate Change Mitigation and Adaptation) promotes development that incorporates sustainable design principles, improves resilience to climate change and integrates green infrastructure, biodiversity and water management within the design of development.

2.8.17 These policy principles have informed the design development of the Project within the Bassetlaw area.

2.8.18 The Bassetlaw Design Code SPD is typically applied to residential and commercial developments, and is not considered directly applicable to the Project. However, it is National Grid's understanding that the design principles of the project align with the objectives of the SPD.

2.9 Design Guidance

NIC Design Group – Design Principles for National Infrastructure (2020)

2.9.1 The NIC Design Group (NIC Design Group, 2020) engaged widely with a range of bodies to identify a set of four key design principles for national infrastructure. The four key design principles are:

- ‘Climate: Mitigate greenhouse gas emissions and adapt to climate change;
- People: Reflect what society wants and share benefits widely;
- Places: Provide a sense of identify and improve our environment; and
- Value: Achieve multiple benefits and solve problems well.’

2.9.2 The four key design principles are intended to be applied to the design of new infrastructure from the start and maintained throughout the Project development. In applying the design principles, applicants should: appreciate the wider context, engage meaningfully, and continually measure and improve design.

Planning Inspectorate – Nationally Significant Infrastructure Projects: Advice on Good Design (2024)

2.9.3 The Planning Inspectorate published the guidance 'Advice on Good Design' in October 2024 (Planning Inspectorate, 2024), which sets out how good design might be successfully delivered in applications for NSIPs.

2.9.4 The advice states:

'Achieving good design requires a holistic approach to deliver high quality, sustainable infrastructure that responds to place and takes account of often complex environments. Good design is not primarily about how infrastructure looks, although these considerations (the aesthetics) are important.

Achieving high quality, good design outcomes requires an effective, intentional, transparent, deliverable process to be planned, followed and secured. Success in good design comes from a combination of securing both good process and good outcomes.'

2.9.5 The guidance references the NIC Design Group, which recommends that considering design properly in NSIPs supports the government's ambition to speed up delivery and maximise value by addressing: a structured design process; design principles; and multiple beneficial outcomes. The guidance further makes reference to the NIC Design Principles, as set out above.

2.9.6 The guidance states that a good design process includes the following components:

- "An effective, intentional, transparent and deliverable process.
- A collaborative, multi-disciplinary approach including positive community and land rights engagement.
- A succinct and ambitious vision for the Project, underpinned by a clear analysis of the context for the place, its environment and the opportunities for creating social value, including for the local and wider economy.
- A clear statement of design principles that will drive the Project and deliver wider value and benefits beyond the core purpose of the scheme.
- A narrative that explains how the approach to design has evolved, the reasons for the choices that have been (or will be) made, an explanation of the multiple beneficial outcomes the Project will achieve and how they will be secured.
- Design leadership supported by an engaged Design Champion to ensure design governance is secured, and the design principles drive a structured design process and hierarchy of design control."

2.9.7 The guidance sets out four key elements that Applicants should consider during the pre-application process and should be addressed within an NSIP application:

- Assemble;
- Research;

- Co-ordinate; and
- Secure.

2.9.8 The extent to which these elements need to be covered will depend on the nature of the infrastructure proposed and the site (see **Application Document 5.9 Design Development Report** for further information.

2.9.9 This document has been prepared to demonstrate how the design process has been undertaken and how good design has embedded from the outset. In developing the Project and preparing this DAD, we have considered the requirements of 'Annex A – Good Design Issues to Consider' of the Planning Inspectorate's Advice on Good Design (Planning Inspectorate, 2024). Appendix A of this DAD presents where they have been addressed.

Planning Inspectorate – Nationally Significant Infrastructure Projects: Advice on Preparing Applications for Linear Projects (2025)

2.9.10 The Planning Inspectorate's Advice on Preparing Applications for Linear Projects (Planning Inspectorate, 2025) provides non-statutory advice specifically for linear NSIPs, such as electric lines. The advice draws on good practice and experience from previous applications and sets out expectations for how linear projects should describe their development and design evolution, recognising the particular challenges of infrastructure that extends across multiple landscapes and communities. This advice note is directly relevant to the Project and has been taken into account in its development. It also refers to the Planning Inspectorate's Advice on Good Design (Planning Inspectorate, 2024), emphasising the importance of a clear and transparent design narrative, including an explanation of how environmental considerations, technical requirements and consultation feedback have informed the evolution of the Project design.

3. Overview of National Grid Approach to Project Development and Design

3.1 Introduction

3.1.1 This section sets out the National Grid approach to project development. As required by paragraph 4.7.4 of NPS EN-1 (Department for Energy Security and Net Zero, 2025), National Grid has adopted a structured approach to project development and consenting from the early stages of the project lifecycle, which is illustrated in Image 3.1. The stages in the process form part of National Grid's Approach to Consenting (National Grid, 2022). This process ensures that projects are developed in a consistent manner and that when proposals are developed, impacts on the environment, local communities and on socio-economic factors are considered.

Image 3.1 – National Grid's approach to project development and delivery



3.1.2 The process has been iterative and commenced at Project inception when the initial need for reinforcement of the electricity transmission system in the Humber, Trent and Lincolnshire was identified. The need for the Project is set out at section 1.3. In summary, increasing volumes of renewable and other low-carbon generation are seeking to connect to the network in these regions, and so additional transmission capacity is required to accommodate this growth and support national energy objectives. Environmental factors (including landscape and visual, biodiversity and cultural heritage), socio-economic considerations, community input and engineering and economic considerations have influenced the optioneering and design evolution process. There have also been extensive discussions with relevant stakeholders during the development of the Project, as well as the consideration of consultation feedback obtained through the non-statutory, statutory and targeted consultations. A short summary of each stage of the process is provided in the sections below, including how consultation has formed part of the Project development process.

3.2 Strategic Proposal

3.2.1 This stage of the process identified and appraised the strategic options that might address the network reinforcement needs. These appraisals considered the likely environmental, socio-economic and technical effects, issues and costs that would be associated with each strategic option. The network performance of each strategic option was also modelled to determine the benefits. This process is documented within **Application Document 7.17 Strategic Options Report inc needs case**.

3.2.2 ECO 1 - New Creyke Beck to new High Marnham (assigned the project title of North Humber to High Marnham) was considered to represent the most advantageous of the options when balancing cost, technical performance and environmental and socio-economic effects.

3.2.3 Further details about the Strategic Proposal stage and the decisions taken are provided in section 7.

3.3 Options Identification and Selection

3.3.1 Having identified the preferred strategic option, a Corridor and Preliminary Routeing and Siting Study (CPRSS) was prepared – see **Application Document 7.18 Corridor and Preliminary Routeing and Siting Study**. This considered the routeing and siting of linear and non-linear aspects of the Project. This followed the National Grid Approach to Consenting (National Grid, 2022), identifying and appraising numerous corridors and sites. This part of the process considered environmental, socio-economic, technical and engineering design and cost factors. The process was used to identify preferences for routeing the linear 400 kV cable run and its associated pylons between the new substations to be built in the vicinity of Creyke Beck Substation and the former High Marnham Power Station site. The steps taken during this process were:

- Step 1 – Defining the Study Area: This step sought to identify the extent of the study areas within the route corridors. This was based on the study area used at the strategic proposal stage, though widened out to ensure route corridors could be developed that avoided environmental and socio-economic constraints as far as possible.
- Step 2 – Scope Environmental Topics and Baseline Data-gathering: This step sought to build on the constraints data already obtained through the strategic options process, to ensure relevant baseline information from various sources was taken into consideration in the options appraisal process.
- Step 3 – Weight, Agree and Heat Map Features: This step comprised ascribing weights to receptors and using this information to develop heat maps for overhead lines and directly buried underground cables.
- Step 4 – Identifying and Defining Corridors: This step involved developing and defining corridors by using a GIS tool and drawing upon the heat mapping exercise undertaken during Step 3.
- Step 5 – Agree Corridors for Appraisal: This involved a review of the draft corridors with the integrated team to confirm their technical feasibility, as well as to ensure that key issues and interactions between constraints had been fully considered. The corridors were also reviewed to ensure that all corridors, links and loops had the potential to form end-to-end solutions.

- Step 6 – Site Visits and Refinement of Corridor: Following identification of the corridors, links and loops, site visits were undertaken by relevant specialists from the integrated team comprising landscape, heritage and ecology specialists. The purpose of the visits was to ground truth the key landscape, environment, community and technical features; to allow closer consideration of particularly constrained areas during the desk studies; and to identify further construction and design hazards that might mean corridors, links and loops would not be feasible.
- Step 7 – Options Appraisal of Corridors: The identified corridors, links and loops were subject to appraisal, in accordance with National Grid's Approach to Consenting (National Grid, 2022), ensuring thorough consideration of technical, socio-economic, environmental and cost implications of the options. The appraisal considered the potential impacts on relevant features and whether such impacts could be avoided or mitigated through careful routeing.
- Step 8 – Confirm Emerging Preferred Corridor and Develop the Graduated Swathe for Consultation: This stage included Challenge and Review workshops to provide a collaborative environment for the multi-disciplinary team to review the outcomes of the appraisals and review the environmental and socio-economic impacts and, in accordance with EN-1 (Department for Energy Security and Net Zero, 2025) and EN-5 (Department for Energy Security and Net Zero, 2025), balance these against technical and cost factors to reach a conclusion on the emerging preferred corridors. Following selection of the preferred options, the integrated team sought to identify preliminary areas within the emerging preferred corridor where the infrastructure for the Project might be best located based on the work completed to date. The graduated swathe was identified to provide an early indication of where the new overhead line and infrastructure could potentially be located within the wider preferred corridor.
- Step 9 – Non-Statutory Consultation: The process undertaken above was documented in the CPRSS, and non-statutory consultation was undertaken to seek feedback on the Project proposals.

3.3.2 The CPRSS report was used as part of the non-statuary consultation and engagement with key stakeholders, including landowners. The non-statutory consultation took place in June and July 2023.

3.3.3 During this stage of the process, the Project team engaged with technical stakeholders to explain the process that was followed, as well as to gather relevant information to inform the optioneering process.

3.3.4 Following non-statutory consultation from June to July 2023 feedback was considered and a backcheck of previous routeing and siting work was undertaken. In route section 10 (A620 to Fledborough), a number of consultation responses suggested that the new overhead line should be routed further to the east, outside of the emerging preferred corridor, closer to the existing overhead lines. Feedback suggested that this would reduce the impact of the new infrastructure in the area, keeping it closer to existing infrastructure. Feedback also commented that this would reduce impacts on sensitive sites, including nature reserves, Sites of Special Scientific Interest (SSSIs) and a number of unlicensed airstrips. The feedback received together with a backcheck of previous work led to the identification of a potential alternative corridor for a section of the Project between South Wheatley and High Marnham, which is referred to as the eastern corridor. National Grid prepared Application **Document 7.19 Supplementary Corridor Routeing Report**, to explore the potential alternative eastern corridor at the south of the route between South

Wheatley and High Marnham. This study, presented for localised non-statutory consultation in 2024, considered environmental, socio-economic, technical, cost and programme factors consistent with the approach described above. A graduated swathe was developed for the eastern corridor to indicate likely location of Project infrastructure, while recognising that detailed design may extend beyond this area as feedback and further technical assessments were incorporated.

3.3.5 No final decision on the eastern or western corridor options at the south of the route were made at this stage. Feedback from both the 2023 and 2024 consultations, alongside updated environmental surveys and technical studies, informed the assessment of the corridor options. The outcomes of this process contributed to the identification of the overall preferred corridor and route alignment as summarised in **Application Document 7.20 Design Development Report - 2025**.

3.3.6 Section 8 provides further details of the options that were considered and the key design decisions that were taken at this stage.

3.4 Defined Proposal and Statutory Consultation

3.4.1 During the next stage of the Project, **Application Document 7.20 Design Development Report – 2025** was produced, which presented how the design had been refined since non-statutory consultation, including identification of the preferred alignment.

3.4.2 The Project was subject to statutory consultation for a period of eight weeks, from 18 February to 15 April 2025, in line with the requirements of the Planning Act 2008 (HM Government, 2008) and The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (HM Government, 2017).

3.5 Assessment and Land Rights

3.5.1 Feedback received during statutory consultation, including targeted supplementary statutory consultation with persons with an interest in land, has informed further refinement of the Project design. A structured design review process was undertaken to ensure that all feedback was considered in a robust and consistent manner, and to inform the evolution of the defined proposal.

3.5.2 As part of this process, National Grid undertook an extensive review of the design, which considered proposed amendments to the preferred alignment and temporary construction working areas raised through consultation and by the design team as a result of ongoing assessment and survey work. The Project was refined further during this stage, including but not limited to updates to construction compounds, haul roads, preferred alignments, and site access arrangements, to ensure that land requirements remained proportionate and justified.

3.5.3 Discussions with key stakeholders continued throughout this phase in relation to design and land interests. The changes to the design post Statutory Consultation are addressed within **Application Document 5.9 Design Development Report**. Details of the consultation undertaken for the Project is provided in **Application Document 5.1 Consultation Report**. The key issues explored, and how these informed the design evolution, are summarised in sections 9 and 10.

3.6 Examination

3.6.1 The DCO application will be examined through this stage of the process. National Grid will provide responses in relation to the Project design and accompanying environmental assessment and control measures and update the documentation accordingly. During this stage we will also continue to engage with stakeholders.

3.7 Implementation

3.7.1 This comprises the detailed design and construction of the Project. Section 11 provides details of how the detailed design will be undertaken and how the design elements are secured through **Application Document 3.1 Draft Development Consent Order** (draft DCO), which will ensure that the design commitments made are implemented.

4. The Design Approach on this Project

4.1 Introduction

4.1.1 This section of the DAD explains how the design process has been undertaken for the Project and how a robust team was used to drive an effective design process. This section outlines the capabilities of the multi-disciplinary team, how the EIA process has informed design, how issues such as BNG were approached, and how digital solutions have been used in the process.

4.2 The Project Team and Design Champion

4.2.1 As required by the Advice on Good Design (Planning Inspectorate, 2024), a multi-disciplinary team has been established from the Strategic Proposal stage of the Project. This spans individuals with expertise across engineering, environmental and socio-economic disciplines, as well as stakeholder engagement, lands and project management specialists.

4.2.2 Paragraph 4.7.5 of NPS EN-1 (Department for Energy Security and Net Zero, 2025) and the Advice on Good Design state that a Design Champion could be appointed to ensure that good design is embedded within the Project development. The Project Director has been the nominated Design Champion, as they have overall accountability for the delivery of the Project and, therefore, for the design process. The core responsibilities of the Design Champion are:

- Ensuring a clear brief for the design is established;
- Driving the Project development process in line with National Grid's processes;
- Ensuring that the design is deliverable;
- Developing and ensuring adherence to design governance;
- Oversight of the integrated Project team to ensure robust processes are being followed and design decisions are being clearly recorded, e,g, challenge and reviews are being undertaken;
- Driving robust consideration of stakeholder feedback as part of the design process, e.g., through design change control; and
- Challenging decisions to drive better outcomes and achievement of the design vision.

4.3 Design Panel

4.3.1 Paragraph 4.7.5 of NPS EN-1 (Department for Energy Security and Net Zero, 2025) states that a representative design panel can be engaged as part of the design process. From the outset of the Project, the National Grid team has been a fully integrated, multi-disciplinary team comprising specialists from a range of disciplines including design, environment, socio-economic, lands, consents, traffic and transport and stakeholder engagement (as well as multiple sub-disciplines including overhead

line design, temporary works design, ecologists and landscape architects). This team has functioned as a design panel through the design process by working in a collaborative manner to develop and appraise strategic and routeing and siting options. It has also considered feedback from consultation processes and new data gathered through surveys and assessment work, and challenged whether/how the design should change as a result. This has been done through the ongoing evolution of the design and through engaging with technical stakeholders to draw their insights and views into the design process.

4.3.2 Therefore, the Project team has acted as a design panel throughout the process and for this reason, a separate, independent Design Panel has not been engaged during the development of this Project. Furthermore, this Project comprises the provision of 400 kV overhead line and the associated pylons, along with other related works, such as: temporary diversions for works on existing overhead line routes; temporary access roads; highway works; temporary works compounds; work sites; utility diversions; drainage works and ancillary works; and environmental mitigation, compensation, and enhancement works, including for BNG.

4.3.3 These works are typical of National Grid infrastructure and the works associated with it. This infrastructure has minimum functional requirements it must meet with and a very limited scope for any design deviations. Given this, an independent Design Panel was not considered to be necessary and was not engaged during the development of this Project.

4.4 Role of EIA in the Design Process

4.4.1 Preparation of the Environmental Statement (ES) as part of the process of Environmental Impact Assessment (EIA) required by The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 is an integral part of the National Grid design process. Preparation of the ES supports the achievement of good design outcomes. It enables adverse effects to be avoided or reduced, and benefits to be provided through identifying ways to improve environmental or socio-economic opportunities. Environmental specialists have been embedded into this Project team from the outset, performing the following key roles through each stage as outlined below:

- Environmental and socio-economic appraisal of the strategic options was undertaken to ensure that environmental perspectives were embedded into the process from the outset.
- Environmental and consents specialists led the corridor selection, routeing and siting process, drawing on expertise from the wider design team (including technical, engineering and cost disciplines). This ensured that environmental and socio-economic factors were key considerations in the development and appraisal of route and site options. The principles of avoidance and the application of the Holford Rules were central to the approach taken, as documented in section 6.
- Following non-statutory consultation, the EIA process commenced with EIA scoping and was subsequently used to inform the evolution of the Project design. Environmental surveys and assessment informed the development of the Project, feeding into the design evolution. From the outset, the principles of the mitigation hierarchy were adopted.

- A Preliminary Environmental Information Report (PEIR) was prepared as part of the DCO pre-application process and presented during statutory consolation to facilitate stakeholder engagement and feedback. Whilst separate from the formal EIA process, the PEIR was a key tool in gathering information to inform the preparation of the ES and the ongoing development and refinement of the Project design.
- Engagement with key technical stakeholders informed both the EIA process and the design of the Project.
- Environmental specialists were integral to the design evolution process, undertaking assessments of proposed changes, attending workshops and proposing amendments to the design in response to environmental surveys and engagement with key technical stakeholders.
- Environmental specialists will continue to be involved in the Project's detailed design post-consent to ensure that all mitigation measures are correctly designed and delivered.

4.5 Approach to Stakeholder Engagement

4.5.1 Since its inception, the development of the Project has involved a wide range of stakeholders, including landowners, statutory and non-statutory consultees, local communities and their elected representatives, and specialist interest groups. These stakeholders have differing interests that require different levels of consultation. Specific communication activities have therefore been focused on the needs of individuals and groups. This has required an understanding of the stakeholders and their likely interests in the Project. Stakeholder engagement for the Project has been based on the following core principles:

- Early and ongoing engagement to inform and influence the design process, which was commenced at the Options Identification and Selection stage.
- Seeking feedback through the iterative design process and taking this feedback into consideration.
- Building long-term relationships with stakeholders throughout the different stages of the Project to better understand their views.
- Continued and ongoing stakeholder engagement with key stakeholders and the local planning authorities to inform the emerging design and the associated environmental assessments.

4.5.2 Full details of the consultation undertaken for the Project is provided in **Application Document 5.1 Consultation Report**. Section 9 of this report provides details of how the feedback received from stakeholders has informed the emerging design.

4.6 Approach to Flexibility

4.6.1 As acknowledged by the Planning Inspectorate's Advice Note Nine (Planning Inspectorate, 2018), a necessary and proportionate degree of flexibility needs to be incorporated into the design of a development so that unforeseen issues encountered after a development has been consented can be addressed. This is particularly relevant for linear infrastructure projects, where detailed ground conditions, local constraints and environmental sensitivities may only be confirmed as the design progresses.

4.6.2 To allow for this proportionate degree of flexibility, Limits of Deviation (LoD) have been developed for the Project, which will be detailed in the DCO. The LoDs define the maximum extent within which Project components may be located and provide a clear and controlled framework for detailed design development. The LoDs operate within the Order Limits, which define the maximum extent of the authorised development.

Overarching Principles for Flexibility

4.6.3 The application of flexibility across the Project is guided by the following principles:

- Flexibility is proportionate to the scale and linear nature of the Project and is not intended to permit materially different infrastructure to that assessed.
- Flexibility is clearly defined and controlled through the Order Limits and LoD secured by the DCO.
- Flexibility is used, where practicable, to avoid or reduce impacts on environmental features, existing infrastructure and land uses.
- Flexibility remains subject to engineering, safety, operational and environmental constraints.

4.6.4 These principles underpin the application of flexibility across the Project and inform the alignment of the overhead line and the siting of pylons.

Horizontal Limits of Deviation

4.6.5 The horizontal LoD define the corridor within which the overhead line and pylons may be located, providing scope to refine alignment in response to local environmental, topographical and engineering considerations. In locations with sensitive receptors or other constraints, the LoDs have been adapted to provide targeted flexibility. This ensures that the alignment can be optimised within a controlled and proportionate envelope.

Vertical Limits of Deviation

4.6.6 Vertical LoDs allow the height and design of pylons to accommodate topography, maintain clearances, and respond to specific technical or environmental requirements, such as major crossing. Vertical flexibility is therefore applied where necessary while remaining clearly defined and controlled to manage impacts and maintain operational integrity.

Pylon Siting and Micro-siting

4.6.7 Within the horizontal and vertical LoDs, micro-siting enables the detailed positioning of pylons and, where relevant, access routes to avoid or reduce impacts on sensitive features, such as habitats, woodlands and trees. Micro-siting considers engineering and safety requirements, and the swing of conductors, ensuring that flexibility is used as a tool to minimise environmental effects while maintaining operational standards.

4.6.8 Further technical detail on the application of LoD, pylon siting and micro-siting is provided in **Application Document 7.20 Design Development Report – 2025** and **Application Document 5.9 Design Development Report**.

4.7 Biodiversity Net Gain

4.7.1 In recent years, the UK Government has introduced legislation and policy that puts biodiversity at the heart of the planning system. The Department for Environment, Food and Rural Affairs (Defra), describes Biodiversity Net Gain (BNG) as an approach to development that makes sure habitats for wildlife are left in a measurably better state than they were before development (Defra, 2026). The statutory requirement for NSIPs to achieve a specified biodiversity gain objective (as set out in a biodiversity gain statement) will be mandatory for applications made from 2 November 2026. The biodiversity gain objective for energy NSIPs, as set out in Nationally Significant Infrastructure Projects: Biodiversity Gain Statement for Energy (Defra, 2026), will require that the biodiversity value attributable to a development exceeds the pre-development biodiversity value of the on-site habitat by at least 10%. This is referred to as 10% BNG.

4.7.2 The Project application for development consent is being submitted prior to 2 November 2026 and therefore the provision of 10% BNG is not mandatory. Notwithstanding, the Overarching National Policy Statement for Energy (EN-1) (Department for Energy Security and Net Zero, 2025) states that NSIPs should seek opportunities to provide BNG, including wider environmental gains and benefits to local communities and national policy priorities, where possible, and the Secretary of State should give appropriate weight to environmental net gain and BNG during decision making. However, 10% BNG is not a legal requirement for this application for development consent.

4.7.3 National Grid's environmental and social commitments in its Social and Environmental Action Plan (National Grid, 2026) includes a commitment to deliver a minimum of 10% BNG with potential for wider environmental and societal benefits for all developments for which planning permission or development consent is required. Therefore, the Project proposes to deliver 10% BNG with potential for wider environmental and societal benefits on a voluntary basis, and substantively follows the guidance set out in Nationally Significant Infrastructure Projects: Biodiversity Gain Statement for Energy (Defra, 2026).

4.7.4 The Project will deliver BNG through habitat creation and enhancement, in addition to the mitigation measures identified to avoid and reduce likely significant effects.

4.7.5 Detail on the Project's approach to voluntary BNG is provided in **Application Document 7.20 Design Development Report - 2025** and **Application Document 7.1 Biodiversity Net Gain Report**.

4.8 Approach to Sustainability in the Design Process

4.8.1 Sustainability has been embedded throughout the evolution of the Project and has informed decision-making from the earliest stages of the design process. The Project has been developed through an iterative and multidisciplinary approach. Engineering, environmental, planning, construction and land specialists have worked collaboratively to identify opportunities to improve environmental performance, reduce construction impacts and enhance the long-term resilience and operation of the proposed infrastructure.

4.8.2 Throughout the design process, sustainability considerations have been balanced alongside engineering, environmental, socio-economic and cost considerations. This has included avoiding or reducing impacts on environmentally sensitive receptors

through routeing and siting. It has also included making efficient use of land by maximising close parallel routeing with existing electricity transmission infrastructure where reasonably practicable. Construction impacts have been reduced through the refinement of access arrangements, working areas and construction methodologies. Whole-life operational performance maintenance requirements and asset resilience have also informed design decisions. Embedded environmental mitigation has been incorporated into the design wherever reasonably practicable. Connectively, these principles have informed the evolution of the preferred alignment and associated infrastructure.

4.8.3 The Project has also been developed having regard to the principles of PAS 2080:2023 – Carbon Management in Buildings and Infrastructure, which promotes the management and reduction of whole-life carbon across the lifecycle of infrastructure assets. Consistent with the PAS 2080 hierarchy, opportunities to reduce carbon has been considered through strategic option selection, routeing, engineering design and construction planning. This has included seeking to avoid unnecessary infrastructure, minimise material use where reasonably practicable, reduce construction activities and promote efficient design solutions that support long-term operational performance.

4.8.4 Sustainability will continue to inform the Project during detailed design and delivery. Further refinement of construction methods, temporary works, access arrangements and environmental mitigation will be undertaken within the parameters secured through the DCO. This will ensure that sustainability principles remain embedded throughout the delivery of the Project.

4.9 Approach to Coordination with Other Projects

4.9.1 The Project has been developed with ongoing regard to the presence of existing and proposed developments within the vicinity of the Project. Given the scale and linear nature of the Project, coordination with other projects has formed an important part of the design process to ensure that interactions are understood and, where reasonably practicable, managed through design evolution and engagement.

4.9.2 Coordination has been undertaken from an early stage of project development, including engagement with third-party developers following the launch of non-statutory consultation in 2023. National Grid has sought to establish regular dialogue with relevant parties to understand the nature, timing and spatial extent of other projects, identify potential interfaces, and consider opportunities to reduce or manage potential conflicts. Feedback received through this engagement has been considered in the development of the Project and, where appropriate, has informed changes to alignment, siting and construction proposals.

4.9.3 In doing so, decision have been made on a balanced basis, taking into account environmental, socio-economic, technical and engineering factors alongside the need to coordinate with other developments. This has ensured that coordination is considered as part of the wider design process rather than in isolation.

4.9.4 Particular attention has been given to coordination with the associated substation developments, including ongoing collaboration between project teams to align design development and stakeholder engagement activities. This has included joint engagement activities during non-statutory consultation in 2023 to provide a coordinated approach to communication with local communities and stakeholders.

4.9.5 The Project team has also maintained an ongoing review of the planning context to identify emerging development proposals within the vicinity of the route. Where relevant proposals have been identified, further engagement has been undertaken to understand potential interactions. Where sufficient detail on proposed third-party developments has been available in the public domain to allow an informed understanding of a third-party scheme's location, scale and likely programme, this information has been considered as part of the iterative design process to, where practicable, avoid or reduce the potential for conflict or inefficiency. Conversely, where third-party developments have been at a preliminary or speculative stage when developing the Project design, or where limited information is available, or other constraints and design considerations have been present, this has constrained the extent to which such proposals can reasonably influence the design of the Project.

4.9.6 The consideration of inter-project interactions has been supported by the EIA process, including the assessment of cumulative effects as reported in **Application Document 6.21 Environmental Statement Chapter 21 Inter-project Cumulative Effects**. This ensures that the combined effects of the Project with other developments are appropriately identified, assessed and, where necessary, mitigated.

4.9.7 Through this approach, the Project seeks to ensure that it is delivered in a manner that is coordinated with other development activity, responsive to stakeholder input, and aligned with the wider environmental and planning context. Further information on this is included in **Application Document 5.11 Interrelationship Document**.

4.10 Use of Digital Tools/Artificial Intelligence

4.10.1 Digital tools have supported a structured and evidence-based design process for the Project, enabling the integration of environmental, technical and socio-economic data to inform routeing, siting and options appraisal.

4.10.2 For overhead line design, PLS-CADD and PLS-TOWER have been used. These are established industry tools for modelling analysis and design of transmission infrastructure.

4.10.3 Spatial analysis, land referencing and plan preparation have been undertaken using GIS Pro and ArcGIS Online. These tools have supported constraints mapping, heat mapping and corridor identification. Any scripting or automation used is embedded within the software and applied in a standard manner.

4.10.4 Artificial intelligence (AI) tools have been used in a limited and proportionate way. Their use accords with the Planning Inspectorate Guidance, Use of Artificial Intelligence in Casework Evidence (Planning Inspectorate, 2026).

5. Context of the Project

5.1 Introduction

5.1.1 This section identifies the key contextual features that have been critical in shaping the evolution of the Project's design. For a linear infrastructure project of this nature, context varies significantly along the route and includes a combination of physical, environmental, historic and human factors.

5.1.2 This section does not seek to replicate the full baseline description provided in the ES. Instead, it identifies the principal constraints and sensitivities that have influenced route selection, alignment refinement, pylon siting and the application of flexibility. It provides the context for the more detailed design discussion in later sections of this document (sections 9 and 10).

5.2 Physical Context

5.2.1 The Project corridor and study area includes a range of physical characteristics, including slight variations in topography, river and drainage corridors, ground conditions, transport infrastructure and existing utilities. These features have shaped decisions relating to route alignment, pylon spacing, span lengths and the identification of crossing locations.

5.2.2 In particular, major linear features, such as watercourses like the River Ouse, roads, railway lines and existing electricity infrastructure represent both constraints and opportunities that have influenced the evolution of the design. These considerations have informed the use of LoD, allowing detailed design to be refined while remaining within an assessed envelope.

5.3 Ecological Context

5.3.1 The Project corridor passes through areas that support a range of ecological features, including designated and non-designated sites, priority habitats and ecological networks. The presence, distribution and sensitivity of these features have been a key influence on route refinement and pylon siting.

5.3.2 Ecological considerations have informed the use of flexibility within the design to avoid or reduce impacts where practicable, including through micro-siting and localised alignment adjustment. They have also shaped the approach to mitigation, which are set out in further detail in later sections of this document, the PEIR, **Application Document 7.1 Biodiversity Net Gain Report**, and **Application Document 6.8 Environmental Statement Chapter 8 Ecology.**

5.4 Landscape and Visual Context

5.4.1 The Project passes through a varied landscape context, with changes in landscape character, land use and visual receptor sensitivity along the route. Open agricultural landscapes, rivers, proximity to public rights of way (PRoWs) and areas with existing infrastructure corridors have shaped the design approach.

5.4.2 Differences in landscape character and visual sensitivity have been factors in the evolution of the design, influencing alignment refinement, pylon height and spacing, and the consideration of views to and from sensitive receptors. These contextual factors have informed decisions on alignment, pylon height and spacing, as well as the need to respond to local landscape context where practicable. Further detail on landscape and visual context is provided within **Application Document 6.6 Environmental Statement Chapter 6 Landscape**.

5.5 Historic Environment

5.5.1 The Project corridor contains areas of known and potential historic interest, including designated heritage assets, non-designated heritage assets and areas of archaeological potential. The location and setting of these assets have been an important consideration during route selection and design development.

5.5.2 The design has evolved to avoid or reduce effects on heritage assets and their settings where practicable. Further detail on the historic environment is provided within **Application Document 6.10 Environmental Statement Chapter 10 Cultural Heritage**.

5.6 Local Communities and Socio-economic Context

5.6.1 The Project passes through a predominantly rural area containing villages, smaller settlements, isolated dwellings, agricultural land and local businesses. The proximity of these receptors and community assets has been a key consideration in the evolution of the Project design.

5.6.2 Socio-economic factors have informed route selection, alignment refinement and pylon siting, with the design seeking, where reasonably practicable to avoid or reduce effects on residential amenity, existing land uses and community assets, including Public Rights of Way.

5.6.3 Engagement with local communities, landowners and stakeholders has informed the understanding of local sensitivities and contributed to interactive design refinement, including localised adjustments and the application of flexibility within the design. Construction strategies have also been developed to minimise disruption where practicable. Further detail is provided in **Application Document 6.17 Environmental Statement Chapter 17 Socio-economic**.

6. Design Principles

6.1 Introduction

6.1.1 This section sets out the overarching design principles that have guided decision making and the evolution of Project design. The Project is a nationally significant electricity transmission development and considered to be critical national priority infrastructure required to be delivered by 2030. In this context, National Grid's objective is to deliver essential infrastructure in a manner that is appropriate to its function, while seeking to avoid and, where possible, reduce the potential adverse effects that can be associated with overhead electricity transmission infrastructure.

6.1.2 The design evolution for the Project has been, and will be, an iterative process informed by technical assessment, environmental considerations and engagement with stakeholders and communities. National Grid has sought to achieve good design through the careful consideration of route corridors and application of defined design principles, along with the use of flexibility to respond to local constraints and opportunities.

6.1.3 The following sections outline the design principles which have been applied to inform the development of the Project, and provide the framework within which detailed design decisions have been made.

6.2 National Grid Strategic Priorities

6.2.1 National Grid is guided by five strategic priorities as outlined in Building our Energy Future (National Grid plc, 2025) and illustrated in Image 6.1:

- Enable the energy transition for all;
- Build the networks of the future now;
- Deliver for customers;
- Operate safely and efficiently; and
- Build tomorrow's workforce today.

Image 6.1 – National Grid Strategic Framework



6.2.2 The purpose of the Project is to deliver the North Humber to High Marnham Project as part of the Great Grid Upgrade. The existing electricity transmission network does not have sufficient capacity to meet current and future demand, including the connection of new sources of generation. The Project will reinforce the network to enable the efficient and reliable transport of electricity, supporting a secure and resilient energy system for consumers. In this context, the design is focused on delivering essential infrastructure that meets functional requirements, with National Grid's Strategic Priorities underpinning the approach to design.

6.3 The Proposed Design Vision

6.3.1 In view of the strategic priorities, the design vision for the Project is as follows:

- Design will meet functional, safety and maintenance requirements and provide good value for customers over the lifetime of the Project.
- Design will be responsive and respectful to the character of the local setting in terms of environmental and socio-economic factors, including landscape, ecology, heritage and community, and will seek to address feedback raised through engagement with stakeholders.
- Design will be driven by a high-quality, integrated, multi-disciplinary approach that balances the need for durability with the benefits of creativity and innovation.

6.3.2 The primary purpose of the Project is to ensure the Project is delivered in a timely and efficient manner to meet Clean Power 2030 Action Plan (UK Government, 2025) requirements. Owing to the nature of the Project, a master-planning/place-making approach is not deemed appropriate or necessary. As demonstrated through this

document, environmental and socio-economic factors have been embedded from the outset, and stakeholder and community feedback has been integrated as part of the design process.

6.4 Good Design Principles

6.4.1 The following design principles have guided the development of the Project and provided the framework within which strategic, routeing and technical decisions have been made. They have given effect to the strategic priorities and design vision set out above and informed the iterative evolution described in the later sections of this document, as well as **Application Document 7.20 Design Development Report - 2025** and **Application Document 5.9 Design Development Report**.

6.4.2 In accordance with NPS EN-1 (Department for Energy Security and Net Zero, 2025) and NPS EN-5 (Department for Energy Security and Net Zero, 2025), good design for electricity transmission infrastructure is not defined solely by visual appearance. It is achieved through infrastructure that is safe, secure and resilient, and which responds appropriately to its environmental and community context. The principles set out below reflect this balanced approach.

Application of the Holford Rules

6.4.3 As outlined in section 2, National Grid employs the Holford Rules to inform the design and routeing of overhead lines. The routeing and alignment of the overhead line have been informed by the Holford Rules, as recognised by paragraph 2.9.16 of NPS EN-5 (Department for Energy Security and Net Zero, 2025). These principles have guided corridor selection and subsequent refinement of alignment and pylon siting.

6.4.4 In applying the Holford Rules, the Project has sought to avoid, where reasonably practicable, areas of highest amenity value at the strategic routeing stage. Where avoidance was not possible due to network, environmental or technical constraints, alignment refinement has been undertaken to reduce, where possible, landscape and visual effects through careful siting.

6.4.5 Consistent with the Holford guidance and National Grid's established good practice, the Project has, where appropriate, sought to maximise opportunities for close parallel routeing with existing overhead lines. This approach reduced the geographic spread of infrastructure and limited the introduction of new transmission corridors across the landscape.

6.4.6 Decisions on the extent of close paralleling balanced potential environmental benefits with engineering, safety and operational requirements, including access for construction, operation and maintenance. The defined alignment reflects that balanced judgement. Further detail is provided within **Application Document 7.20 Design Development Report - 2025**.

6.4.7 A line swap over has been utilised at Brantingham Dale, to the north-west of Dale Road to allow more of the new overhead line to be routed in close parallel to the existing 4ZQ overhead line, where the two lines descend the scarp slope from the Wolds. Despite the resultant removal of a strip of plantation woodland at Bilks Hill it was considered that this close parallel alignment would help reduce the scale of landscape impacts in this sensitive section of the Yorkshire Wolds Important Landscape Area. This line swap-over also enables the preferred alignment to be routed to the south of Ellerker and avoids the need for overhead lines both north and

south of the village in accordance with feedback received during non-statutory consultation. The proposals rationalise the spatial arrangement, support close parallel alignment while maintaining network resilience and constructability, and reduce the cumulative effect of multiple lines.

6.4.8 Where constraints intersect, professional judgement has been exercised through a design review process to achieve an appropriate balance between landscape protection, technical feasibility, operational efficiency and statutory obligations.

6.4.9 The application of the Holford Rules supported the identification of a coherent and logical alignment that responded to the environment while remaining technically feasible and operationally robust.

Undergrounding Policy

6.4.10 In accordance with NPS EN-5 paragraphs 2.9.21 to 2.9.26 (Department for Energy Security and Net Zero, 2025), the starting presumption for new, high voltage transmission infrastructure outside nationally designated landscapes is the use of overhead lines. This presumption is reversed where a route would cross part of a nationally designated landscape (paragraph 2.11.5).

6.4.11 National Grid considers every case for using underground cables for amenity reasons instead of overhead lines on its merits. The additional cost of high voltage underground transmission coupled with the environmental and operational disadvantages are important reasons for the limited use of underground cables at high voltage 275/400 kV. The following guidelines set out the categories of area where consideration may be given to undergrounding.

6.4.12 When planning the routeing for transmission connections in exceptionally constrained areas, consideration may be given to the use of underground cables. Exceptionally constrained areas refer to situations where physical or amenity factors related to landscape, land use and development weigh most heavily against the use of overhead lines and, therefore, where consideration of underground cables is warranted. In such areas, judgement on the merits of each case will be required to justify the use of underground cables.

6.4.13 The nature of the exceptionally constrained areas varies in urban, rural and estuary-crossing areas, and the key factors are outlined as a basis for the consideration of the potential use of underground cables:

- Exceptionally constrained urban areas: Urban areas where there may be exceptional constraints on the siting of overhead transmission lines comprise those locations where the density of residential, community and associated development, and public open space is such that a reasonable direct overhead route is impracticable.
- Exceptionally constrained rural areas: Of special concern in the siting of overhead transmission lines in the countryside is the protection of important landscape features in nationally or internationally designated areas of amenity value. These designated areas comprise National Parks, World Heritage Sites, National Landscape and Heritage Coasts. Exceptionally constrained rural areas comprise those locations within or immediately alongside those designated areas, where the scale of new, high voltage transmission pylons and conductors would dominate unspoilt landscape and cause serious damage to major open views of spectacular panoramas, crests of prominent ridges and skylines, or attractive small-scale valleys seen from important locations within or immediately alongside the designated areas.

- Exceptionally constrained estuary and major river crossings: these occur where the exceptional difficulty and cost of an overhead line would be comparable with, or exceed, those of an underground cable.

6.4.14 National Grid considers the relative merits of using an underground cable on a case-by-case basis. The potential use of underground cable in, or close to, exceptionally constrained urban, rural or estuary-crossing areas would require the demonstration that this is the most cost-effective means of avoiding the need for high voltage overhead lines, which would seriously harm the amenity of these areas. Consideration would also have to be given to the potential adverse effects on amenity of undergrounding cables, e.g., tree and hedge removal, Cable Sealing End Compounds, terminal and ancillary equipment.

6.4.15 The Project has been developed having regard to this policy framework. At the strategic stage, route options were identified and assessed to avoid, where reasonably practicable, nationally designated landscapes and exceptionally constrained areas. This approach sought to minimise the need to consider undergrounding as a primary design response.

6.4.16 In Route Sections where landscape sensitivity, settlement proximity or cumulative visibility required careful considerations, the relative merits of undergrounding were examined on a case-by-case basis. Non-statutory consultation during 2023 was undertaken on the basis of a starting assumption for development of an overhead line for the Project to be routed within the identified preferred corridor and graduated swathe. Consultation feedback related to requests for localised areas of undergrounding along the Project have been considered on their own merits and in context of planning policy. Details of the consultation is set out within **Application Document 5.1 Consultation Report.**

6.4.17 Through the design process, it was concluded that overhead line infrastructure represented the most efficient and appropriate solution for the entire route, in accordance with NPS EN-5 and National Grid's statutory duties.

6.4.18 At an early stage of design development, a preliminary assumption was made to underground a section of the existing 400 kV ZDA overhead line between Ealand and west of Keadby to facilitate the crossing of the proposed new overhead line. As set out in **Application Document 7.20 Design Development Report - 2025**, a detailed appraisal of alternative crossing solutions was subsequently undertaken, including both underground and overhead options, having regard to the technical feasibility, environmental and socio-economic effects, cost and programme considerations. This process identified an overhead 'diamond duck under' crossing as the preferred solution, as it utilises and modifies existing infrastructure, reduces land take and construction complexity. It also avoids the greater environmental effects, carbon intensity and costs associated with undergrounding high-voltage transmission circuits. Having regard to NPS EN-5 and National Grid's statutory duties, this approach was considered to represent the most appropriate and proportionate solution, and undergrounding was not taken forward in this location.

Local Planning Policy

6.4.19 The Project has had regard to the relevant local plan policies as identified in **Application Document 5.5 Planning Statement**, insofar as they relate to landscape, heritage, biodiversity, character and infrastructure delivery. Where local

policy objectives align with national infrastructure policy and statutory obligations, these have informed route refinement and siting decisions.

6.4.20 Local policy considerations have therefore been integrated within the broader design framework, while recognising the primacy of national policy and National Grid's statutory duties in determining the fundamental form of transmission infrastructure.

NIC Design Principles

6.4.21 The Project has had regard to the NIC Design Principles (NIC Design Group, 2020):

- **Climate:** The Project enables the transition to a low-carbon energy system and has considered climate mitigation and adaption in design development, including resilient infrastructure design and sustainable construction practices.
- **People:** Engagement with local authorities, statutory consultees, landowners and communities has informed alignment refinements, pylon siting and construction planning.
- **Places:** Through application of Holford Rules, close paralleling and contextual siting, the Project seeks to respond proportionately to landscape character and settlement patterns.
- **Value:** The Project delivers national and regional value by reinforcing the electricity network while seeking to achieve wider benefits, including BNG and the efficient use of materials.

Planning Inspectorate's Advice on Good Design and on Linear Projects

6.4.22 The Project has had regard to the Planning Inspectorate's Advice on Good Design (Planning Inspectorate, 2024) and Advice on Preparing Applications for Linear Projects (Planning Inspectorate, 2025). These emphasise the importance of a structured, transparent and multidisciplinary design process supported by clear principles and a robust design narrative.

6.4.23 The Project has been developed through an iterative process integrating engineering, environmental assessment, land considerations and stakeholder engagement. Sections 7 to 10 provide a narrative of how the design evolved, the reasons for key decisions, and how environmental and community considerations have influenced outcomes.

6.4.24 Design governance has been embedded within the Project team structure, supported by design review process to ensure that established principles have driven decision making.

Proportionate Flexibility and Deliverability

6.4.25 Defined LoD and micro-siting allowances provide a controlled mechanism for refinement during detailed design and construction. Flexibility enables responsiveness to local constraints while maintaining the established design intent.

6.4.26 Consistent with NPS EN-1 (Department for Energy Security and Net Zero, 2025) and NPS EN-5 (Department for Energy Security and Net Zero, 2025), the Project prioritises safety, resilience and operational efficacy. Good design in this context is

demonstrated through infrastructure that is deliverable within programme-requirement timescales, and capable of operating safely and efficiently over its lifetime.

Integration of Construction and Operational Design

6.4.27 Design considerations have encompassed both operational infrastructure and associated temporary and construction works. Access strategies, haul roads, compounds and working areas have been developed alongside permanent infrastructure to minimise land-take and construction effect, where reasonably practicable.

6.4.28 This integrated approach ensures that the overall environmental and community effects of the Project have been holistically considered.

6.5 Technical Design Requirements

Regulatory and Other Constraints (such as Operational, Safety and Security Requirements)

6.5.1 Given the nature of the electricity transmission infrastructure compared to other types of infrastructure projects, the Project design is governed by statutory duties and obligations set out under the following regulations and legislation:

- Electricity Act 1989 (HM Government, 1989) – requires the distributor to develop and maintain efficient, co-ordinated and economical system of electricity distribution;
- Transmission Licence obligations – connections and security of supply;
- National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS) – design safety standards;
- Electricity Safety, Quality and Continuity Regulations 2002
- The Construction (Design and Management) Regulations 2015 (HM Government, 2015); and
- NPS EN-1, EN-3 and EN-5 requirements.

6.5.2 The above legislation and policy provide the framework for decision-making when identifying the most appropriate strategy option for any planned new connection and defining the Project in detail. The primary design requirement for electricity infrastructure is that it must be safe and secure. These functional constraints, particularly around safety and operational reliability, can significantly limit National Grid's ability to adapt the aesthetic appearance of its infrastructure.

6.5.3 In the case of the Project, the preferred strategic option is an onshore connection. This is the preferred strategic option because it best aligns with National Grid's statutory obligations under s9 of the Electricity Act 1989 (HM Government, 1989), and is supported by national government policies, including NPS EN-1 (Department for Energy Security and Net Zero, 2025) and NPS EN-5 (Department for Energy Security and Net Zero, 2025). National Grid's starting position for new onshore electricity transmission infrastructure is then informed by NPS EN-5, which, for areas outside nationally designated landscapes, identifies the general acceptability of the use of overhead lines.

6.5.4 Paragraph 2.9.7 of NPS EN-5 indicates that:

'…the government does not believe that the development of overhead lines is incompatible in principle with applicants' statutory duty under Schedule 9 to the Electricity Act 1989, to have regard to visual and landscape amenity and to reasonably mitigate possible impacts thereon.'

6.5.5 There is nonetheless recognition that, in practice, new overhead lines can give rise to adverse landscape and visual impacts, and that the right balance must be struck between the need for infrastructure development and the preservation of visual and landscape quality. The NPS goes on to identify circumstances and decision-making criteria where a change from the starting presumption may be appropriate.

6.5.6 For overhead lines, National Grid uses standard steel lattice pylons as the starting point in project design. These are well-established, cost-effective, and proven technologies. Their size, height and spacing are determined by a combination of safety regulations, environmental conditions and operational needs. Similarly, substation sitings and layouts are driven by technical and safety requirements, meaning there is limited flexibility to alter their configuration for visual or architectural reasons.

6.5.7 These infrastructure components of the overhead lines are, by nature, large-scale and often highly visible within the landscape. Despite this, in most circumstances overhead lines are accepted in relevant national planning policy, as they are essential for meeting National Grid's statutory duty to deliver a network that is both economical and efficient.

6.5.8 However, in Protected Landscape areas, paragraph 2.9.21 of NPS EN-5 is clear that:

'Although it is the government's position that overhead lines should be the strong starting presumption for electricity networks developments in general, this presumption is reversed when proposed developments will cross part of a nationally designated landscape.'

6.5.9 Therefore, in such cases and in line with the above policy, National Grid reverses the assumption and assumes the use of underground cables. Additionally, the use of underground cables may be appropriate outside of these designated areas, in cases where NPS EN-5 (paragraph 2.9.24) states that there is '*a high potential for widespread and significant adverse landscape and/or visual impacts along certain sections of its route*'. National Grid also considers whether the starting presumption is most appropriate, or whether there is a basis to consider further application of the mitigation hierarchy and the use of alternative pylon designs, or whether the use of underground cables is justified. The mitigation hierarchy is a stepped process that helps development projects to address potentially adverse impacts on the environment.

Design Limitations Due to Nature of Electricity Transmission Infrastructure

6.5.10 NPS EN-1 paragraph 3.3.80 (Department for Energy Security and Net Zero, 2025) states that:

'…it is recognised that the case for a new connection or network reinforcement is demonstrated if the proposed development represents an efficient and economical means of:

- *Connecting a new generating station or storage facility to the network;*
- *Reinforcing the network to accommodate such connections; or*
- *Reinforcing the network to ensure that it is sufficiently resilient and capacious (per any performance standards set by Ofgem) to reliably supply present and/or anticipated future levels of demand*.'

6.5.11 In meeting the 'efficient and economical' test (as required by the Electricity Act 1989) and guided by NPS EN-1, the good design, avoidance and mitigation principles are achieved by meeting the requirements set out in NPS EN-5.

6.5.12 NPS EN-5 (Department for Energy Security and Net Zero, 2025) requires, at paragraph 2.4.2, that applicants consider the criteria for good design set out in NPS EN-1 at an early stage when developing proposals. NPS EN-5 recognises at paragraph 2.4.3 that:

'…the Secretary of State should bear in mind that electricity networks infrastructure must in the first instance be safe and secure, and that the functional design constraints of safety and security may limit an applicant's ability to influence the aesthetic appearance of that infrastructure.'

6.5.13 At paragraph 2.4.4, NPS EN-5 goes on to state that '*the functional performance of the infrastructure in respect of security of supply and public and occupational safety must not thereby be threatened*.'

6.5.14 Taken together, NPS EN-1 and NPS EN-5 recognise that electricity transmission infrastructure is subject to inherent functional design constraints. These arise from the need to ensure safety, security of supply, technical performance, and compliance with statutory and regulatory standards. As a result, the scope to influence the form and appearance of overhead lines and associated infrastructure is limited, particularly where changes would compromise network efficiency or public and occupational safety.

6.5.15 In this context, good design for electricity transmission projects is not defined by visual appearance alone. As set out in NPS EN-1, it is primarily achieved through infrastructure that is fit for purpose, efficient, resilient and sustainable, and which responds appropriately to its context. This Project design has therefore focused on route selection, alignment refinement and pylon siting, guided by established principles including those set out in NPS EN-1, NPS EN-5, and the Holford Rules relating to routeing and siting of overhead lines.

6.5.16 Within these constraints, design influence is necessarily focused on aspects that do not compromise functional performance, including detailed siting, layout and the proportionate use of mitigation. This reflects national policy recognition that, while the nature of electricity infrastructure may limit its ability to enhance local character, good design remains a key means of avoiding and reducing adverse effects and delivering sustainable, well-considered infrastructure.

Sustainability Vision

6.5.17 The Project is required to support the connection of renewable and other low-carbon electricity into the National Electricity Transmission System network. In doing so, it will support the UK government's Clean Power 2030 Action Plan (UK Government, 2025) and the wider transition to a net-zero energy system. The operational, medium- to long-term national benefits of enabling increased renewable generation

and secure power transfer are therefore considered to outweigh the short-term effects of greenhouse gas emissions associated with construction activities and material use.

6.5.18 The Project has been designed having regard to climate resilience. Overhead line infrastructure is inherently robust and is designed to operate safely under extreme weather conditions, including high winds and ice loading. National Grid has previously assessed the implications of climate change for overhead line design and concluded that future climate scenarios are unlikely to increase the combined risk of extreme wind and ice events. Consideration of climate change adaption and resilience is addressed further within the ES, including **Application Document 6.19 Environmental Statement Chapter 19 Climate Change** and the greenhouse gas assessment.

6.5.19 Flood risk has been an important consideration in the development of the Project. Sections of the route cross river floodplains, including the River Ouse and River Trent, which are located within Flood Zone 3. The presence of these floodplains has been recognised as a key constraint on the alignment and pylon siting. Flood risk has been assessed in **Application Document 7.13 Flood Risk Assessment** submitted with the DCO application. The EIA process will ensure that appropriate measures are embedded in the design, construction and operational phases to manage flood risk effectively.

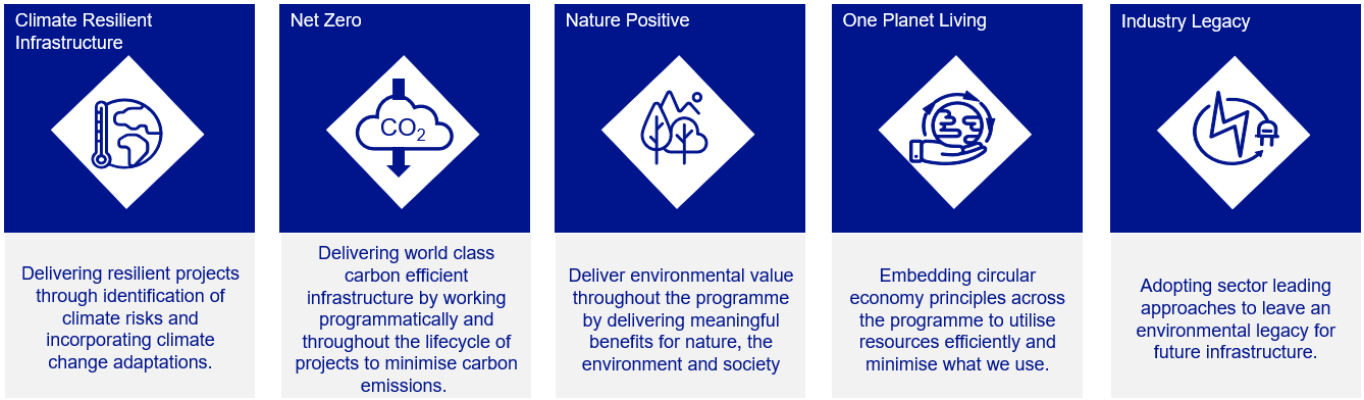
6.5.20 National Grid commits to embedding a sustainable approach in the design of the Project. This approach is informed by National Grid's Environmental Action Plan for RIIO-T3 2026–2031 (National Grid plc, 2024).

6.5.21 On all National Grid projects, this involves reducing, where possible, material use in construction – especially reducing reliance on high-carbon materials such as concrete and cement – and reducing waste. Buildings both temporary and permanent should be energy and resource efficient. Wildlife should be preserved with habitats enhanced, where possible. The Project has committed to delivering 10% BNG with wider environmental and societal benefits.

6.5.22 National Grid's vision for the Project links to five pillars (shown in Image 6.2) and the United Nations Sustainability Goals. The five pillars are the following:

- Climate Resilient Infrastructure;
- Net Zero;
- Nature Positive;
- One Planet Living; and
- Industry Legacy.

Image 6.2 – Embedding sustainability into the Project



6.5.23 How these pillars will be committed to and delivered are set out in Table 6.1. The sustainability framework contained within this section underpins how the Project design team and the Great Grid Partnership adopt the National Grid framework for sustainability. National Grid is committed to meeting certain sustainability requirements as a company; these requirements have been committed to for the Project and its contractors.

6.5.24 The sustainability vision ensures that sustainability is embedded through the full life cycle of the Project from design, procurement, construction and, finally, operation. Therefore, the Project design team including the Great Grid Partnership will continue to embed National Grid's design principles through to delivery of the Project, integrating PAS 2080 principles and wider best practice where applicable.

Table 6.1 – Summary of the sustainability strategy for project delivery

	Net Zero	One Planet Living	Nature Positive	Climate Resilient Infrastructure	Industry Legacy
National Grid are committed to making informed decisions and driving positive impact through:	Delivering world-class, carbon-efficient infrastructure by working programmatically and throughout the lifecycle of projects to minimise carbon emissions. National Grid will pave the way for sustainable design and set a new standard for future infrastructure.	Embedding circular economy principles across the programme to utilise resources efficiently and minimise what National Grid use.	Leading the transition to nature positive infrastructure by delivering meaningful benefits for nature and the environmental boundaries of each project.	Delivering resilient projects through identification of climate risks and adapting to climate change and other future challenges.	Adopting sector-leading approaches to leave an environmental legacy for future infrastructure.
National Grid will meet these commitments through application of technical excellence and delivery of:	• Programmatic alignment and compliance to PAS 2080 • Establish industry-leading, whole-life carbon reduction targets, in line with the National Grid SBTs • Strive for zero fossil-fuel construction sites by leading the transition away from diesel to more	• Take a hierarchical and programmatic approach to resource management across the programme • Beneficially reuse 100% clean excavated material • Undertake a circular economy	• At least 10% BNG, whilst delivering a positive wider environmental gain • Assessment of carbon sequestration achieved through nature delivery • Embedding resilience through nature-based solutions, and measuring the ecological impact of Project activities to	• Integrating climate adaptation into constructability • Assess and improve design standards to allow for planning for adaptation to a future climate 4 degrees Celsius higher than today • Developing adaptation	• Delivering innovations to progress the industry • Developing a green skills legacy through upskilling programmes and support of the supply chain • Delivering long-term benefits through programmatic opportunities beyond the portfolio by supporting new markets and technologies • Aggregating demand for key materials to enter partnerships to drive

	Net Zero	One Planet Living	Nature Positive	Climate Resilient Infrastructure	Industry Legacy
	sustainable alternatives • Procure low-carbon materials • Develop sustainable procurement systems • Establish incentive and reporting mechanisms for activities that realise low-carbon infrastructure.	assessment to understand material hotspots and opportunities to create a consistent approach to material management • Embedding sustainability to ensure modern methods of construction deliver the right outcome • Minimising non-potable water risks and resource use • Responsibly source materials, aligning to BES6001 and driving for better industry wide data.	fully understand the true impact of decisions • Work towards Science Based Targets Network (SBTN) alignment by first understanding the Project impact • Integrating constructability early in project development to minimise nature loss • Be the first programme to embed the Building with Nature standards for National Grid substations delivering better outcomes for nature.	pathways to identify actions to cope with a range of possible futures • Portfolio climate risk assessment to identify design guidelines to improve resilience, implemented at project level.	supply chain decarbonisation • Leave a legacy for future National Grid projects by resolving barriers and improving processes and tools • Engage regulators and industry partners to help shape industry progress • Review the legacy left from previous infrastructure programmes with a view to leaving a legacy for future programmes
Delivery:	• PAS 2080 Carbon Management System	• Portfolio Resources	• Portfolio Nature Strategy, inclusive	• Climate design standards	• Sustainability innovations • Industry learning

	Net Zero	One Planet Living	Nature Positive	Climate Resilient Infrastructure	Industry Legacy
	• Portfolio whole-life carbon assessment to establish targets and Carbon Management Plans per project • Sustainable fuel transition plan • Alignment to ISO20400 sustainable procurement standard • Mechanism for delivering incentivisation.	Management Plan • Temporary works design principles.	of the whole value chain • Embedding nature within design principles • Programmatic environmental licensing and consents.	• Project climate risk assessments • Asset management and handover plans to include adaptation plans.	• Sustainable Design Statements • Supply chain engagement and partnerships • Digital systems • Requesting material passports and Environmental Product Declarations (EPDs) to drive industry improvement.

7. Summary of the Strategic Proposal Stage

7.1 Strategic Options Considered

7.1.1 **Application Document 7.17 Strategic Options Report inc needs case** (SOR) identified and evaluated a range of high-level strategic solutions to address the need for increased transmission capacity between the North of England and the Midlands, to support renewable energy connections and anticipated future power flows. The assessment was part of a structured iterative process to identify options that would deliver the additional transmission capability required to meeting system standards and generation connections by 2030.

7.1.2 For the North Humber to High Marnham element of the SOR, the strategic options considered included a number of onshore and offshore alternatives. The onshore options involved different combinations of new, double-circuit transmission connections from the Creyke Beck area to various potential downstream points (Cottam, Grimsby West, Weston March, Walpole). Offshore options were also considered, such as subsea connections between key nodes. Each strategic option was evaluated against objectives including system capacity, deliverability, environmental and socio-economic impacts, and interaction with other planned network developments, such as Eastern Green Link 3 and 4.

7.1.3 The appraisal concluded that an overhead line connection between a new Creyke Beck Substation and a new High Marnham Substation (Option ECO1) was the most efficient and effective strategic solution for Issue (a). This option was taken forward as the basis for the Project.

7.2 Preferred Strategic Proposal

7.2.1 The preferred strategic proposal for the Project is to deliver a new 400 kV overhead transmission connection between a new substation at Creyke Beck in the East Riding of Yorkshire, and a new substation at High Marnham in Bassetlaw, Nottinghamshire. This solution was selected through the SOR process because it meet the need case by providing the required additional boundary capacity, supporting generation connections, and managing north-south power flows – all while balancing environmental, technical and socio-economic considerations relative to the other options assessed.

7.2.2 The selection of this preferred proposal reflects a combination of:

- System performance and operational effectiveness: delivering additional capacity across the relevant transmission boundaries in line with NETS SQSS requirements.
- Deliverability: an overhead line connection aligned with existing and proposed infrastructure that utilises established design and construction approaches.

- Comparative assessment: relative advantages in environmental footprint, cost, constructability and programme when compared with longer or more complex onshore alignments or subsea alternatives.

7.3 Key Issues Identified at Strategic Proposal Stage

7.3.1 In progressing the preferred strategic proposal, a number of key contextual and constraint issues were identified that need to be considered further at the next stages of project development and detailed design:

- **Environmental designations and landscape context**: The route corridor crosses areas of varying landscape character, ecological sensitivity and environmental designations that required refined alignment to avoid and minimise impacts.
- **Historic environment**: Landscapes with archaeological potential and heritage assets that may be affected by routeing choices.
- **Hydrology and flood risk:** Floodplain crossings, particularly associated with the River Ouse and River Trent, require assessment and design responses to manage flood risk.
- **Cumulative network developments:** The interaction with other network projects (e.g., EGL3 and EGL4) may influence sequencing and design interfaces.
- **Land use and community context:** Local land uses, transport infrastructure, and settlement edges that inform micro-siting and access planning.

7.3.2 These considerations will be taken forward into the detailed design, assessment and consultation phases, with early technical and environmental studies guiding further alignment refinement and assessment.

7.4 Early Stakeholder Engagement

7.4.1 At the strategic stage, formal stakeholder engagement specific to the SOR was limited given its high-level nature. The strategic options process was informed principally by technical, policy and system-planning drivers. However, subsequent rounds of non-statutory and statutory consultation have been undertaken for the Project itself, and feedback from those consultations has been used to inform design evolution beyond the strategic stage.

8. Summary of the Options Identification and Selection Stage

8.1 Approach to Routeing and Siting

8.1.1 The routeing and siting of the Project were developed through a structured and proportionate process undertaken during the Options Identification and Selection stage (Stage 2), as documented in the **Application Document 7.18 Corridor and Preliminary Routeing and Siting Study** (CPRSS). This stage built upon the Strategic Proposal (Stage 1), which identified the broad need and location for the Project to reinforce the national electricity transmission network and support the delivery of the UK's Net Zero ambitions.

8.1.2 The development of routeing and siting options for the Project followed a structured, evidence-led approach informed by statutory duties under the Electricity Act 1989 (HM Government, 1989), NPS EN-1 (Department for Energy Security and Net Zero, 2025) and NPS EN-5 (Department for Energy Security and Net Zero, 2025), the NPPF (Ministry of Housing, Communities and Local Government, 2026), and the British Energy Security Strategy (HM Government, 2022). The process considered the need for efficient and coordinated transmission infrastructure while balancing environmental, social and technical constraints.

8.1.3 Routeing decisions focused on identifying broad corridors that avoided areas of highest landscape and ecological sensitivity, minimised visual impacts, and responded to key engineering and operational requirements. The Holford Rules provided guidance on corridor alignment, prioritising direct lines, minimising sharp angles, and taking advantage of natural screening where available.

8.1.4 Siting decisions refined the location of infrastructure within these corridors, considering localised features, such as topography, watercourses, property boundaries and sensitive receptors. The aim was to minimise environmental and community impacts, optimise performance and maintain safety and resilience.

8.1.5 The approach also incorporated iterative appraisals of potential constraints and opportunities. Environmental, heritage, landscape and socio-economic considerations were assessed at each stage, alongside operational and engineering requirements. Feedback from technical stakeholders informed refinement of the corridors and siting principles, ensuring that key risks and opportunities were addressed prior to consultation.

8.1.6 This staged, integrated methodology provided a robust basis for the identification of emerging preferred corridors and locations, setting the foundation for subsequent design development and consultation.

8.2 Routeing and Siting Options and Selection of the Preferred Option

8.2.1 Routeing options for the Project were developed and refined during the Options Identification and Selection stage (Stage 2), as set out in the CPRSS. This stage sought to identify a preferred corridor through a structured and proportionate process

that systematically considered environmental, socio-economic, technical and cost constraints across a defined study area. While the focus at this stage was on the identification of a preferred route corridor, siting considerations were integral to the refinement and appraisal of routeing options.

8.2.2 The routeing process began with the definition of a study area informed by connection points identified at the Strategic Proposal stage. The study area reflected the distribution of areas of highest environmental and amenity value, physical and human geography, existing electricity transmission infrastructure, and established routeing principles, including the Holford Rules. Within this study area, detailed environmental, socio-economic and technical baseline data were gathered and mapped to understand the relative distribution of constraints and opportunities that would inform both routeing and siting considerations.

8.2.3 A structured GIS-based analysis was used to inform the development of routeing options. Environmental and socio-economic features were assigned sensitivity weightings according to their potential to constrain the Project, having regard to legislation, policy and best practice. These weightings were used to produce composite 'heat maps' that visually represented areas of greater and lesser constraint. The heat maps provided a consistent and transparent basis for identifying preliminary routeing corridors that sought to minimise interaction with the most sensitive receptors, while maintaining technically feasible and efficient connections between the identified start and end points.

8.2.4 Using the heat maps, a GIS 'cost corridor' analysis was undertaken to identify potential route corridors that minimised overall environmental 'cost', taking into account both distance and sensitivity. This analysis was undertaken separately for overhead line and underground cables. The outputs of the GIS analysis were not treated as definitive routes, but as a starting point for professional judgement by landscape, environmental and engineering specialists within the Project Team.

8.2.5 Four preliminary overhead line route corridor options were identified within the study area. To enable a robust and transparent appraisal, each corridor was structured into sections, links and loops. This approach allowed different components of the corridor sections to be assessed both in isolation and in combination, enabling constrained areas to be bypassed where appropriate, while still forming viable end-to-end routeing solutions. The corridors were refined iteratively through reviews by the Project Team and the Front-End Engineering Design (FEED) Contractors, ensuring that routeing options were technically feasible and responsive to environmental and socio-economic considerations, including early siting constraints that could not be fully captured through desk-based mapping alone.

8.2.6 Targeted site visits were undertaken to test the desk-based findings, with a particular focus on areas identified as constrained or forming potential pinch points. These visits informed further refinement of routeing and siting considerations and, where necessary, the amendment or discounting of specific corridor sections. The refined corridors were then subject to a comparative options appraisal in accordance with National Grid's Approach to Consenting (National Grid, 2022), considering environmental, socio-economic, technical and cost factors, and with the potential for mitigation in line with National Grid's mitigation hierarchy.

8.2.7 Following the appraisal of individual sections, links and loops, an end-to-end solution was identified between Creyke Beck and High Marnham. This review considered how the preferred elements of each corridor performed collectively when assessed as a continuous route. This ensured that the emerging preferred corridor represented a

coherent and balanced solution across the full length of the Project, rather than series of local optimised decisions. The end-to-end review confirmed the suitability of the emerging preferred corridor.

8.2.8 The appraisal process demonstrated that, where practicable, routeing the new overhead line broadly parallel to the existing 400 kV transmission infrastructure offered the most balanced solution. This approach was found to minimise overall environmental and socio-economic impacts by concentrating effects within areas already influenced by existing infrastructure, while also avoiding areas of highest engineering challenge and maintaining an efficient route length. Localised deviations from existing infrastructure were identified, where required, to respond to specific technical or environmental constraints, including in the vicinity of Keadby windfarm and within parts of the Trent Valley.

8.2.9 Within the emerging preferred corridor, a graduated swathe was developed to illustrate areas where the Project infrastructure is more or less likely to be located at this stage. The graduated swathe reflects the incorporation of routeing and siting considerations and provides flexibility for further design development. The emerging preferred corridor and graduated swathe were taken forward to inform non-statutory consultation, with feedback to be used to refine routeing and siting as the Project progressed to the defined proposal and statutory consultation stage. See Image 8.1 below.

8.2.10 Further design development was undertaken in response to stakeholder feedback from non-statutory consultation and ongoing technical assessment. In route section 10 (A620 to Fledborough), a number of consultation responses suggested that the new overhead line should be routed further to the east, outside of the emerging preferred corridor, closer to the existing overhead lines. Feedback suggested that this would reduce the impact of the new infrastructure in the area, keeping it closer to existing infrastructure. Feedback also commented that this would reduce impacts on sensitive sites, including nature reserves, Sites of Special Scientific Interest (SSSIs) and a number of unlicensed airstrips. The feedback received together with a backcheck of previous work led to the identification of a potential alternative corridor for a section of the Project between South Wheatley and High Marnham, which is referred to as the eastern corridor. The SCRR (**Application Document 7.19 Supplementary Corridor and Routeing Report)** sets out further detail on the identification and assessment of the potential alternative eastern corridor between South Wheatley and High Marham and was subject to localised non-statutory consultation in 2024. The assessment of this alternative corridor followed a methodology consistent with the CPRSS, including the identification of a graduated swathe.

8.2.11 The comparative appraisal of the eastern and western corridor options, informed by consultation feedback from 2023 and 2024, together with updated environmental surveys and technical studies, identified that while both corridors were feasible, the western corridor provided a more balanced solution overall. The western corridor avoided extensive areas of Flood Zone 3, reducing construction and operational risk, allowing for a more straightforward and efficient engineering design with fewer constrains on alignment, and minimising interactions with third-party developments and associated cost and programme risks. While the eastern corridor offered some potential landscape and visual advantages through partial co-location with existing infrastructure, these benefits were limited by the inability to achieve continuous close parallel alignment and the potential for increased cumulative effects.

8.2.12 On balance, and having regard to environmental, socio-economic, technical and cost considerations, the western corridor was identified as the preferred corridor between South Wheatley and High Marnham. This outcome is reflected in the preferred corridor and is reported in **Application Document 7.20 Design Development Report - 2025.** See Image 8.1 below.

Image 8.1 – Emerging preferred corridor and graduated swathe presented at the Non-Statutory Consultation 2023 (Source: Figure 3.1 – Application Document 7.20 Design Development Report - 2025)

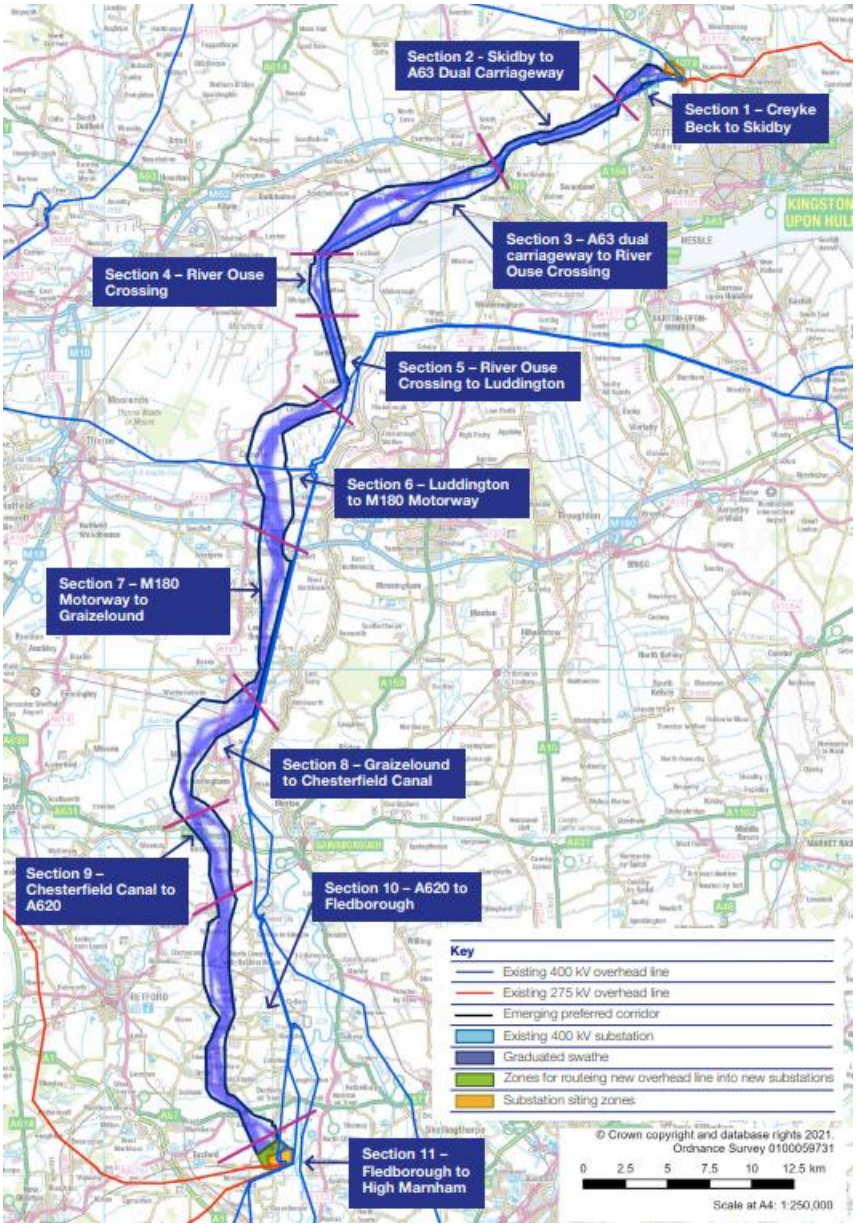
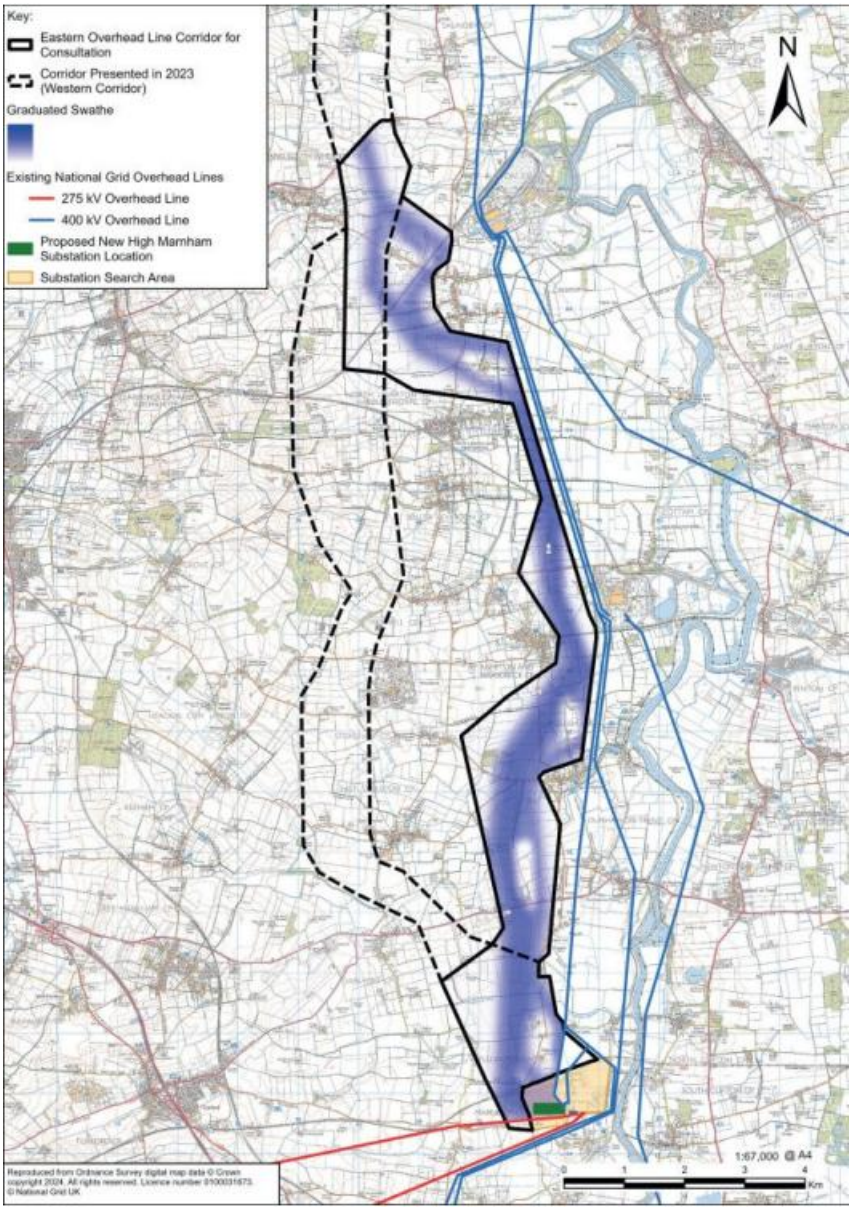


Image 8.2 – Eastern corridor option and graduated swathe between South Wheatley and High Marnham presented at the localised Non-Statutory Consultation 2024 (Source: Figure 3.13 – Application Document 7.20 Design Development Report - 2025)



9. Evolution of the Project Design

9.1 Technical Design Considerations

9.1.1 The Project design has been developed with consideration of a range of high-level technical factors that influence both the feasibility and performance of the new overhead line. These factors have guided decisions on the alignment, configuration and specification of the infrastructure to balance operational efficiency, environmental sensitivity and socio-economic impact. Further detail is provided in **Application Document 7.20 Design Development Report - 2025**. Key design considerations as detailed below.

Line Swap Overs

9.1.2 Line swap overs have been incorporated into the Project design in Route Section A as set out in more detail within **Application Document 5.9 - Design Development Report**) as a strategic design measure to maintain parallel alignment between new and existing overhead line routes. The high-level design consideration for including line swap over was to ensure continuity of the route while optimising land use, and minimising the overall footprint of new infrastructure.

Close Parallel Opportunities

9.1.3 The preferred alignment has sought to maximise the use of close parallel routeing with existing overhead lines, where technically feasible and environmentally appropriate. This approach reduces the spread of transmission infrastructure, minimises landscape and visual impacts, and facilitates a coherent and deliverable design.

9.1.4 The route closely follows the existing 4ZQ overhead line between Creyke Beck Substation and Keadby Substation, running predominantly in close parallel shortly after Skidby. Deviations from parallel alignment were implemented to avoid environmental and infrastructure constraints, including nearby high-pressure gas pipelines, local wildlife sites, the Lazaat Hotel, Orsted Hornsea P4, lower voltage overhead lines and residential receptors.

9.1.5 From there, it remains in close parallel until it deviates around the Brantingham Dale Site of Special Scientific Interest in order to minimise any loss of woodland.

9.1.6 It then remains in close parallel until just south of where the Project crosses the River Ouse. The new overhead line deviates away from close parallel to avoid the village of Ousefleet, and to avoid the main part of the RSPB Blacktoft Sands Reserve and the main area of bird activity. The proposed routeing has been designed to avoid physical impacts on, and oversail of the Hall Garth Moated site, however the overhead line will be located within its setting. Works within the designated site boundary will be restricted to prevent adverse effects.

9.1.7 The routeing returns to close parallel just south of the village of Ousefleet. It remains in close parallel until just south of Luddington where the existing 4ZQ overhead line and the proposed overhead line diverge. The existing 4ZQ line connects into Keadby and the new overhead line continues south, first routeing west, to avoid Keadby Wind Farm.

9.1.8 The proposed route continues in close parallel with existing overhead lines just east of Epworth, running parallel with the existing 4TM and ZDA overhead lines, where feasible. Deviations occur to avoid residential properties, conservation areas and locally sensitive environmental features up until east of Graizelound.

Pylon Types

9.1.9 The selection of pylon type for the Project has been informed by a balance of technical requirements, operational considerations and the need to integrate the new overhead line within landscapes already influenced by existing high voltage electricity infrastructure.

9.1.10 Standard lattice steel pylons are proposed along the majority of the route. This reflects their proven ability to support the required conductor configuration, their compatibility with existing 400 kV overhead lines, and their established operational resilience. The use of a consistent pylon type along extended sections of the route also supports visual coherence, particularly where the proposed alignment closely parallels existing overhead lines.

9.1.11 Alternative pylon types were considered at a strategic level in locations where local circumstances suggested potential benefit. However, the appraisal concluded that, in most cases, these alternatives would provide limited additional mitigation when considered alongside potential increases in construction complexity, operational constraints, and visual inconsistency with adjacent infrastructure. As a result, no strong justification was identified for their widespread use at this stage, although limited use of alternative structures may continue to be reviewed as the detailed design progresses.

Conductor Types

9.1.12 The overhead wires that transport the electrical power are known as conductors. The selection of conductor type has been driven by the electrical rating required for the Project and the need to ensure safe and reliable operation of the transmission network.

9.1.13 The Project requires a 400 kV overhead line capable of transmitting the required power capacity. To meet this, an Araucaria, All Aluminium Alloy Conductor bundle or similar 400kV capable conductor bundle, will be required. This conductor requirement directly informs the range of pylon designs that can be employed and has been considered alongside pylon selection to ensure technical compatibility.

9.1.14 On works to the ZDA route running east-west between Keadby Substation and Crowle, it is proposed to reuse the existing conductor type, twin Rubus All Aluminium Alloy Conductor where suitable and fit for purpose.

9.1.15 For the River Ouse crossing section, a bespoke conductor may be required which will be confirmed post consent during detailed design

9.1.16 This approach provides a robust and deliverable design while allowing for refinement as the Project progresses through detailed design.

9.2 Evolution of the Project Design Following Non-Statutory Consultation

9.2.1 Non-statutory consultation was undertaken in 2023, and localised non-statutory consultation in 2024. Following on from this, the Project design was further developed in response to stakeholder feedback, ongoing environmental assessment and engineering studies. The process included development and refinement of the preferred alignment, review of routeing and siting decisions and the consideration of alternative options where appropriate. This included the assessment of the eastern corridor between South Wheatley and High Marnham.

9.2.2 The outcome of this iterative design process is documented in **Application Document 7.20 Design Development Report - 2025.** The purpose of the report is to describe how the Project evolved following non-statutory consultation, including how consultation feedback and technical assessments informed the identification of the preferred alignment and the development of the proposals taken forward to statutory consultation.

9.3 Evolution of the Project Design Following Statutory Consultation

9.3.1 Following statutory consultation undertaken between February and April 2025, the Project design was further refined in response to consultation feedback, alongside the results of environmental, socio-economic, transport and engineering studies. This stage of design development focused on reviewing the preferred alignment and proposals presented at statutory consultation, identifying potential modifications, and assessing where changes were proposed.

9.3.2 The outcome of this stage of design development is documented in the 2026 Design Development Report - **Application Document 5.9 Design Development Report.** The purpose of the report is to describe how the Project has evolved since statutory consultation, including how feedback, additional surveys and assessments, and further design review have informed the refinement of the final proposals submitted for development consent.

10. Evolution of Temporary Works Design

10.1 Evolution of the Temporary Works Design

10.1.1 The temporary works design has evolved through an iterative process informed by non-statutory consultation, statutory consultation, environmental assessment, ongoing engagement with highway authorities and landowners, site visits, and the progressive development of construction methodologies.

10.1.2 At PEIR stage, the temporary works strategy was presented on a draft and flexible basis, identifying a range of Primary Access Routes, highway access points, haul road alignments, distribution network operators' works, working areas and compound locations within a broad corridor. Since that stage, the strategy has been refined through detailed survey information, transport assessment, construction sequencing and stakeholder engagement. This has resulted in the rationalisation of these works.

10.1.3 Given the linear nature of the Project, temporary works form a substantial component of the overall design. Their location, extent and specification have been refined to ensure that construction can be undertaken safely and efficiently while seeking to avoid and reduce potential environmental and socio-environmental effects.

10.1.4 Full technical detail regarding the above is provided within **Application Document 5.9 Design Development Report**, **Application Document 7.15 Transport Assessment**, and **Application Document 6.14 Environmental Statement Chapter 14 Traffic and Transport**. This section explains how the temporary works design has evolved.

10.2 Transport and Access Evolution

10.2.1 The transport and access strategy has progressed from an initial identification of potential routes and access points at PEIR stage to a more defined and rationalised arrangement at application stage. Early optioneering retained flexibility across a wider range of local roads and junctions. Through ongoing engagement with highway authorities and a review of junction capacity, carriageway width, visibility, traffic flows and settlement sensitivity, certain routes were removed from the strategy where they were unsuitable for regular heavy goods vehicle movements or where potential community impacts would be disproportionate. Appropriate alternatives were then proposed and discussed.

10.2.2 Primary Access Routes have been identified to connect directly to the Strategic Road Network where practicable, reducing reliance on constrained local roads. The siting of new bellmouth access points has been refined to:

- Maximise the use of existing field gates and hardstanding;
- Maximise on opportunities to provide access crossovers to reduce the amount of construction traffic needing to be routed on the highway.
- Reduce the need for vegetation removal and hedgerow loss;
- Avoid sensitive receptors and residential properties; and
- Ensure compliance with visibility splay and highway safety requirements.

10.2.3 The number and distribution of access points have been rationalised, where possible, to limit the overall extent of highway intervention and reduce temporary land-take. This refinement balances the need for safe and efficient heavy goods vehicle access, with the objective of minimising construction effects on local communities and the surrounding environment.

10.3 Haul Road Refinement

10.3.1 Given the linear nature of the Project, the construction haul road forms a critical element of the temporary works strategy. At PEIR stage, indicative alignments were identified. As the alignment and pylon positions have been refined, the haul road has been correspondingly adjusted to reduce unnecessary length, limit repeat crossings of environmental features and reduce temporary land-take.

10.3.2 The haul road has been positioned, where practicable, to reduce the need to multiple access points from the public highway, and to limit construction traffic on unsuitable local roads. Where possible existing crossings have been used to reduce the number on new interactions with the public highway network. Minor realignments have avoided environmentally sensitive areas identified through survey works, reduced impact on agricultural land, and made use of existing crossing points, where feasible.

10.3.3 The progression over the course of the design has moved from a broad, corridor-based strategy to a more focused construction layout alignment that follows the defined overhead line alignment.

10.4 Conductor Stringing and Working Area Design

10.4.1 As design refinement has progressed, including the application of close paralleling and localised line adjustments, construction working areas have been iteratively reviewed and refined. This process has been informed by updated survey information, landowner feedback and other site-specific data as it has become available, while ensuring that stringing equipment can be safely located at appropriate distances from pylon bases.

10.4.2 This process informed the spatial requirements of stringing positions and access arrangements and, in more instances, resulted in adjustments to working area extents to reduce environmental or land use effects, whilst maintaining operational safety and efficiency.

10.5 Crossing Protection

10.5.1 The need to safeguard existing infrastructure such as roads, railways, navigable watercourses and existing overhead lines during conductor installation has informed the incorporation of temporary crossing protection measures.

10.5.2 At earlier stages, scaffold protection was identified at a broad range of crossing points. Through engagement with asset owners and technical design review, the requirement for protection, location and extent of scaffold netting and associated working areas has been refined to minimise disruption and, where necessary, to coordinate temporary closures in a managed manner.

10.5.3 This iterative coordination has ensured that safety requirements are met while limiting effects on transport corridors and other infrastructure.

10.6 Public Rights of Way and Road Network Management

10.6.1 Public rights of way (PRoWs) intersecting the construction corridor were identified during early route development and assessed through environmental and socio-economic studies, and through engagement with the relevant local authorities and organisations. At PEIR stage, potential temporary closures were identified where routes crossed working areas and interacted with pylon locations and accesses.

10.6.2 As the Project has progressed, a more tailored approach has been developed, distinguishing between:

- Managed access arrangements allowing supervised passing, where safe;
- Short-duration closures during specific work activities; and
- Temporary diversions where sustained works would otherwise create unsafe conditions for PRoW users.

10.6.3 The refined approach seeks to maintain connectivity, where reasonably practicable, with reinstatement following completion of works while maintaining safety.

10.6.4 The identified PRoWs are set out in:

- **Application Document 6.14 Environmental Statement Chapter 14 Traffic and Transport;**
- **Application Document 6.14.F4 Environmental Statement Figure 14.4 Public Rights of Way (PRoWs) Impacted During Construction Phase**;
- **Application Document 6.17 Environmental Statement Chapter 17 Socio-economic**; and
- **Application Document 7.6 Outline Public Rights of Way Management Plan**.

10.6.5 Temporary road management measures have similarly evolved alongside the transport assessment to ensure safe and proportionate control of construction traffic.

10.6.6 Temporary traffic management will be implemented throughout the construction period to manage interactions with the road network, while maintaining access wherever possible. Measures will typically include temporary traffic lights, shuttle land working and marshal operated stop-go boards. In some cases, temporary road closures will be required, with diversion routes provided where feasible. Additional traffic management will also be implemented within towns and villages along the Primary Access Route to facilitate the safe passage of heavy goods vehicles. This may include temporary parking suspensions and signal control at constrained locations. Further details are provided in the:

- **Application Document 6.14 Environmental Statement Chapter 14 Traffic and Transport**;
- **Application Document 7.4 Outline Construction Traffic Management Plan**; and
- **Application Document 7.15 Transport Assessment**.

10.7 Temporary Construction Compounds

10.7.1 Temporary construction compounds and laydown/storage areas are required to support the construction phase. At PEIR stage, a broader distribution of potential compound locations was identified to maintain flexibility across the route.

10.7.2 The number, size and location of temporary construction compounds have evolved in response to route length, geographical constraints and the location of key construction activities. Compounds have been positioned to balance operational efficiency with environmental and socio-economic considerations.

10.7.3 As design has progressed, compound siting has been refined to align with Primary Access Routes, reduce travel distances along the haul road, and respond to technical servicing requirements, including drainage outfalls and power supply. This has resulted in a distribution of compounds that supports efficient construction while limiting unnecessary land-take.

10.8 Coordination with Third Parties

10.8.1 The temporary works strategy has taken account of relevant live planning applications, existing utilities and distribution network operators' requirements. Since PEIR stage, live applications and known utility works have been reviewed against the updated Project and construction layout, with adjustments made where necessary to reduce potential cumulative or interface effects.

10.8.2 Ongoing coordination ensures that temporary works are appropriately aligned with third-party activities. Further information on this is provided in **Application Document 6.21 Environmental Statement Chapter 21 Inter-project Cumulative Effects**.

10.8.3 Collectively, these refinements ensure that temporary lands requirements are limited to what is necessary to construct the Project safely and efficiently, consistent with the principles of good design and proportionate mitigation.

11. Approach to Design Post-Consent

11.1 Introduction

11.1.1 This section of the DAD outlines the mechanisms that are proposed to ensure that the design commitments that have been made are secured and effectively developed post-consent. It also outlines the processes that will be used during detailed design including proposed consultation and engagement.

11.2 Securing the Design

11.2.1 The primary mechanism for securing the Project design is the draft DCO and the certified documents secured through it. Project design is secured through a combination of the DCO, Works Plans, Control Plans and associated management plans, some of which will be required to be secured through requirements of the DCO. These establish the approved parameters for the Project while allowing an appropriate degree of flexibility for detailed design and construction.

11.2.2 This approach aligns with the principles set out within the Advice on Good Design (Planning Inspectorate, 2024), which recognises that effective post-consent design governance can be achieved through mechanisms such as parameter plans, management plans, certified documents and required base approvals.

Table 11.1 – Mechanisms for securing the design

Article or Requirement	Relevant Plans/Drawings	Description
DCO Schedule 1	Authorised Development	Defines the authorised development and principal infrastructure works comprising the Project.
DCO Schedule 2 - Requirement 4 - Construction Management Plans	Construction Management Plans	Requires the Project to be constructed in accordance with a written scheme setting out the stages of the authorised development and inline with the management plans set out within Requirement 2.
DCO Schedule 2 - Requirement 5 – Management Plans and Commitments	Commitments Code of Construction Practice Construction Traffic Management Plans Landscape and Ecology Management Plan Public Rights of Way Management Plan	Each state of the authorised development must be carried out in accordance with the register of environmental actions and commitments which is reflective of the actions and commitments within the listed management plans. These management plans are subject to

Article or Requirement	Relevant Plans/Drawings	Description
	Soil Management Plan Noise and Vibration Management Plan Archaeological Written Scheme of Investigation Cultural Heritage Management Plan	agreement with the relevant Local Authority.
DCO Schedule 2 - Requirement 6 – Typical design drawings	2.12 – Typical Design Drawings	The Authorised Development must be carried out in general accordance with the Typical Design Drawings which establish the form and parameters of key infrastructure elements.
DCO Schedule 2 - Requirement 8 – Reinstatement planting plan	Reinstatement planting plan	A plan to be submitted to the relevant planning authority to agree a plan for reinstatement of trees, groups of trees, woodlands and hedgerows.
DCO Schedule 2 - Requirement 9 – Reinstatement schemes	Reinstatement plans and schemes	Secures restoration and landscape mitigation measures following construction.
DCO Schedule 14	Certified Documents	Secure the approved design parameters, plans and drawings that define the Authorised Development.
Order Limits and Limits of Deviation	2.4 Works Plans and Shapefile of Order Limits	Define the spatial extent of the authorised works and prove controlled flexibility for detailed design development.

11.2.3 The design at submission incorporates flexibility to accommodate further refinement during detailed design and construction. This flexibility includes the use of the Limits of Deviation, micro siting allowances and refinement of temporary works area providing that any changes made remain within the parameters assessed through the Environmental Statement and secured through the DCO.

11.3 Delivery and Detailed Design

11.3.1 Following the grant of development consent, the Project would progress into detailed design and construction planning. Detailed design would be undertaken within the parameters secured through the DCO and informed by further engineering development, site investigations, landowner discussions and construction planning requirements.

11.3.2 Detailed design development would continue to apply to the design principles established throughout the Project development process, including consideration of operational requirements, constructability, environmental mitigation, landscape integration and minimisation of effects on local communities.

11.3.3 The detailed design process would be undertaken by appropriately qualified and experienced engineering, environmental, planning and construction professionals. This multidisciplinary approach reflects the principles of integrated design advocated within the Planning Inspectorate's Advice on Good Design (Planning Inspectorate, 2024).

11.3.4 The Project team would continue to include specialists in overhead line engineering, environmental assessment, landscape, ecology, archaeology, access and construction management and other relevant disciplines to ensure that the detailed design remains aligned with the commitments and mitigation measures secured through the DCO.

11.3.5 As detailed design progresses, further refinement may be undertaken to elements such as construction access arrangements, temporary working areas, pylon micro-siting and construction methodologies, where permitted within the approved design parameters and Limits of Deviation.

11.4 Consultation and Engagement Post-Consent

11.4.1 Following consent, engagement with local planning authorities, statutory consultees and relevant stakeholders would continue as part of the discharge of DCO requirements and the progression of detailed design.

11.4.2 This engagement is expected to focus primarily on the approval of detailed information required by the DCO requirements, including environmental management plans, construction controls and other detailed design submissions where approval or consultation is required.

11.4.3 Ongoing engagement with landowners and relevant stakeholders would also continue during detailed design and construction planning to facilitate access arrangements, construction programming and the implementation of mitigation measures.

11.4.4 No further public consultation on the Project design is anticipated following the grant of development consent. However, community liaison and communication would continue throughout the construction phase to keep local communities informed of construction activities, programme updates and mitigation measures.

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Appendix A
Good Design Issues to Consider

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Appendix A
Good Design Issues to Consider

Consideration of 'Annex A – Good Design Issues to Consider' of the Planning Inspectorate's Advice on Good Design (Planning Inspectorate, 2024).

Issue	Considerations	Where this is demonstrated in the DAD/other documents
Design Approach Document (DAD)	Is a DAD provided?	Yes – this document.
	Does the DAD address the brief, the design process, the design principles, and beneficial outcomes?	Yes – this has been addressed in sections 1, 2, 4 and 6 to 10 of this document.
	If a DAD is not provided, where are the design process and design principles set out?	They are also set out in **Application Document 5.9 Design Development Report** and **Application Document 7.20 Design Development Report – 2025.**
Analysis, research	How has the development site been analysed to inform a good design approach?	Please refer to the site context section of this document (section 5).
	What are the main conclusions from this analysis that inform the design at this stage and as it develops?	The analysis demonstrates that the Project must balance statutory and operational requirements with landscape, ecological, heritage and other constraints along the corridor, and that consolidation of infrastructure along the route where appropriate will be key to ensuring the best deliverables. Please see sections 5, 7 and 8 of this report.
Response	What are the main significant adverse effects of the proposed development and how are they addressed to enable good design?	Please refer to sections 8 and 9 of this document.
Vision	What is the vision for the completed development and its surroundings? Where is it set out?	Please see section 6 of this document.
	Set out the narrative, how the vision will achieve sustainability, create a new place and hold the design together.	Linked to the above – the infrastructure is not about creating a new place but delivering critical net zero infrastructure – please see the need case at section 1.3, as well as

Issue	Considerations	Where this is demonstrated in the DAD/other documents
		the functional requirements that the design needs to meet at section 2.
Skills	What professional disciplines and skill sets are being and will be working on the design of the project?	Please see section 4.2 of this document.
	Is there a design champion designated for this project, and if so, who is it and what are their skills?	Please see section 4.2 of this document.
Developing the design	Describe the approach to good design and explain how the design has (and will continue) to evolve.	Refer to sections 4 and 6 to 11.
	How is any required flexibility being addressed?	Please see sections 4.6 and 6.4 of this report.
	What design choices have (and will be) made?	Please see sections 7 to 11.
	What are the emerging design principles and how have the principles directly informed decision making?	Please see sections 4 and 6 to 11.
	Is there a hierarchical approach to elements of the proposal (for example in designing major and less important bridges in a highways scheme)?	The alignment of the overhead line is the fundamental factor. Once corridor/siting areas are established, the wider details such as construction and detailed siting can be considered. Please see section 7.
	Have digital techniques, including algorithms and AI been used in design development? If so, explain the tools and data used.	Please refer to section 4 of this document where this is explained.
	Is there a coherent narrative of how the approach to design has evolved?	Refer to section 4, which documents evolution of the Project design.
	Where are design outcomes set out?	Refer to section 6 that outlines the vision, and sections 9 and 10 that document design evolution and key decisions.
	Will additional value beyond the site boundary be incorporated?	Yes. The Project includes measures that extend beyond the operational infrastructure including environmental mitigation, habitat creation, biodiversity enhancement and landscape reinstatement. These

Issue	Considerations	Where this is demonstrated in the DAD/other documents
		measures have been integrated into the design to provide environmental benefits and support the restoration of land following construction. Refer to section 4.7 regarding BNG.
Independent design review	Has the design development been the subject of an independent design review?	Design development has been undertaken by an integrated multi-disciplinary Project team which has collectively fulfilled the role of a design panel. Given the standardised and highly functional nature of 400 kV overhead line infrastructure, a separate independent design panel was not considered necessary. Please see section 4.3 for further information.
	If so, what were the main comments and how has the design responded to them?	N/A – see above.
	Is it the intention to include design reviews post-consent? If so, how are these secured?	Please see section 11 of this document
Delivery	How will the final design be delivered? Will there be a design management plan, a design guide, or a design code? If not, why are they not required?	Please see section 11 of this document.
	Is there a design consultation plan to engage the community following consent of the DCO?	Please see section 11 of this document.
	If there an agreed process for post-consent decisions with local planning authorities and others, where required?	Please see section 11 of this document.
Place	How is placemaking being addressed?	Placemaking has been addressed through context-led design that responds to landscape character, settlement location, constraints and ecological networks along the route. Alignment refinement, close paralleling and careful pylon siting have been used to reduce visual prominence. Please see sections 7 to 9 for further information.

Issue	Considerations	Where this is demonstrated in the DAD/other documents
	How will this be a distinctive place and how will the community benefit from it?	As a strategic electricity transmission project, the Project is not intended to create a new 'place' in the conventional sense. Its form is driven by functional and safety requirements. Community benefit arises from the Project's role in strengthening network resilience and supporting decarbonisation. See section 1.3.
	Describe what the quality of place outcome will be, how this relates to the vision and how it will be secured?	As above and see section 11.
People	What consultation has taken place with statutory and local authorities, communities and people with an interest in the land?	Please refer to **Application Document 5.1 Consultation Report**, as well as sections 4 and 9 of this document.
	How will their views be incorporated in the design evolution and where will this be set out?	As above.
Integrated design approach	Explain how an integrated, holistic approach to the project's design will be achieved.	The Project has been developed by a balanced, multi-disciplinary team. This ensures that technical, environmental and community considerations are addressed together. Design decisions are reviewed and tested by the team ensuring the Project is delivered in a coordinated and holistic manner. Please see section 4 for further information.
	Where is it shown in the documentation? Is there a masterplan?	The Project proposals are shown in various documents including; **Application Document 2.1 Guide to the plans** **Application Document 2.2 Location and Master Key Plan** **Application Documents 2.3 Sections A – F** **Application Documents 2.4 Land Plans A – F.** **Application Document 7.1 Biodiversity Net Gain Report**

Issue	Considerations	Where this is demonstrated in the DAD/other documents
		Application Document 6.22 Environmental Statement – Non-Technical Summary.
	How will this be secured?	Please refer to section 11 of the report where this is explained.
National Policy Statements (NPSs)	How have the requirements for good design in the relevant NPS (or NPSs) been met?	Please refer to sections 7 to 11, as well as the Planning Statement.
Design Principles	Set out the good design principles being applied to the project.	Please see section 6.
	Are the design principles structured or grouped logically?	Please see section 6.
	How will they be developed prior to consent?	Please see section 6.
	How will they be illustrated and secured?	Please see sections 7 to 11.
National Infrastructure Commission (NIC) 'principles'	Is there a response to the NIC's four principles of good design?	Please see sections 4 and 6.
	If not, what design principles have been adopted?	Please see sections 4 and 6.
	What process has been used to develop and embed project level design principles?	Please see sections 4 and 6.

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