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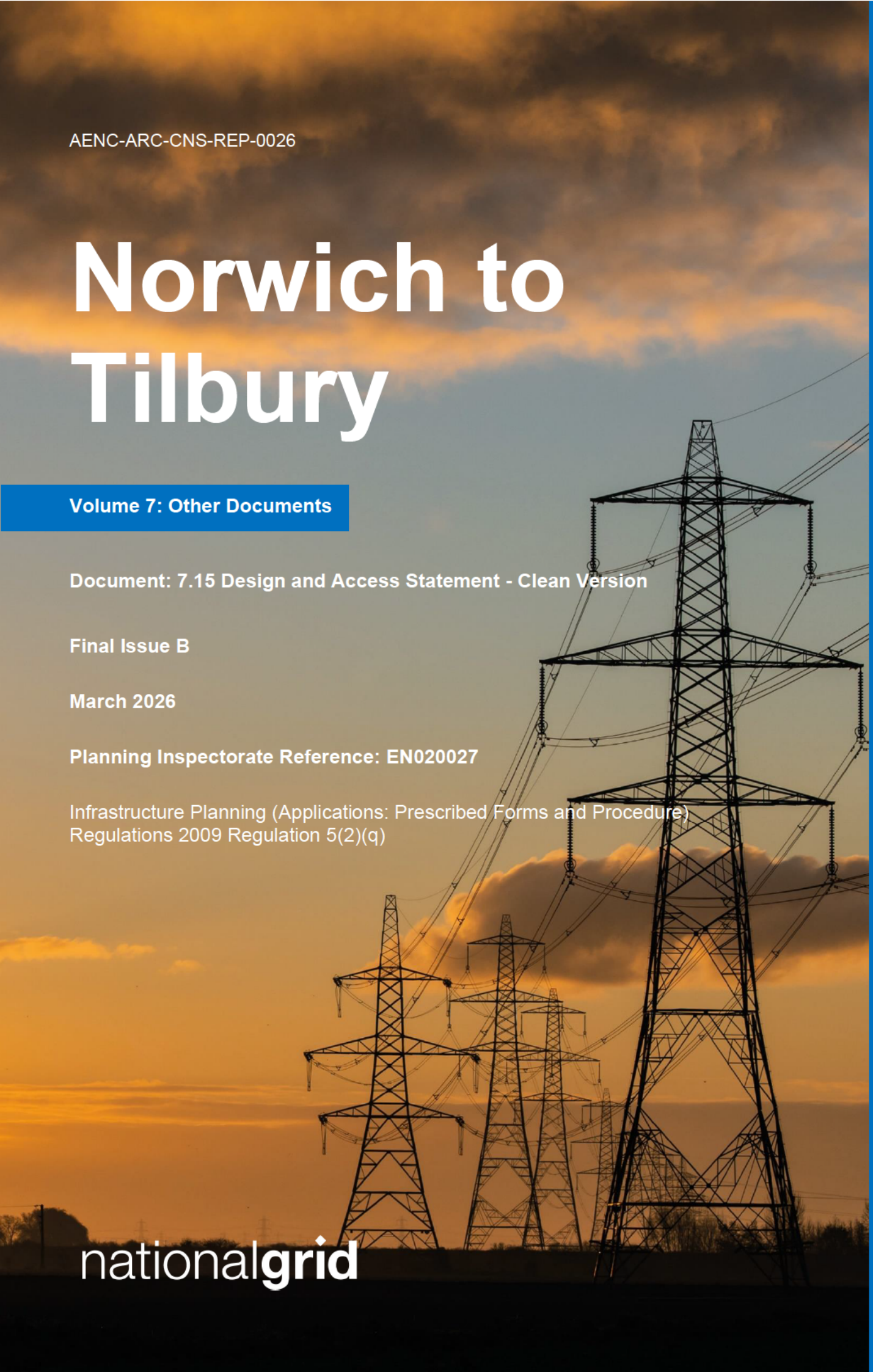


nationalgrid

Revision History

Version	Date	Submitted at
A	29 August 2025	DCO Application
B	12 March 2026	Updates following Relevant Representation responses and ongoing consultation following DCO submission

Contents

Executive Summary

This Design and Access Statement (DAS) has been prepared to accompany an application by National Grid Electricity Transmission plc (National Grid) for a Development Consent Order (DCO) under Section 37 of the Planning Act 2008 (the Act) for a new electricity transmission connection known as the Norwich to Tilbury project (the Project).

The purpose of this DAS is to describe the factors that influence design in relation to the permanent linear elements of the Project. The DAS sets out the background to the Project, the design principles applied by National Grid and summarises the approach to and development of good design.

The DAS and the 2023 Design Development Report (DDR) (National Grid, 2023b), the 2024 DDR (National Grid, 2024b) 2025 DDR (document reference 5.15) are the primary documents referred to for information on the Project's approach to good design. The Design Approach for Site Specific Infrastructure (DASSI) (document reference 7.16) aims to supplement the DAS and aims to focus on the site-specific infrastructure (non-linear works), unlike the DAS, the DASSI will be secured through requirements.

Chapter 2 of this DAS sets out the need for the Project and the Project proposal to upgrade the electricity transmission system in East Anglia between Norwich and Tilbury.

Chapter 3 of this DAS considers the policy context for the consideration of design issues, focusing on the Overarching National Policy Statement for Energy (EN-1) and the National Policy Statement for Electricity Networks Infrastructure (EN-5). Those policy documents emphasise the importance of good design, while recognising the importance of the functional requirements, that 'good design' the concept is more than simply a consideration of visual appearance and set out the physical constraints which apply to a linear infrastructure project of this nature. This Chapter also focuses on the Nationally Significant Infrastructure Projects: Advice on Good Design (Planning Inspectorate, 2024d) and National Infrastructure Commission (NIC) Design Guidance; whilst neither document form part of legislation they give advice on design and explains why good design is important. While the design development of this project commenced prior to the publication of the Advice on Good Design and NIC Design Guidance, it was not shaped by it from the outset. The DAS takes the opportunity to demonstrate how the evolving design aligns with the principles and expectations set out in the Advice on Good Design and NIC Design Guidance. This assessment ensures design can be understood in relation to the most current Planning Inspectorate Advice on Good Design and NIC Design Guidance.

The Project description is set out in ES Chapter 4: Project Description (document reference 6.4) and is summarised section-by-section within Chapter 4 of this DAS.

The DAS Chapter 5 is set out to reflect the four stages of good design in the Planning Inspectorates Advice on Good Design (Planning Inspectorate 2024d): *'assemble, research, co-ordinate and secure'.* The design of the Project has been an iterative process, influenced by an extensive process of stakeholder engagement, engineering and environmental surveys, assessments and refinements. The DAS seeks to describe the evolution of the principal components and the Project-wide factors and feedback which have influenced the design and location.

The **assemble stage** sets out the Project's purpose, including the need for the Project and timeline for delivery. It sets out the core Project design team and delivery team to demonstrate the multi-disciplinary team that has been working on the Project since the Strategic Options Stage through to delivery. The design principles and technical design requirements are set out including the application of NPS EN-1 and EN-5 recognising that there is very limited scope to alter the design and physical appearance of the linear and non-linear works. Key elements like pylon size, substation and Cable Sealing End (CSE) Compound layout are fixed by their functional needs. The sustainability vision for all National Grid Project's ensures that sustainability is embedded through the full life cycle of the Project from design – procurement – construction – operation. The Project design team and delivery team will embed and continue to embed the design principles through to the delivery of the Project.

The **research stage** sets out an analysis of constraints and opportunities of alternative technologies that were initially considered for the Project (as set out in ES Chapter 4: Project Description (document reference 6.4), the 2025 DDR (document reference 5.15), ES Chapter 3: Alternatives (document reference 6.3) and the National Grid Corridor and Preliminary Routeing and Siting Study Report (CPRSS) (2022a). The use of alternative pylon designs is discussed including low height lattice, T-pylon and undergrounding. The DASSI supplements the DAS and focuses on the site-specific infrastructure (including CSE Compounds and substations), a high-level overview is set out in the DAS. The Project has undergone non-statutory and statutory consultation since 2022 and the feedback received during this process has informed the evolution of the Project design, as has the Environmental Impact Assessment process (as set out in ES Chapter 3: Alternatives (document reference 6.3) and the Consultation Report (document reference 5.1).

The **co-ordinate stage** sets out how the feedback received during the research stage influenced design evolution (as set out in the Consultation Report (document reference 5.1) and 2025 DDR (document reference 5.15) and ES Chapter 3: Alternatives (document reference 6.3). The Environmental Impact Assessment demonstrates that the mitigation hierarchy that has been applied to minimise residual impacts of the Project throughout the design and development of the Project. The NIC Design Principles have been given due regard during the development of the Project and the DAS reflects how the Project has considered the principles including climate, people, places and value.

The **secure stage** sets out how the Project's good design is secured and will be delivered. The draft Development Consent Order (DCO) (document reference 3.1) is a critical mechanism for ensuring that good design is secured. Schedule 3 of the DCO (Requirements) controls how the Project is built by securing conditional control relating to design. National Grid has fulfilled the requirement to appoint a Design Champion role, as supported by NPS EN-1, NIC Design Principles and the Planning Inspectorate Advice on Good Design. Given the current stage of the Project, this will consist of two complementary roles:

i. Development Design Champion (DDC), formally appointed from the existing Project Design Team (see organogram Image 5.3), and

ii. Delivery and Detail Design Champion (DDDC) from the Great Grid Partnership (GGP), who will be responsible for detailed design during the delivery phase (see organogram Image 5.4).

Together, the DDC and DDDC will ensure design leadership and continuity across the full project lifecycle, with further information on these roles provided in Section 5.6.8.

Community engagement in the context of good design will be secured by National Grid appointing a community relations team to act as the main point of contact during both pre-construction and construction phases. Permanent access proposals are set out for both the

CSE compounds and substations including interactions between permanent accesses and Public Rights of Way (PRoWs).

This DAS describes the factors that have influenced the design of the Project and in particular seeks to demonstrate how National Grid has sought to satisfy the Good Design criteria (as set out by the Planning Inspectorate), NPS EN-1 and EN-5, as well as detailing how the NIC Design Principles have been given due regard during the development of the Project.

1. Introduction

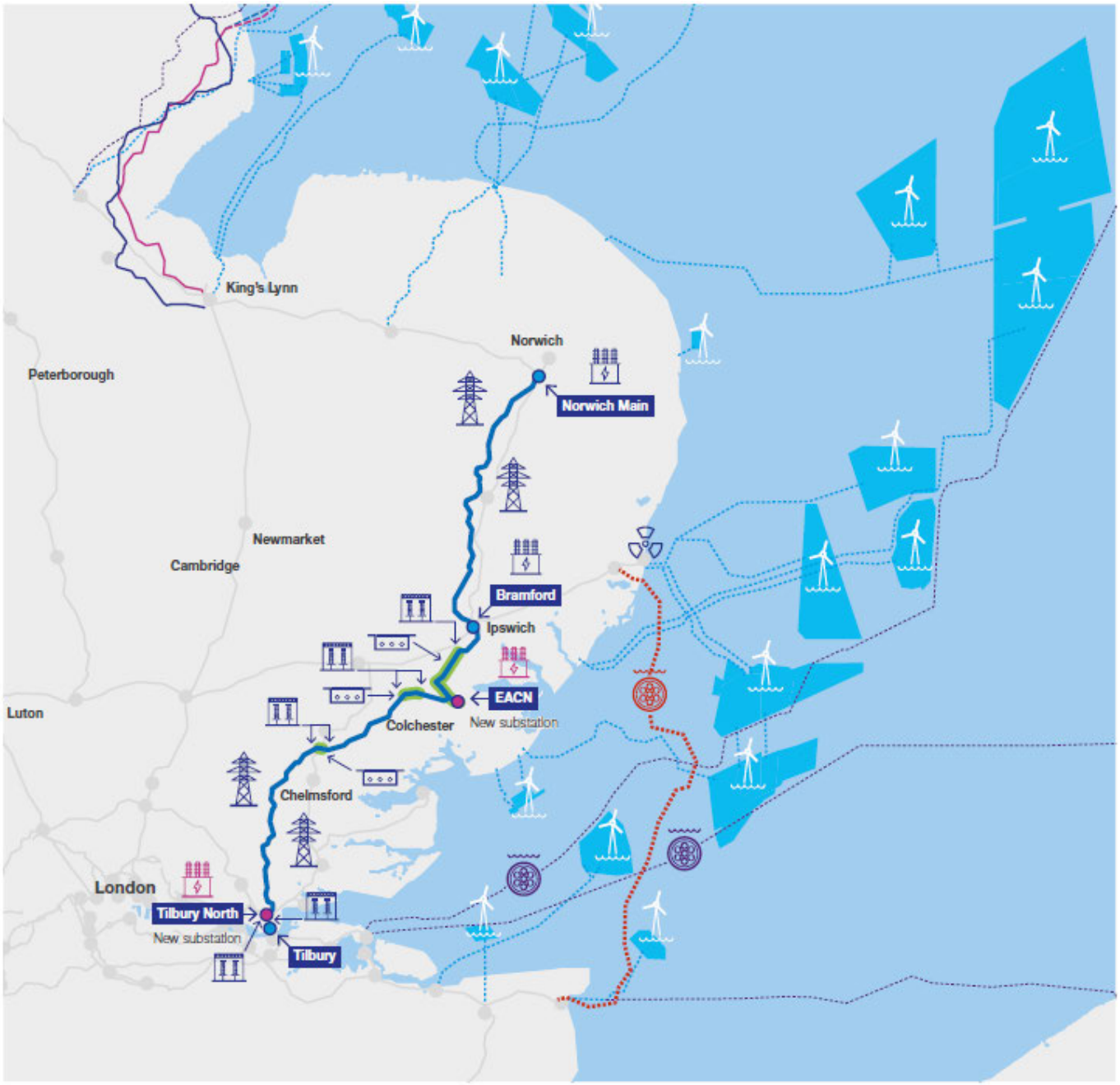
1.1.1 This Design and Access Statement (DAS) has been prepared to accompany an application by National Grid Electricity Transmission plc (National Grid) for a Development Consent Order (DCO) under s37 of the Planning Act 2008 (as amended by the Localism Act 2011) ('the Act') for a new electricity transmission connection known as the Norwich to Tilbury project ('the Project').

1.1.2 The Project is divided into eight geographical sections, based largely on Local Authority boundaries for ease of reference. They are presented in the Environmental Statement (ES) Figure 1.1: Site Location Plan and Project Sections (document reference 6.1.F1) and comprise:

- Section A – South Norfolk Council
- Section B – Mid-Suffolk District Council
- Section C – Babergh District Council, Colchester City Council and Tendring District Council
- Section D – Colchester City Council
- Section E – Braintree District Council
- Section F – Chelmsford City Council and Brentwood Borough Council
- Section G – Basildon Borough Council and Brentwood Borough Council (and part of Chelmsford City Council)
- Section H – Thurrock Council.

1.1.3 The Project proposes to reinforce the transmission network between the existing substations at Norwich Main in Norfolk, Bramford in Suffolk, and a new Tilbury north substation in Essex as well as connecting new offshore wind. Image 1.1 illustrates how the Project connects with the other infrastructure projects.

Image 1.1 Geographical Context – Schematic Map



Strategic Proposal

1.1.4 The development of the Project aligned with National Grid's Our Approach to Consenting (National Grid, 2022b) and the National Grid Corridor and Preliminary Routeing and Siting Study Report (CPRSS) (National Grid, 2022a). The key steps up to the submission of the DCO application include:

- Strategic Proposal
- Options Identification and Selection
- Defined Proposal and Statutory Consultation
- Assessment and Land Rights.

1.1.5 National Grid has carried out detailed assessments of the strategic options available to meet the need case. The Strategic Proposal sets the scene for the Project. Details of these options and the rationale for the decisions made to date are provided in the Corridor and Preliminary Routeing and Siting Study Report (National Grid, 2022), the 2023 Strategic Options Backcheck and Review (SOBR) (National Grid, 2023a), the 2024 Strategic Options Backcheck and Review (National Grid, 2024a) and the 2025 Strategic Options Backcheck Review (document reference 7.17). Further detail on how the Project progressed prior to the application is provided in the 2023 Design Development Report (DDR) (National Grid, 2023b), the 2024 DDR (National Grid, 2024b) and the 2025 DDR (document reference 5.15).

1.1.6 National Grid has continued to backcheck and review its proposal. After taking into consideration the socio-economic, environment, technical and cost factors, the proposal that best meets the needs case set out above is an onshore reinforcement between Norwich Main Substation and Tilbury Substation via Bramford Substation, a new East Anglia Connection Node (EACN) Substation and a new Tilbury North Substation.

1.1.7 The application of these stages of the process (as set out in 1.1.5) to the Project is discussed in further detail in ES Chapter 3: Alternatives (document reference 6.3). The Chapter explains the role and purpose of the CPRSS and SOBR regarding the strategic option identification and how the detail of the Project is developed after the strategic option to best meet the identified need.

1.2 Purpose of this Design and Access Statement

1.2.1 There is no specific statutory requirement for a DAS for applications for development consent under the Act; however, Regulation 5(2)(q) of The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 does provide for any other documents considered necessary to support the application to accompany it. In addition, s10 'Sustainable development' of the Act (subsection (3)(b)) states that in setting policy for Nationally Significant Infrastructure Projects (NSIPs) (through National Policy Statements), the SoS must have regard to the desirability of achieving 'good design'.

1.2.2 In the absence of any further guidance on the use of DAS in applications under the Act, reference has been made to the requirements that apply to a DAS prepared for planning applications under the Town and Country Planning Act 1990. These are set out in Part 3, Article 9 of the Town and Country Planning (Development Management Procedure) (England) Order 2015. In summary these requirements seek that a DAS

should explain the design principles that have been applied to the development, the steps taken to appraise the context, the policy for access, the consultation that has taken place in relation to access, and how specific issues relating to access have been taken into account. Guidance on the production of DAS suggests that it is helpful to structure the description of the proposals under the headings of: '*use, amount, layout, scale, landscaping, appearance and access'* (Commission for Architecture and the Built Environment, 2006). As an approach this particular formula is considered more suitable to a residential or commercial proposal rather than a major linear infrastructure proposal where there is a need to respond to existing operational layouts as well as specific project-wide functional requirements.

1.2.3 Therefore, this DAS does not address these seven themes under separate headings; instead they are embedded into the description of the core elements of the Project. The physical, social, economic and planning policy context assessments are not explicitly identified in the DAS, but instead are set out in the Planning Statement (document reference 5.6); however key themes are drawn out where possible.

1.2.4 Whilst there is no statutory requirement for a DAS to be produced to accompany a DCO, Paragraph 4.7.7 of Overarching National Policy Statement (NPS) for Energy (EN-1) (Department for Energy Security and Net Zero (DESNZ), 2024a) states that:

'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'.

1.2.5 Planning Inspectorate Advice Note (NSIPs: Advice on the Preparation and Submission of Application Documents (Planning Inspectorate, 2024e)) advises that 'reports and statements' should include a DAS to support the application. This DAS is supplied by National Grid to assist in the understanding of how the Project design process has evolved.

1.2.6 In light of this, it is considered that a DAS will assist the Examining Authority appointed to report on the DCO application to the Secretary of State for Energy Security and Net Zero (SoS) in the determination of the application by setting out the factors that influence the design of the Project. Further details are set out within Chapter 3 of the DAS. This DAS therefore:

- Explains the legislative, policy and physical context within which the design proposals have evolved and the way in which that context has influenced the final proposals
- Sets out design principles applied by National Grid and summarises its approach to good design
- Describes the way in which the proposals have been influenced by consultation and how they have been informed by the design principles.

1.2.7 This DAS should be read in conjunction with the plans submitted with the draft DCO (document reference 3.1), the ES (document reference 6.1 to 6.17), the Consultation Report (document reference 5.1), the Planning Statement (document reference 5.6), the Design Approach for Site Specific Infrastructure (DASSI) (document reference 7.16), the 2023 DDR (National Grid, 2023b), the 2024 DDR (National Grid, 2024b) the 2025 DDR (document reference 5.15). The design of the Project has been informed by the design principles which are set out in this DAS. The draft DCO (document reference 3.1) contains proposed requirements to be imposed, should the

Secretary of State be minded to approve the application for development consent. The purpose of the DCO requirements is to ensure that all subsequent detailed design work complies with the parameter plans and design.

1.2.8 The DAS and the DDR are the primary documents referred to for information on the Project's approach to good design. The DASSI aims to supplement the DAS and aims to focus on the site-specific infrastructure (non-linear works), unlike the DAS, the key design principles set out in the DASSI will be secured through DCO requirements. The relationship between the DAS, DASSI and DDR in respect of 'Good Design' is set out in Appendix A: Guide to the Approach on Design. Appendix B provides an internal design review note that has been prepared in support of the DCO application for the Project. It has been prepared by a technical design expert and sets out a review of how the project is meeting and addressing good design and why a full Design Review Panel is not considered necessary for the Project. Appendix C sets out National Grid's response of how the project is meeting and addressing good design against the considerations of Annex A of the NSIPs Advice on Good Design (Planning Inspectorate, 2024d), also set out within Chapter 5.

1.3 Structure of the Design and Access Statement

1.3.1 This DAS is structured as follows:

- **Chapter 2: Overview of the Project** – provides an introduction to National Grid, outlines the need for the Project and provides an outline of the elements comprising the Project
- **Chapter 3: Legislation, Policy and Guidance Context** – provides an overview of legislation, NPS, development plan and National Grid Policies which are considered to be of relevance to the design of the Project
- **Chapter 4: Physical Context** – provides a summary of the route corridor and key features along the route
- **Chapter 5: Good Design Process** – describes the elements that influence good design of the Project with reference to the Planning Inspectorates Nationally Significant Infrastructure Projects: Advice on Good Design and with reference to the National Infrastructure Commission Design Guidance
- **Chapter 6: Conclusions** – demonstrates how the Project has sought to achieve a high standard of design whilst also satisfying the requirements of the NPS in terms of good design and operational and technical requirements.

2. Overview of the Project

2.1 National Grid

2.1.1 National Grid Electricity Transmission plc ('National Grid') owns and maintains the national high voltage electricity transmission network throughout England and Wales. The transmission network connects the power from where it is generated to the regional Distribution Network Operators (DNO) who then supply businesses and homes.

2.1.2 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 (as amended) (the Electricity Act).

2.1.3 National Grid, as the regulated provider of electricity transmission services in England and Wales, is regulated by the Office of Gas and Electricity Markets (Ofgem). Transmission services include maintaining reliable electricity supplies and offering to construct new transmission system assets for new connections to the National Electricity Transmission System (NETS).

2.1.4 Under s9(2) of the Electricity Act, 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.

2.1.5 This means that, when considering how best to provide transmission capacity, it should do so in a co-ordinated manner by considering all potential development which may interact with the current requirement.

2.1.6 S38 and Schedule 9 of the Electricity Act requires National Grid, when formulating proposals for new lines and new 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.'*

2.1.7 National Grid has an obligation under its transmission licence to provide a connection to the transmission system in response to each valid application made.to it by energy generators. In summary, where any applicant applies for a connection, National Grid must offer to enter into an agreement(s) to connect, or to modify an existing connection, to the transmission system and the offer shall make detailed provision regarding:

- The carrying out of works required to connect to the transmission system
- The carrying out of works (if any) in connection with the extension or reinforcement of the transmission system

- The date by when any works required to permit access to the transmission system (including any works to reinforce or extend the transmission system) shall be completed.

2.1.8 National Grid must comply with Standard Condition D3 (Transmission system security standard and quality of service) of its Transmission Licence. This means that where the boundary capacity of the Main Interconnected Transmission System (MITS) is exceeded against the standards, National Grid must resolve the capacity shortfall under the terms of its Transmission Licence. The standards against which National Grid assesses these shortfalls are set out in the 'Design of the Main Interconnected Transmission System' section of the National Electricity Transmission System Security and Quality of Supply Standard (NETS SQSS).

2.1.9 The NETS SQSS is a document that defines criteria which specify the robustness of the transmission system, in terms of the faults, and combination of faults, that it must be able to withstand without any interruption of supplies, and the maximum interruption to supplies which is permitted for certain more onerous combination of faults.

2.2 The Need for the Project

2.2.1 Consistent with the Government's Net Zero target, there has been, and continues to be, growth in the volume of renewable and zero carbon generation that is seeking to connect to the electricity transmission system in the East Anglia and South East regions. UK Government policy clearly sets out the critical requirement for significant reinforcement of the transmission system to facilitate the connection of renewable energy sources and to transport electricity to where it is used. In particular, the British Energy Security Strategy (HM Government, 2022) sets targets for the connection of up to 50 GW of offshore wind by the 2030s as a key part of a strategy for secure, clean and affordable British energy for the long term.

2.2.2 In November 2024, the National Energy System Operator (NESO) published Clean Power 2030: Advice on achieving clean power for Great Britain by 2030 (NESO, 2024). This report states that *'Three projects have been identified as critical to delivering a network which supports the clean power pathways, but at present have delivery dates after 2030. Support is therefore needed to bring these projects forward for 2030 delivery. These are projects in East Anglia and in the southeast that are critical for connecting offshore wind in the North Sea and supporting the flow of clean power. Our assessment suggests that without these projects, the clean power objective would not be achieved, leaving the clean power target short by around 1.6% in 2030 (assuming a typical weather year) and consumers could face extra constraint costs of around £4.2 billion in 2030.'* The Project is specified as two of those three projects. The critical and urgent nature of the project is therefore also recognised in the strongest terms in a recent report in achieving Clean Power 2030 objectives.

Need for future reinforcement of the East Anglia and South East transmission system

2.2.3 East Anglia's 400 kV electricity transmission network was built in the 1960s. It was built to supply regional demand, centred on Norwich and Ipswich. For many years, the only significant power stations generating in the East Anglia region were the Sizewell A and the Sizewell B nuclear power stations, Spalding North and Sutton

Bridge gas fired power stations, and some further smaller 132 kV connected gas fired power stations

2.2.4 This generation capacity has recently been added to by several offshore windfarms with the existing generation totalling 6,552.4 MW of installed capacity. This is expected to grow substantially in coming years. In the East Anglia region, connection agreements have been signed for 26,919.9 MW of new generation (total generation of 33,472.3 MW minus existing generation of 6,552.4 MW). These future connection agreements comprise a large volume of offshore wind generation (including East Anglia Offshore Wind), gas-fired generation, energy storage projects, and a nuclear power station (at Sizewell C).

2.2.5 Without reinforcement, the capacity of the East Anglia and South East existing network is insufficient to accommodate the connection of the proposed new power sources. The 'Thermal Boundary Export Limit' – the physical maximum energy capacity the system can accommodate during planned system faults – would be exceeded, preventing export of power to demand centres beyond East Anglia. In these circumstances, generators connecting in the area would be required to reduce their output and would be compensated via a 'constraint' payment. These costs would be passed on to end consumers. National Grid Electricity System Operator (ESO) (now NESO) analysis shows that, in this case, predicted constraint costs are likely to significantly exceed those of reinforcement.

2.3 The Project

2.3.1 The Project is a proposal by National Grid to upgrade the electricity transmission system in East Anglia between Norwich and Tilbury, comprising:

- A new 400 kilovolt (kV) electricity transmission connection of approximately 180 km overall length from Norwich Main Substation to Tilbury Substation via Bramford Substation, a new EACN Substation and a new Tilbury North Substation, including:
  - Approximately 159 km of new overhead line supported on approximately 509 pylons, either standard steel lattice pylons (approximately 50 m in height) or low height steel lattice pylons (approximately 40 m in height) and some of which would be gantries (typically up to 15 m in height) within proposed Cable Sealing End (CSE) compounds or existing or proposed substations
  - Approximately 21 km of 400 kV underground cabling, some of which would be located through the Dedham Vale National Landscape (an Area of Outstanding Natural Beauty (AONB)
- Up to seven new CSE compounds (with permanent access) to connect the overhead lines to the underground cables
- Modification works to connect into the existing Norwich Main Substation and a substation extension at the existing Bramford Substation
- A new 400 kV substation on the Tendring Peninsula, referred to as the EACN Substation (with a new permanent access). This is proposed to be an Air Insulated Switchgear (AIS) substation
- A new 400 kV substation to the south of Orsett Golf Course in Essex, referred to as the Tilbury North Substation (with a new permanent access). This is proposed to be a Gas Insulated Switchgear (GIS) substation

- Modifications to the existing National Grid Electricity Transmission overhead lines to facilitate the connection of the existing network into the new Tilbury North Substation to provide connection to the Tilbury Substation
- Ancillary and/or temporary works associated with the construction of the Project.

2.3.2 In addition, third party utilities diversions and/or modifications would be required to facilitate the construction of the Project. There would also be land required for environmental mitigation and Biodiversity Net Gain (BNG).

2.3.3 As well as the permanent infrastructure, land would also be required temporarily for construction activities including, for example, working areas for construction equipment and machinery, site offices, welfare, storage and temporary construction access.

2.3.4 The Project would be designed, constructed and operated in accordance with applicable health and safety legislation. The Project will need to comply with design safety standards including the Security and Quality of Supply Standard (SQSS), which sets out the criteria and methodology for planning and operating the NETS. This informs a suite of National Grid policies and processes, which contain details on design standards required to be met when designing, constructing and operating assets such as those proposed for the Project.

3. Legislation, Policy and Guidance Context

3.1 Introduction

3.1.1 Building on the comprehensive review of legislation, planning policy and guidance set out in the Planning Statement (document reference 5.6) and the Policy Compliance Document (document reference 5.7), this section focuses specifically on how these frameworks have informed the development of this DAS.

3.2 Legislative Context

3.2.1 The Project is defined as a NSIP, under s14(1)(b) and s16 of the Planning Act 2008, and as amended by the Planning Act 2008 (NSIPs) (Electric Lines) Order 2013, as it involves the installation of a new electric line above ground of more than 2 km, which would operate at 400 kV in England.

3.2.2 For an NSIP, the grant of development consent is required by the making of a DCO under the Planning Act 2008. A DCO may include a range of consents and powers.

3.2.3 The proposed new above ground electricity line would be an NSIP by virtue of the definitions in the Planning Act 2008. Other development, such as underground cables, may be granted development consent as associated development within the meaning of s115 of the Planning Act 2008.

3.2.4 Section 104(2) of the Planning Act 2008 sets out the matters to which the SoS must have regard in deciding an application submitted in accordance with the Planning Act 2008. In summary, the matters set out in section 104(2) include any relevant NPS, any local impact report (LIR); and any other matters the SoS thinks are both important and relevant to the decision.

3.2.5 Section 104(3) of the Planning Act 2008 requires that the SoS must decide an application for development consent in accordance with any relevant National Policy Statement (NPS), except to the extent that the SoS is satisfied that, in summary:

- doing so would lead to the United Kingdom being in breach of its international obligations
- doing so would lead to the SoS being in breach of any duty imposed on the SoS under any enactment
- doing so would be unlawful under any enactment
- the adverse impact of the proposed development would outweigh its benefits, or
- that any prescribed condition for deciding the application otherwise than in accordance with the NPS would be met.

3.2.6 The relevant NPS for the Project is, therefore, of primary importance to the decision maker in considering the need for the Project and its acceptability in terms of the policy guidance in the relevant NPS.

3.2.7 For the Project, there are two relevant NPS, the Overarching NPS for Energy (EN-1) (DESNZ, 2024a) and the NPS for Electricity Networks Infrastructure (EN-5) (DESNZ, 2024b). EN-1 provides the overarching policy framework for making decisions on development consent applications for energy infrastructure in England, and EN-5 is specifically related to electricity networks infrastructure and does not directly address need.

3.2.8 The text below outlines the key policy framework that has informed the development of this DAS.

3.3 Policy Context

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

3.3.1 The Overarching National Policy Statement ('NPS') for Energy (EN-1) (DESNZ, 2024a) sets out the Government's policy for the delivery of critical national priority (CNP) nationally significant low carbon infrastructure.

3.3.2 Part 4.7 of EN-1 'Criteria for good design for Energy Infrastructure' is of particular relevance to this DAS. Paragraph 4.7.2 of EN-1 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'.

3.3.3 Paragraph 4.7.6 states *'whilst the applicant may not have any or very limited choice in the physical appearance of some energy infrastructure, there may be opportunities for the applicant to demonstrate good design in terms of siting relative to existing landscape character, land form and vegetation. Furthermore, the design and sensitive use of materials in any associated development such as electricity substations will assist in ensuring that such development contributes to the quality of the area. Applicants should also, so far as is possible, seek to embed opportunities for nature inclusive design within the design process'.*

3.3.4 Paragraph 4.7.10 goes on to explain *that 'in light of the above and given the importance which the Planning Act 2008 places on good design and sustainability, the Secretary of State needs to be satisfied that energy infrastructure developments are sustainable and, having regard to regulatory and other constraints, are as attractive, durable and adaptable (including taking account of natural hazards such as flooding) as they can be'*. The Secretary of State should satisfy itself that *'the applicant has considered both functionality (including fitness for purpose and sustainability) and aesthetics (including its contribution to the quality of the area in which it would be located, any potential amenity benefits, and visual impacts on the landscape or seascape) as far as possible'.*

3.3.5 EN-1 therefore recognises that in discussing 'good design' the concept is more than simply a consideration of visual appearance. Through the adoption of good design principles, National Grid has sought to develop its proposals in an iterative manner, considering local constraints or concerns (as set out in Chapter 4 of this DAS in

terms of physical context, and Chapter 6 of this DAS in terms of feedback received), where possible, and amending the Project where feasible, taking into account alternatives, in order to avoid and minimise adverse impacts associated with the Project. The concept of good design has therefore not only informed the selection of technologies, route of the overhead line, cables and the location of Bramford Substation, EACN Substation and Tilbury North Substation and the CSE compounds but also those embedded mitigation measures as set out in the ES Chapter 4: Project Description (document reference 6.4) which will avoid, reduce or compensate for adverse effects both during the construction and operation of this Project which is of national significance. Management plans are submitted with the Application which secure the implementation of measures during construction and operation which would seek to avoid or reduce risks relating to pollution and emissions, including Outline Code of Construction Practice (CoCP) (document reference 7.2) and accompanying appendices.

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

3.3.6 The NPS for Electricity Networks Infrastructure (EN-5) (DESNZ, 2023b) includes specific national planning policy with respect of new electricity transmission connections that constitute NSIPs.

3.3.7 Part 2.4 of EN-5 'Consideration of good design for energy infrastructure' is of particular relevance to this DAS. Paragraph 2.4.3 states: *'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'.*

3.3.8 Paragraph 2.4.4 states *'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… - the functional performance of the infrastructure in respect of security of supply and public and occupational safety must not thereby be threatened'.*

3.3.9 Paragraphs 2.9.3 – 2.9.6 set out how Applicants must provide information on relevant impacts on biodiversity and geological conservation, in particular *'electricity networks infrastructure pose a particular potential risk to birdlife. Large bird, such as swans and geese, may collide with overhead lines especially in poor visibility'.*

3.3.10 Paragraphs 2.9.7 – 2.9.15 add further detail on landscape and visual impact considerations *'while 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, in practice new overhead lines can give rise to adverse landscape and visual impacts'.*

3.3.11 Also of relevance in terms of design, paragraph 2.9.16 of EN-5 states that the Holford Rules *'should be embodied in the applicants' proposals for new overhead lines'*. The Holford Rules were first set out in 1959, and subsequently reviewed by National Grid in 1992. They have become accepted within the electricity transmission industry as the basis for defining overhead transmission line routeing. National Grid employs the Holford Rules to inform the design and routeing of all new overhead line projects, including the Project. Paragraph 2.9.18 of EN-5 states that the Horlock Rules

'guidelines for the design and siting of substations…should be embodied in the applicants' proposals for the infrastructure associated with new overhead lines'. The Horlock Rules were established in 2009 by National Grid in pursuance of its duties under Schedule 9 of the Electricity Act.

3.3.12 In April 2025, the government launched a consultation on proposed changes to NPS EN-1 and EN-5 that ended on 29 May 2025. The consultation covers updates to all three NPSs for new energy infrastructure:

- Draft: Overarching National Policy Statement for Energy (EN-1) (DESNZ, 2025a)
- Draft: National Policy Statement for Electricity Networks Infrastructure (EN-5) (DESNZ, 2025b)

3.3.13 Changes consulted upon in the draft 2025 updates to the energy infrastructure NPSs include alignment with Clean Power 2030 targets and endorsement of the Centralised Strategic Network Plan. The 2025 revisions have strengthened the process for delivering major new infrastructure, reinforcing the government's ambition to deliver clean power by 2030.

3.3.14 The transitional provisions on the status of the 2025 revisions say:

> '*While the review is undertaken, the current suite of energy NPS remain relevant government policy and EN-1 to EN-5 have effect for the purposes of the Planning Act 2008. The Secretary of State has decided that for any application accepted for examination before amending the energy NPSs, the current suite of energy NPS, published in 2024, should have effect. The amended energy NPSs will therefore only have effect in relation to those applications for development consent accepted for examination after the publication of the final amended energy NPSs. However, any emerging draft energy NPSs (or those amended but not having effect) are potentially capable of being important and relevant considerations in the decision-making process. The extent to which they are relevant is a matter for the relevant Secretary of State to consider within the framework of the Planning Act 2008 and with regard to the specific circumstances of each development consent order application'*.

3.3.15 At the point of submission of the Project, the NPSs designated in January 2024 were government policy. If the revised NPSs are designated prior to a decision being made on the application for development consent, the ES will be reviewed for consistency with the newly designated NPSs, and any additional requirements would be captured within an additional submission for consideration. It was confirmed in Section 51 advice received from the Planning Inspectorate that if the new NPSs are adopted after the application has been submitted, the Examining Authority can issue procedural decisions to ask all parties for views on the impacts of new NPSs

National Policy and Relevant Guidance

National Planning Policy Framework (February 2025)

3.3.16 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2025) sets out the Government's planning policies for England and how these are expected to be applied. The weight of the NPPF relating to NSIPs is clarified in paragraph 5 of the NPPF, which states:

'*The Framework does not contain specific policies for nationally significant infrastructure projects. These are determined in accordance with the decision making framework in the Planning Act 2008 (as amended) and relevant national policy statements for major infrastructure, as well as any other matters that are relevant (which may include the National Planning Policy Framework). National policy statements form part of the overall framework of national planning policy, and may be a material consideration in preparing plans and making decisions on planning applications.'*

3.3.17 The NPPF is, therefore, capable of being an important and relevant consideration in in decision making for NSIPs but the prime documents to be considered and given appropriate weight are the relevant Energy NPS. The following extracts are therefore considered to relevant considerations for the purpose of this DAS.

3.3.18 Paragraph 161 of the NPPF (Ministry of Housing, Communities and Local Government, 2025) states:

'The planning system should support the transition to net zero by 2050 and take full account of all climate impacts…It should help to…support renewable and low carbon energy and associated infrastructure'.

3.3.19 Paragraph 131 of the NPPF states that *'good design is a key aspect of sustainable development, creates better places in which to live and work and helps make development acceptable to communities. Being clear about design expectations, and how these will be tested, is essential for achieving this. So too is effective engagement between applicants, communities, local planning authorities and other interests throughout the process'.*

3.3.20 Paragraph 137 of the NPPF advises that *'Design quality should be considered throughout the evolution and assessment of individual proposals. Early discussion between applicants, the local planning authority and local community about the design and style of emerging schemes is important for clarifying expectations and reconciling local and commercial interests. Applicants should, where applicable, provide sufficient information to demonstrate how their proposals will meet the design expectations set out in local and national policy, and should work closely with those affected by their proposals to evolve designs that take account of the views of the community. Applications that can demonstrate early, proactive and effective engagement with the community should be looked on more favourably than those that cannot'.*

Nationally Significant Infrastructure Projects: Advice on Good Design

3.3.21 The NSIPs: Advice on Good Design was published in October 2024 (Planning Inspectorate, 2024d); whilst not part of legislation it gives advice that explains why good design is important, what success might look like and how it might be delivered in NSIP applications.

3.3.22 While the design development of this project commenced prior to the publication of this guidance and was therefore not shaped by it from the outset, this DAS takes the opportunity to demonstrate how the evolving design nonetheless aligns with the principles and expectations set out in the advice note. This assessment ensures design can be understood in relation to the most current Planning Inspectorate advice on good design.

3.3.23 The advice states that given the scale and impact of NSIP developments, achieving well-designed project outcomes addressing sustainability and climate change is essential. It states '*the National Infrastructure Strategy commits government to embedding good design into all NSIPs. The National Infrastructure Commission (NIC) Design Group 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*
- *Multiple beneficial outcomes'*

3.3.24 The advice sets out that a good design process is iterative with a structured approach which problem solves and secures good design outcomes. It states that achieving good design *'requires a holistic approach to deliver high quality, sustainable infrastructure that responds to place and takes account of often complex environments.'*

3.3.25 The advice sets out four principles for good design, including assemble, research, co-ordinate and secure. These principles should be considered during pre-application and are advised to be addressed within the NSIP application.

3.3.26 The advice also emphasises the importance of Environmental Impact Assessment (EIA) as a decision-making tool that *'can help the achievement of good design outcomes by avoiding or reducing adverse effects and providing benefits through identifying ways to improve the environmental or cultural opportunities.'* In order to maximise EIA effectiveness, the advice states that *'engagement and collaboration with technical experts and integrating the design team with the EIA team will maximise the effectiveness of the process. This collaboration should be used to inform the main design decisions and secure environmental gains.'* The diagram in Image 3.1 is a graphic description of elements within the good design process. It shows the design process through four stages: '*assemble, research, co-ordinate and secure*'. They should be considered during pre-application and are advised to be addressed within the NSIP application. The advice sets out the following guidance in relation to each of the stages.

'*Assemble*

This stage requires a brief setting out the project's purpose, a budget, a proposed timeline, a multi-disciplinary team with design skills and gathering of baseline information which can inform consideration of alternatives and eventual site selection.

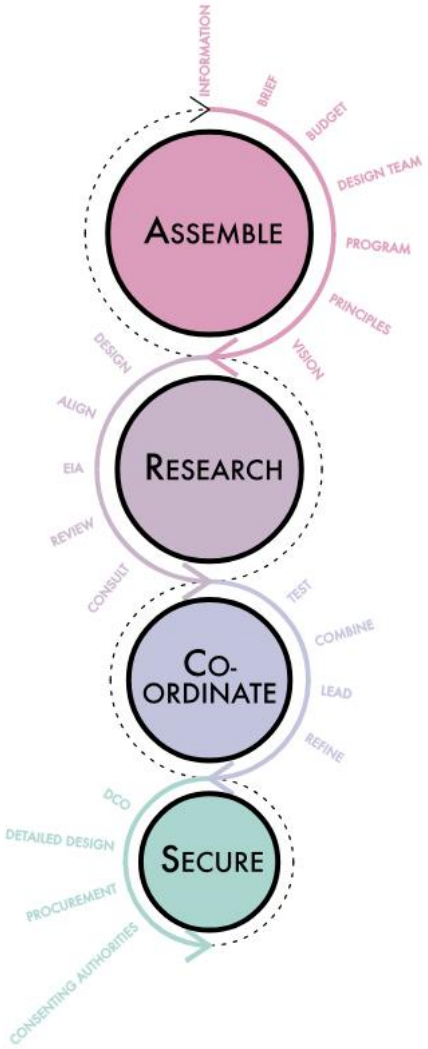
The multi-disciplinary project team must use the information that it has assembled to develop a vision. The vision should have a compelling narrative, which goes beyond solving technical problems and policy compliance and considers construction as well as operation. It should define an ambition which goes beyond the Order limits in line with outcomes that are wider than the project limits. It must include the development of design principles.

Research

This stage needs to be iterative. It should analyse the constraints and opportunities of technology and location with a narrative of how the design evolved from the brief. It will need to mitigate adverse effects assessed as part of the EIA process and show how the proposed development will deliver positive outcomes and create a new and distinctive place. During this stage, engagement and consultation with statutory

parties, affected persons, local communities and independent design panels should inform the project's design evolution. This should be explained.

Image 3.1 Good design process diagram



Co-ordinate

Further iteration must be undertaken to refine choices for details and parameters. This should incorporate consultation responses, independent design input and ensure that design principles are being met. There may be choices to be made. Decisions need to be taken using strong design leadership, driven by the vision. This stage must set out the process by which future post-consent decision-making will be made.

Secure

The essential output of this stage must be to set out how the project's good design is secured and will be delivered, including ongoing design advice and community engagement. It is important that applicants are clear about the influence procurement decisions could have and that any differences with future consenting authorities are aired. ExAs will expect designs to be progressed to a detailed level where the outcomes of the applicant's analysis, program and vision are defined. Clarity over how design elements that have less certainty at application stage will be decided and secured post-consent must be provided.'

3.3.27 This DAS demonstrates how National Grid has taken into account the criteria for good design contained within EN-1, NPS for Electricity Networks Infrastructure (EN-5) (DESNZ, 2024b) and the NSIP: Advice on Good Design. The document explains the ways in which the design of the Project has evolved.

National Infrastructure Commission (NIC)

3.3.28 The NIC (now known as National Infrastructure and Service Transformation Authority) design group published the Design Principles for National Infrastructure in 2020. The Design Principles are based on four core pillars: climate, people, places and value. A summary of each principle is set out below:

- Climate: mitigate greenhouse gases and adapt to climate change, enable decarbonisation
- People: reflect what society wants, improve quality of life and health/wellbeing as well as take into account the views of affected communities
- Places: create a sense of identity and improve the environment, provide a positive contribution to the local landscape, protect and enhance biodiversity and achieve biodiversity net gain
- Value: achieve multiple benefits and solve problems, seek opportunity to add value and solve multiple problems with one solution.

Local Plan Policies

3.3.29 S38(6) of the Planning and Compulsory Purchase Act 2004 provides the principal basis in law for the determination of planning applications, namely that they must be determined in accordance with the development plan unless material considerations indicate otherwise. The provision does not apply to applications for development consent under the Planning Act 2008. Local plan policies may, however, be an important and relevant consideration in the determination of applications for development consent.

3.3.30 The Policy Compliance Document (document reference 5.7) submitted with the DCO application sets out a comprehensive review of relevant national and local planning policy. The DAS has considered the Project against the following key adopted policies in relation to design.

- **Norfolk County Council** Minerals and Waste Development Framework: Core Strategy and Minerals and Waste Development Management Policies Development Plan Document 2010-2026 (adopted September 2011)
  - Policy DM8 – Design, local landscape and townscape character
- **South Norfolk** Development Management Policies Document (adopted October 2015)
  - Policy DM 3.8 – Design Principles applying to all development
  - Policy DM 4.9 – Incorporating landscape into design
- **Breckland** Local Plan (adopted September 2023)
  - Policy GEN 02 – Promotion of High-Quality Design
  - Policy COM 01 – Design

- **Babergh and Mid Suffolk** Joint Local Plan Part 1 (adopted November 2023).
  - Policy LP24 – Design and Residential Amenity
- **Colchester** City Local Plan 2013-2033: North Essex Authorities' Shared Strategic Section 1 Plan (adopted February 2021)
  - Policy SP7 – Place Shaping Principles
- **Colchester** City Local Plan 2017-2033: Section 2 (adopted July 2022).
  - Policy DM15 – Design and Amenity
- **Tendring** Local Plan 2013-2033 and Beyond: North Essex Authorities' Shared Strategic Section 1 (adopted January 2021)
  - Policy SP7 – Place Shaping Principles
- **Tendring** Local Plan 2013-2033 and Beyond: Section 2 (adopted January 2022).
  - Policy SPL3 – Sustainable Design
- **Braintree District** Local Plan 2013-2033: Section 1 (adopted February 2021)
  - Policy SP7 – Place Shaping Principles
- **Chelmsford** Local Plan (adopted in May 2020).
  - Policy DM23 – High Quality and Inclusive Design
  - Policy DM25 – Design and Place Shaping Principles in Major Developments
- **Brentwood** Local Plan (adopted March 2022).
  - Policy BE14 – Creating Successful Places
- **Thurrock** Local Development Framework: Core Strategy and Policies for Management of Development (adopted January 2015)
  - Policy CSTP11 – Thurrock Design

3.3.31 The development plans above contain planning policies which highlight the importance of high quality and sustainable design which acknowledges local character and enhances the local environment. The development plan policies do not provide criteria for determining the acceptability of NSIPs, and in their detail they are not always directly applicable to linear infrastructure projects. Notwithstanding this the overarching principles of responding to place, minimising adverse impacts and enhancing the local environment have been key objectives for the Project.

3.4 Summary

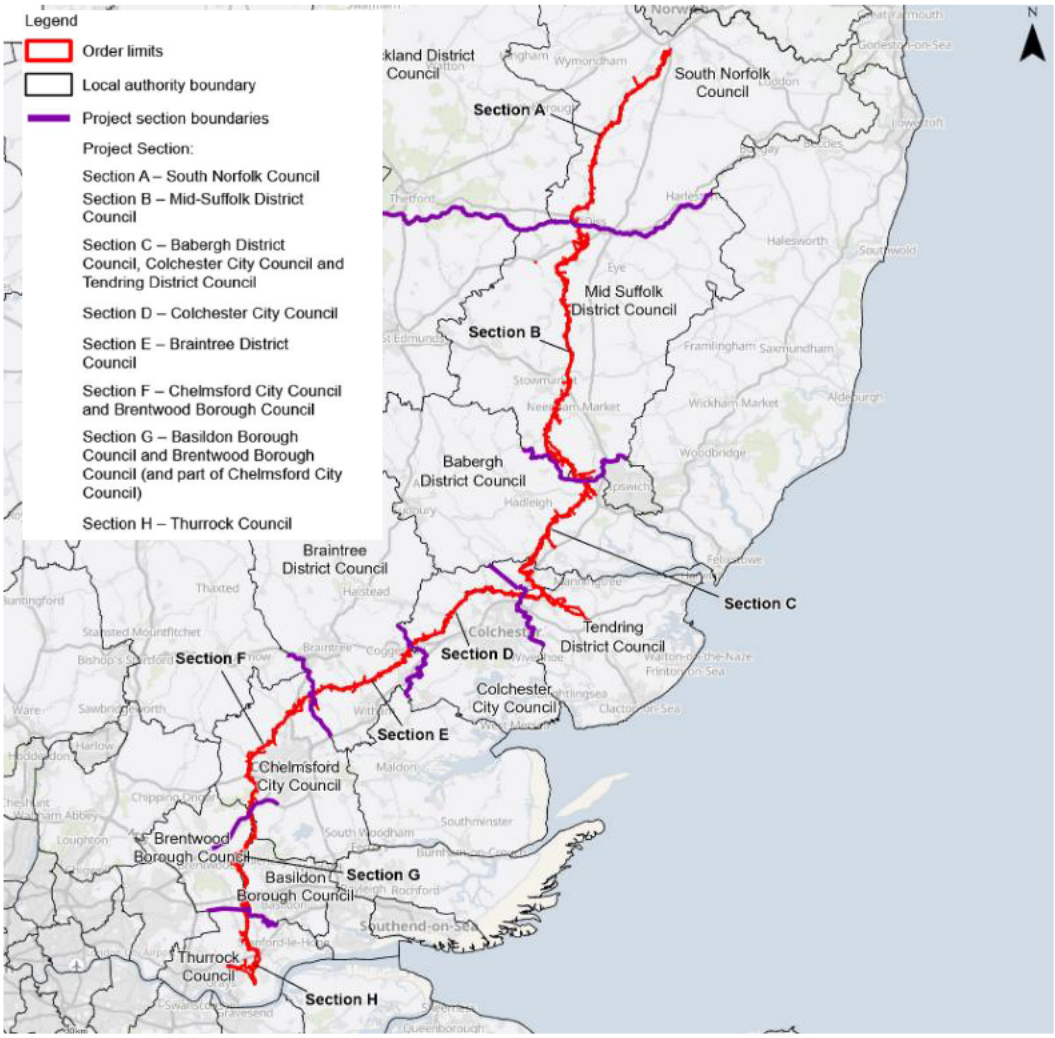
3.4.1 This DAS demonstrates how National Grid has taken into account the criteria for good design contained within EN-1 and EN-5 as well as relevant national guidance including the Nationally Significant Infrastructure Projects: Advice on Good Design (Planning Inspectorate, 2024d), NIC Design Guidance and local planning policy. The DAS describes the design of the Project and the various components of associated development in a proportionate way. Further information on policy guidance around good design principles is set out in Chapter 5 of the DAS.

4. Physical Context

4.1.1 This chapter provides a high-level section-by-section overview of the Project in respect to its physical context and a more detailed description of the proposed route alignment.

4.1.2 For ease of reference sections have been identified along the route of the Project. These are presented in ES Figure 1.1: Site Location Plan and Project Sections (document reference 6.1.F1) and also shown in Image 4.1.

Image 4.1 Site location plan and project sections



4.1.3 The sections comprise the following:

- Section A – South Norfolk Council
- Section B – Mid-Suffolk District Council
- Section C – Babergh District Council, Colchester City Council and Tendring District Council
- Section D – Colchester City Council

- Section E – Braintree District Council
- Section F – Chelmsford City Council and Brentwood Borough Council
- Section G – Basildon Borough Council and Brentwood Borough Council (and part of Chelmsford City Council)
- Section H – Thurrock Council.

4.1.4 The Project description is set out in ES Chapter 4: Project Description (document reference 6.4) and is summarised below. This section should be read in conjunction with Figure 1.1: Site Location Plan and Project Sections (document reference 6.1.F1), Figure 4.1: Proposed Project Design (document reference 6.4.F1) and Figure 4.2: Proposed Project Design – Permanent Features (document reference 6.4.F2).

4.2 Section A: South Norfolk Council

4.2.1 The Project would start at its northern end at National Grid's existing Norwich Main Substation. Modification works to connect into the substation are required.

4.2.2 The Order Limits head south from Dunston then south-west through arable fields before crossing an unnamed river between Flordon and Toprow. This river is connected to the Flordon Common Site of Special Scientific Interest (SSSI) located approximately 320 m to the south-east of the Order Limits.

4.2.3 The Order Limits continue generally south-west through arable fields and crossing some narrow lanes, passing between Forncett St Mary and Forncett End. The Order Limits continue and pass within approximately 110 m of an area of Ancient Woodland (Bunwell Wood) at Bunwell Hill.

4.2.4 The Order Limits then cross the River Tas, west of Cargate Common, and continue south-south-west to the west of Tibenham Airfield. The Project then crosses the B1134 between Goose Green and Long Row, continues south through arable fields, before crossing another unnamed river, approximately 180 m south-east of Shelfanger Meadows SSSI.

4.2.5 The Project then heads west after crossing the B1077 (Shelfanger Road) and then another unnamed river before heading south, around Snow Street, crossing the A1066 between the Bressingham Steam Museum and Gardens and the Grade I listed Church of St Remigius, Roydon, through the Waveney Valley. The Project then passes south-east between the Wortham Ling SSSI and Roydon Fen Local Nature Reserve, crossing into Section B, north of Ling Road.

4.3 Section B: Mid-Suffolk District Council

4.3.1 The Project enters Section B and continues to the south past Wortham Ling, through arable fields before crossing the A143 at Old Bury Road. Shortly after, the Project crosses an unnamed river.

4.3.2 The Project continues south-west past the northern side of Mellis and the Mellis Conservation Area, then heads south and south-east before crossing an unnamed river located to the north-east of Gislingham.

4.3.3 The Project continues generally south before crossing the Great Eastern Main Line Railway, which travels north-east to south-west across the path of the Order Limits. The Project continues south past Finningham and Mendlesham Green, crossing the River Gipping.

4.3.4 The Project continues south before crossing the A1120 at Bell's Lane, then continues south passing by the Grade II* listed Roydon Hall, and crossing the A14 between Creeting St Peter and Creeting St Mary. Shortly after, it crosses an unnamed river and another section of the River Gipping, east of the Badley Conservation Area.

4.3.5 The Order Limits then cross the Ipswich to Ely railway line between Stowmarket and Needham Market before crossing the B1113. South of the B1113 the Project passes close to the Great Newton Wood and Little Newton Wood Ancient Woodlands and further south the Lower Wood Ancient Woodland.

4.3.6 The Project continues south before crossing the B1078 between Barking Tye and Ringshall Stocks. Here, the Order Limits split in two, continuing south on either side and adjacent to Middle Wood (Ancient Woodland and SSSI) and crosses a river known as 'The Channel'. The two sections of the Order Limits both cross Bildeston Road and continue to the south-east to the north of Flowton where the two sections join again. The Project continues south-east adjacent to Somersham Park Ancient Woodland. The Project then heads south into the existing Bramford Substation where an extension to the existing site is proposed, along with works to connect the Project into the substation. The Order Limits are adjacent to Bullen Wood Ancient Woodland and interact with Round Wood Ancient Woodland and Millers Wood Ancient Woodland at this location. The Order Limits extend east to allow for third party mitigation works. Section B ends to the south of Round Wood Ancient Woodland.

4.4 Section C: Babergh District Council, Colchester City Council and Tendring District Council

4.4.1 The Project in Section C starts adjacent to Burstall Long Wood Ancient Woodland with the Order Limits split into two sections, allowing for the proposed alignment and third party mitigation works to the east. The alignment continues south and crosses the A1071 at Thorpe's Hill. Shortly afterwards it heads south-west and crosses an unnamed river. The Order Limits extend east to allow for third party mitigation works. The Project then crosses Spring Brook.

4.4.2 The Project then heads south-west through arable fields, crossing Chattisham Road, before continuing west-south-west adjacent to Brimlin Wood Ancient Woodland and Wenham Thicks Ancient Woodland.

4.4.3 The Project then transitions from overhead line to underground cable at a CSE compound to the north of Notley Enterprise Park. The underground cables are routed between Raydon and Holton St Mary, and into Dedham Vale National Landscape. In selecting a route through the National Landscape, National Grid has sought to apply the mitigation hierarchy through careful routeing and siting to identify a preferred option away from particularly highly valued parts of the Dedham Vale National Landscape with less potential for adverse effects.

4.4.4 The Project stays within the National Landscape located in both Babergh and Colchester. Within the National Landscape to the north-west of Stratford St Mary, the alignment crosses the River Stour, and to the north-east of Langham crosses the Black Brook, outside of the National Landscape. The Project then crosses the A12

and re-enters the National Landscape between Langham and Lamb Corner. The Project once again leaves the National Landscape, crossing Birchwood Road, west of Lamb Corner.

4.4.5 From the Colchester and Tendring boundary south of Lamb Corner, the Project heads south-east crossing the B1029 at Dedham Road. The underground cabling continues south-east, crossing the A137 before the connection enters the new EACN Substation located to the east of Hungerdown Lane.

4.4.6 The Project then exits the new EACN Substation, heading west as overhead line, following the alignment back on itself until it crosses the A137, passing to the north of Ardleigh. The Project continues west crossing the northern part of the Ardleigh Reservoir and continuing to the A12, where this section ends.

4.5 Section D: Colchester City Council

4.5.1 In Section D, the Project heads to the west at the A12 Ipswich Road and then is undergrounded at a CSE compound to the north-north-east of Great Horkesley where the Project is within the setting of the National Landscape.

4.5.2 The Project crosses under the A134 The Causeway before transferring back to overhead line after Vinesse Road, through the CSE compound to the east of Grove Lodge, north of the B1508. The CSE compounds are located approximately 1.3 km to the south of the National Landscape at both ends of this underground section.

4.5.3 The Project heads south crossing the B1508, heading south-west until it crosses the River Colne. Just south-east of the River Colne, Fiddlers Wood Ancient Woodland is adjacent to the Order Limits. It then continues south-west passing the Fordstreet Conservation Area, before crossing the A1124 at Halstead Road.

4.5.4 The Project then continues south past Aldham and Aldhamhall Wood Ancient Woodland, located adjacent to the Order Limits. The Project then turns south-west at Aldham Hall Farm, with Church House Wood Ancient Woodland located adjacent to the Order Limits to the north, and Marks Tey Brickpit SSSI to the south. The Project crosses the railway line between Marks Tey and Chappel and Wakes Colne, before crossing the Roman River. The Project continues through arable fields past Little Tey before it ends just north of the A120 Colchester Road.

4.6 Section E: Braintree District Council

4.6.1 At the start of Section E, the Project crosses the A120 Colchester Road. The Project continues south-west past Coggeshall Hamlet and crosses the River Blackwater, before crossing the B1024 at Coggeshall Road. It continues south-west and interacts with Rivenhall Thicks Ancient Woodland between Silver End and Rivenhall.

4.6.2 The Project continues west-south-west, crossing the B1018 Cressing Road. It then crosses a railway line connecting White Notley and Witham before crossing the River Brain. At this point, the Faulkbourne Hall Registered Park and Garden is located approximately 270 m to the south of the Order Limits.

4.6.3 It then continues west through arable fields; the Troy's Wood Ancient Woodland is within approximately 160 m of the Order Limits.

4.6.4 Further west, the Project then crosses an unnamed tributary of the River Ter. At this point, the existing Braintree – Pelham – Rayleigh 400 kV overhead line intersects the

Project which requires the proposed overhead line to be undergrounded for a short section. This would require CSE compounds to be positioned either side of the existing line to facilitate the transition.

4.6.5 As the Project goes back to overhead lines, the Project passes adjacent to an unnamed Ancient Woodland, continuing south-west, where the Order Limits is adjacent to the Mann/Parsons Woods Ancient Woodland.

4.7 Section F: Chelmsford City Council and Brentwood Borough Council

4.7.1 Section F of the Project continues south-west through arable fields until crossing the River Ter. At this point, the Order Limits are close to the River Ter SSSI. The Project then continues south-west through arable fields, passing adjacent to Lyonshall Wood Ancient Woodland before passing adjacent to Sheepcotes Ancient Woodland then crossing the A131 Braintree Road.

4.7.2 The Project continues south-west crossing the B1008, Chatham Hall Lane and the River Chelmer between Great Waltham and Little Waltham Conservation Areas. The Order Limits interact with the Great Waltham Conservation Area and are within approximately 40 m of Langley Registered Park and Garden. The Project continues south-west, past Sparrowhawk Wood Ancient Woodland, just south of Broad's Green.

4.7.3 The Project then continues south, to the west of Broomfield Hospital, before turning south-west again at Bushy Wood Ancient Woodland, located adjacent to the Order Limits.

4.7.4 The Project then passes south of Chignal St James and crosses the River Can. It then crosses the A1060 Roxwell Road and Roxwell Brook. From here, the Project heads south crossing the A414 Ongar Road and then Sandy Brook.

4.7.5 The Project heads south-east, to the south of Little Oxney Green, before diverting south-west near Gable Cottages on Margaretting Road. The Project interacts with Writtle-Writtle Park Wood Ancient Woodland, and adjacent to Writtle-James Spring Ancient Woodland heading south crossing Ivy Barns Lane. The Order Limits pass between and adjacent to Bushey Wood and Osbornes Wood Ancient Woodlands, where the section ends at the A12 Ingatestone Bypass.

4.8 Section G: Basildon Borough Council and Brentwood Borough Council (and part of Chelmsford City Council)

4.8.1 Section G starts on the southern side of the A12 Ingatestone Bypass, heading south-east over the B1002 at Margaretting, and crossing a railway line linking Stratford and Chelmsford. It continues south-east past Spring Wood, crossing the River Wid, before heading south and crossing Stock Brook.

4.8.2 The Project then heads south-west, crossing different sections of the River Wid twice and passing by Harespring Wood Ancient Woodland. It continues south, crossing the railway line linking Billericay and Shenfield, then the A129 Rayleigh Road. The Order Limits extend east to allow for third party mitigation works near Woodlands School Hutton Manor.

4.8.3 The Project continues south past Havering's Grove and Jame's Wood Ancient Woodland.

4.8.4 The Project then crosses an unnamed river before continuing south through arable fields passing between Little Burstead to the east and Parkhill Wood Ancient Woodland to the west, before crossing the A127 Southend Arterial Road. At this point, the Project is within approximately 50 m of Friern Manor Wood Ancient Woodland. The Project continues south through arable fields concluding this section at the border of Thurrock at the crossing of another railway line between Laindon and West Horndon.

4.9 Section H: Thurrock Council

4.9.1 Section H of the Project continues south through arable fields, with Langdon Ridge SSSI adjacent to the east, before crossing the River Mardyke and then Doesgate Lane. It then continues south through arable fields and some areas of woodland, passing to the west of Horndon on the Hill, before crossing the A13 Stanford-le-Hope Bypass and the A1013 Stanford Road. The Project continues south where it connects into the new Tilbury North Substation adjacent to Orsett Golf Club and Rainbow Wood Ancient Woodland.

4.9.2 The Order Limits continue to the west and south of the new Tilbury North Substation to allow for modifications to the existing ZB and YYJ infrastructure, including two CSE compounds south of the proposed Lower Thames Crossing project. Ashen Wood Ancient Woodland also interacts with the Order Limits.

5. Good Design Process

5.1 Introduction

5.1.1 NPS EN-1, NPS EN-5 set out the requirement to deliver good design, and National Grid and the project team have been responding to the criteria by which it will be assessed, following the Holford Rules and the Horlock Rules, in developing the Project. The project team has sought to respond to its guidance to ensure that the Project is able to demonstrate that it adheres to good design through both process and outcomes. The structure of this chapter is set out to reflect the four principles of good design in the Planning Inspectorates Advice on Good Design (Planning Inspectorate 2024d).

5.1.2 The majority of National Grid's infrastructure for the Project is located above ground. The key design objective was to ensure that this infrastructure was integrated successfully into its surroundings having regard to National Grid's statutory duties under the Electricity Act 1989 (including Section 9(2) duties to develop and maintain an efficient, co-ordinated and economical system of electricity transmission, and Section 38 and Schedule 9 duties to preserve natural beauty and mitigate environmental effects), the industry-standard Holford Rules for overhead line routeing and Horlock Rules for substation siting, and the then-current policy framework including the 2011 versions of National Policy Statements EN-1 and EN-5 (which was the relevant policy framework during the design stage of the Project) and now the 2023 EN-1 and EN-5.

5.1.3 The design of the Project has been an iterative process, influenced by an extensive process of stakeholder engagement, engineering and environmental surveys, assessments and refinements. This chapter seeks to describe the evolution of these principal components and the Project-wide factors and feedback which have influenced their design and location. Appendix B provides an internal design review note that has been prepared in support of the DCO application for the Project. Appendix C sets out National Grid's response of how the project is meeting and addressing good design against the considerations of Annex A of the NSIPs Advice on Good Design (Planning Inspectorate, 2024d).

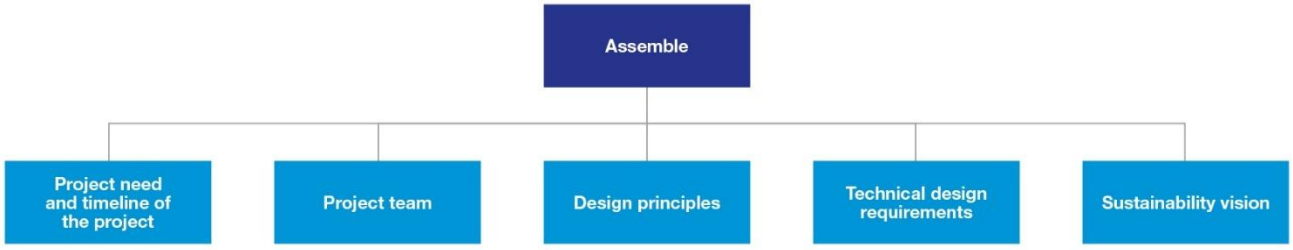
5.2 Design of the Electricity Transmission Project

5.2.1 The following sections will detail the design evolution against the relevant headings of the Planning Inspectorate's Advice on Good Design. The detail of the good design process is provided within Chapter 3 of the DAS.

5.3 Assemble

5.3.1 This section of the DAS sets out how National Grid and the project team has addressed the first stage of the Advice Note on Good Design – Assemble.

Image 5.1 Advice on Good Design – Assemble



Project Need and Timeline of the Project

Project Need

5.3.2 The Project Need is set out in Section 2.2 of this DAS. East Anglia's 400 kV electricity transmission network was built in the 1960s.

5.3.3 National Grid needs to reinforce the electricity network to allow power to be imported to and exported from East Anglia. The reinforcement would provide additional capability to connect to areas of demand, allowing power flows across boundaries, and linking interconnectors to and from Europe.

5.3.4 The British Energy Security Strategy (HM Government, 2022) sets targets for the connection of up to 50 GW of offshore wind by the 2030s as a key part of a strategy for secure, clean and affordable British energy for the long term. In November 2024, the National Energy System NESO published its independent analysis on how the DESNZ can achieve its ambitious clean power goal (NESO, 2024).

5.3.5 The Project as proposed has been identified as a CNP that must facilitate new connections by the end of 2030. As such and as set out in NPS EN-1 Paragraphs 4.3.22 and 4.3.23, any alternative to the Project would have to demonstrate it could support the delivery of the connections within the 2030 programme. There is a need for the Project to be delivered at pace to achieve the Clean Power 2030 target for the benefits to be realised.

5.3.6 In the Clean Power 2030 report, NESO lays out pathways for how Great Britain can reach a clean power system by 2030. The report identifies the Project as critical to delivering a network which supports the clean power pathways, but at present has a delivery date after 2030. Support is therefore needed to bring the Project forward for 2030 delivery. The report also states that the Project and Sea Link are critical for connecting offshore wind in the North Sea and supporting the flow of clean power.

5.3.7 The report notes the need to accelerate transmission projects to ensure that they can help to deliver the new sources of clean power generation by 2030. There is a need for the Project to be delivered at pace to achieve the Clean Power 2030 target and realise the benefits.

Timeline

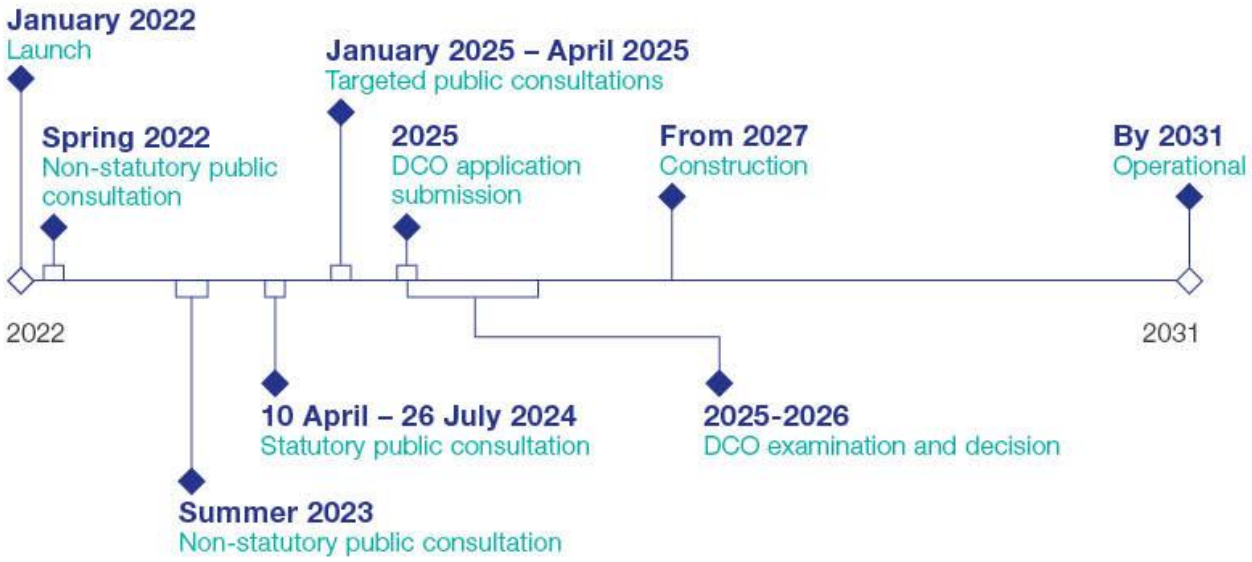
5.3.8 Non-statutory consultation took place between April and June 2022. A further non-statutory consultation was undertaken between June and August 2023 to provide information on how the Project had developed in response to feedback from the 2022 non-statutory consultation and further environmental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

required under the Planning Act 2008, a statutory consultation took place between April and July 2024. Further targeted consultations, a combination of statutory and non-statutory (community) in certain locations took place between January and April 2025 and August 2025 in response to changes arising from feedback and further evolution of the proposed draft Project.

5.3.9 National Grid has continued to backcheck and review its proposal. After taking into consideration the socio-economic, environment, technical and cost factors, the proposal that best meets the needs case set out above is an onshore reinforcement between Norwich Main Substation and Tilbury Substation via Bramford Substation, a new EACN Substation and a new Tilbury North Substation. The Project timeline does not influence design however National Grid need to deliver the Project to timeline and any design work needs to be completed within it.

5.3.10 An indication of the Project timelines through to operation is provided in Image 5.2.

Image 5.2 Project timeline

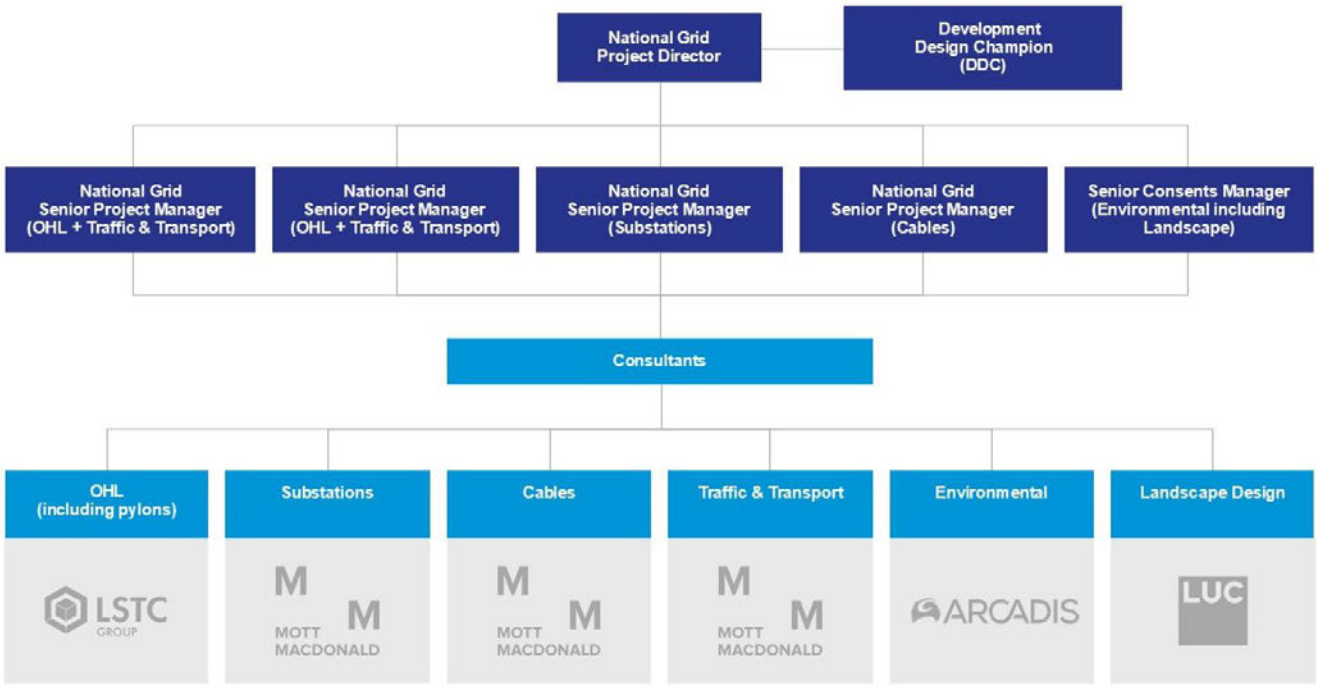


Project Team

Design Phase

5.3.11 The core Project Design Team was set up by National Grid who have worked on the project since Strategic Options Stage and through the subsequent, design evolution and up to submission. This consists of a multi-disciplinary design team which combines engineering with environmental, planning and land disciplines. Consultants lead various aspects of the Project design including overhead lines, substations, cables, traffic and transport, environmental and landscape. Image 5.3 shows the Project Design Team organogram.

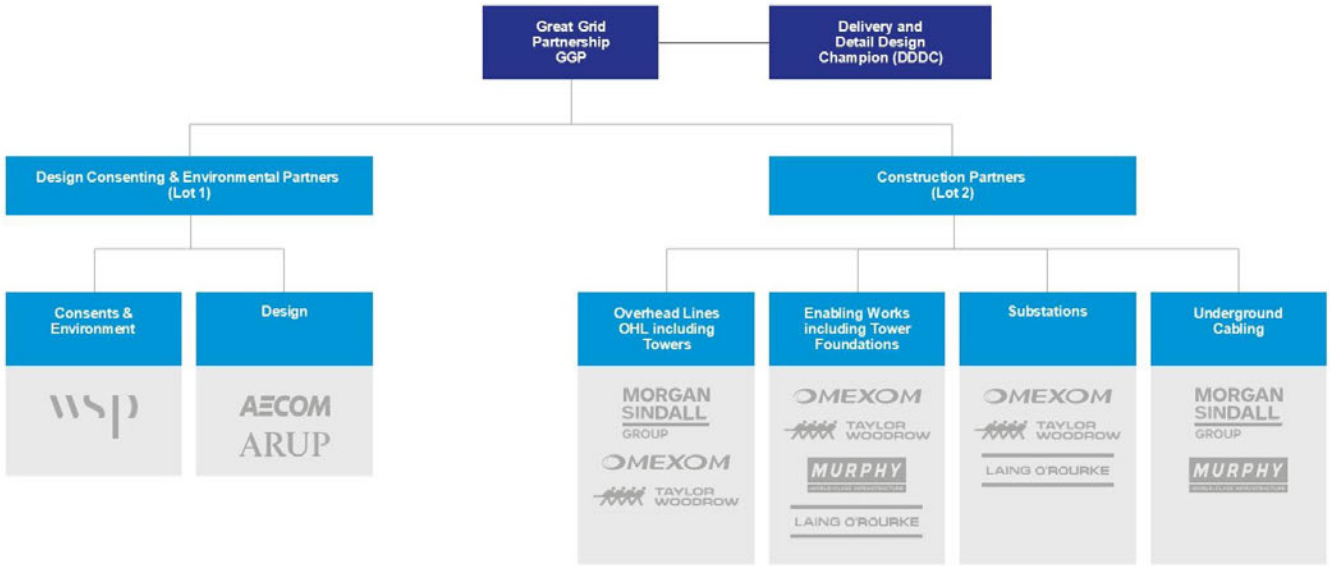
Image 5.3 Project Design Team organogram



Delivery Phase

5.3.12 National Grid has set up the Great Grid Partnership (GGP) who will support the delivery of the project. The company comprises seven partners who will support the delivery of an initial nine Accelerated Strategic Transmission Investment (ASTI) projects. Image 5.4 shows the GGP organogram showing the construction partners working specifically on the Project. The ASTI projects form a key part of The Great Grid Upgrade, which is building the significant new electricity network infrastructure required to reduce the UK's reliance on fossil fuels by connecting 50 GW of offshore wind by 2030. The GGP have been onboarded in a design review capacity and have been engaged in the Project during the pre-submission stages.

Image 5.4 GGP organogram



5.3.13 This new 'enterprise model' is a collaborative partnership, bringing together National Grid's supply chain partners. Two design and consenting service partners (AECOM Arup (JV); WSP), and five construction partners (Laing O'Rourke; Morgan Sindall Infrastructure; Morrison Energy Services; Murphy; Omexom / Taylor Woodrow (OTW)) are joining National Grid in the newly formed Great Grid Partnership.

5.3.14 The early appointment of the GGP ahead of the DCO submission has enhanced the quality and robustness of the Project's design. The GGP's involvement has allowed their technical expertise and constructability insight to inform the development of design proposals prior to submission of the application for development consent. As a result, the design reflects practical delivery requirements ensuring the proposals are both buildable and efficient in addition to environmental and planning considerations.

Design Principles

Introduction

5.3.15 National Grid's overarching design principles are set out in this section of this DAS; these key design principles have guided decision making and project design. National Grid have developed a well-designed Project which responds positively to environmental constraints and comments from key stakeholders and the public (further details on the consideration of alternatives put forward in feedback is set out in the Consultation Report (document reference 5.1), the 2023 DDR (National Grid, 2023b), the 2024 DDR (National Grid, 2024b) and the 2025 DDR (document reference 5.15)). National Grid's objective is to ensure that the Project, which is a development of National Significance and identified as being CNP that must be delivered by 2030, is designed to mitigate any potential adverse impacts where possible which can be associated with overhead lines (section 5.3.5 of the DAS).

5.3.16 In April 2022, National Grid published its Approach to Consenting which states that *'Whether the proposed development is predominantly overhead, underground or sub-sea, further detailed survey and assessment work may be carried out to help refine the route (or site) which best balances our duties, obligations and the views of stakeholders. In doing this we seek to avoid as far as practical impacts on people, communities, environmentally sensitive areas and any other important receptors.'*

5.3.17 The design evolution for the Project has been an iterative process. National Grid has looked at ways to achieve good design through the careful consideration of route corridors and application of design principles which have been subject to consultation. National Grid has also investigated alternatives from suggested design changes made during consultation, which are reported in the Consultation Report (document reference 5.1), the 2025 DDR (document reference 5.15) and ES Chapter 3: Alternatives (document reference 6.3). This chapter seeks to outline the design principles which National Grid has adopted to inform the design.

Good Design Principles

5.3.18 Paragraph 4.7.1 of NPS EN-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.'

5.3.19 Paragraph 4.7.2 of NPS EN-1 states: '*Applying good design to energy projects should produce sustainable infrastructure sensitive to place … efficient in the use of natural resources … and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible'*. The NPS EN-1 recognises (Paragraph 4.7.6) that there may be limited choice in physical appearance of energy infrastructure, but there could be opportunities to demonstrate good design in terms of siting. It also suggests that functionality (fitness for purpose and sustainability) and aesthetics should be considered (Paragraph 4.7.10).

5.3.20 The Project has been designed in line with the National Grid options appraisal process (National Grid, 2012), as outlined in ES Chapter 3: Alternatives (document reference 6.3).

5.3.21 The 2025 DDR (document reference 5.15) provides an explanation of the main changes in the route alignment and technology following the review and consideration of feedback received to the 2024 statutory consultation and to the targeted statutory and non-statutory consultations held in 2025.

5.3.22 Good design of transmission infrastructure is primarily governed by application of the Holford and Horlock Rules (set out in full detail further in this section), alongside an iterative design approach informed by the Environmental Impact Assessment. The design approach is also set within technical limitations to meet safety, security, cost effectiveness and operational requirements. These limit the scope for aesthetic or architectural customisation. Key elements like pylon size and substation layout are fixed by these functional needs.

5.3.23 Image 5.5 presents an example of National Grid substation in colour cladding. Both demonstrate balancing the inherent form and function of electricity transmission infrastructure with technical, economic and environmental considerations to reach reasonably practicable development proposals.

Image 5.5 Photo of a National Grid 400 kV substation in colour cladding

5.3.24 As outlined above, the assessment of the Project presented within the ES (document references 6.1 – 6.18) is based on the design and Limits of Deviation (LoD) as shown on the Works Plans (document reference 2.3), Figure 4.1: Proposed Project Design (document reference 6.4.F1) and Figure 4.2: Proposed Project Design – Permanent Features (document reference 6.4.F2). However, it should be noted that the permanent aspects of the Project, including pylon locations, are not fixed and could be located anywhere within the LoD, as defined on the Works Plans (document reference 2.3) (unless a commitment has been made to restrict the LoD – details of which are outlined within the CoCP (document reference 7.2)). In addition, smaller design details, such as the colour of fencing or finishes, are agreed upon and documented through the Development Consent Order process. Furthermore, NPS EN-1 encourages developers to ensure designs '*demonstrate good aesthetics as far as possible*,' within the bounds of functional and safety constraints.

5.3.25 The Planning Inspectorate Advice on Good Design advises that *'Good design is not primarily about how infrastructure looks, although these considerations (the aesthetics) are important'.* EN-1 does stress the importance of process and addressing sustainability are essential elements of good design. The emphasis placed on the importance of process through the Project's evolution and delivering sustainability is set out in within this DAS and ES Chapter 3: Alternatives (document reference 6.3).

5.3.26 Furthermore, the Design Principles for National Infrastructure (National Infrastructure Commission, 2020) supports design champions within the Project management team to account for delivering on any good design objectives. National Grid has committed to this approach through the appointment of two design champions, Development Design Champion who has been involved throughout the Project and will play an integral role going forward co-ordinating with the GGP (acting as a knowledge transfer), and a further Delivery and Detail Design Champion from the GGP to support detailed design development, and the delivery of the Project.

5.3.27 While minor design details (e.g. colour finishes) can be agreed through the Development Consent Order process, overall design and layout flexibility is limited. Policy encourages good aesthetics 'as far as possible', but only within the bounds of technical constraints.

5.3.28 ES Chapter 4: Project Description (document reference 6.4) notes that environmental appraisal has been an integral part of the Project design process since conception, which has meant that the Project has been able to avoid environmentally sensitive features as far as reasonably practicable. Embedded mitigation measures include the sensitive routeing and siting of the alignment and Order Limits to avoid and reduce as far as possible the effects on residential areas.

5.3.29 In summary, National Grid's design principles are rooted in legal, safety, technical, cost effectiveness and policy frameworks. While there may be scope for aesthetic considerations, the overarching priority is the safe, secure, and efficient delivery of infrastructure, which significantly limits opportunities for design innovation especially in standard, non-protected locations.

Holford Rules

5.3.30 National Grid employs the Holford Rules to inform the design and routeing of overhead lines. The rules were reviewed by National Grid in 1992 and have become accepted within the electricity transmission industry as the basis for overhead transmission line routeing. Paragraph 2.9.16 of EN-5 recognises the importance of

the guidelines provided in the Holford Rules. These guidelines, 'intended as a common-sense approach to overhead line design, were reviewed and updated by the industry in the 1990s and they should be embodied in the applicants' proposals for new overhead lines', including avoiding, if possible, areas of highest amenity value or scientific interest. A summary of the Holford Rules and how these have been considered on the Project are included in Chapter 2: Key Legislation and Planning Policy Context (document reference 6.2) and the Planning Statement (document reference 5.6).

5.3.31 The Holford Rules state that developers should:

- Rule 1 – avoid altogether, if possible, the major areas of highest amenity value, by so planning the general route of the line in the first place, even if total mileage is somewhat increased in consequence
- Rule 2 – avoid smaller areas of high amenity value or scientific interest by deviation, provided this can be done without using too many angle towers i.e. the bigger 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 – chose tree and hill backgrounds in preference to sky backgrounds wherever possible; and when a line has to cross a ridge, secure this opaque background as long as possible and cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees
- Rule 5 – prefer moderately open valleys with woods where the apparent height of towers will be reduced, and views of the line will be broken by trees
- Rule 6 – in country which is flat and sparsely planted, keep the high voltage lines as far as possible independent of smaller lines, converging routes, distribution poles and other masts, wires and cables, so as to avoid a concentration of lines or 'wirescape'
- Rule 7 – approach urban areas through industrial zones, where they exist, and when pleasant residential and recreational land intervenes between the approach line and the substation, carefully assess the comparative costs of undergrounding.

5.3.32 Supplementary notes have been added to the Holford Rules which state:

- Residential areas – avoid routeing close to residential areas as far as possible on grounds of general amenity
- Designations of county, district and local value – where possible choose routes which minimise the effect on special landscape areas, areas of great landscape value and other similar designations of county, district or local importance
- Alternative tower design – in additional to adopting appropriate routeing, evaluate where appropriate the use of alternative tower designs are available where these would be advantageous visually and where the extra cost can be justified.

5.3.33 In cases where a predominantly overhead route has been selected, as is the case for the Project, National Grid will continue to apply the Holford Rules, as a starting point, and identify any sections where it would be more appropriate to place the

infrastructure underground. However, it is worth noting that other factors may also influence the final design, including consultation feedback and EIA.

5.3.34 Holford Rules 1, 2, 3 and 7 have been particularly relevant in the selection of the route corridor for the Project. Holford Rules 4, 5 and 6 have been relevant in the consideration of possible landscape and visual effects that may arise from the Project.

5.3.35 From a Holford Rules perspective, at the route corridor stage of appraisal, it is difficult to identify significant differentiators between the overhead line corridors based on the Holford Rules, as all the options have been designed with due consideration of the Rules, and as far as possible to avoid areas of environmental constraint.

Horlock Rules

5.3.36 The Horlock Rules (guidelines for the design and siting of substations) were devised by National Grid in 2003 and updated in 2006 in pursuance of its duties under Schedule 9 of the Electricity Act 1989. Paragraph 2.9.18 of EN-5 refers to the Horlock Rules, setting out that, '*These principles should be embodied in applicants' proposals for the infrastructure associated with new overhead lines'*, including considering environmental issues from the earliest stage to balance the technical benefits and capital cost requirements.

5.3.37 The guidelines state that:

- Rule 1 – in the development of system options including new substations, consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum
- Rule 2 – the siting of new National Grid substations, CSE compounds and line entries should as far as reasonably practicable seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections
- Rule 3 – areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable
- Rule 4 – the siting of substations, extensions and associated proposals should take advantage of the screening provided by land form and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum
- Rule 5 – the proposals should keep the visual, noise and other environmental effects to a reasonably practicable minimum
- Rule 6 – the land use effects of the proposal should be considered when planning the siting of substations or extensions
- Rule 7 – in the design of new substations or line entries, early consideration should be given to the options available for terminal towers, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practical minimum

- Rule 8 – space should be used effectively to limit the area required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation
- Rule 9 – the design of access road, perimeter fencing, earth shaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings
- Rule 10 – in open landscape especially, high voltage line entries should be kept, as far as possible, visually separate from low voltage lines and other overhead lines so as to avoid a confusing appearance
- Rule 11 – the inter-relationship between towers and substation structures and background and foreground features should be studied to reduce the prominence of structures from main viewpoints. Where practicable the exposure of terminal towers on prominent ridges should be minimised by siting towers against a background of trees rather than open skylines.

5.3.38 The Horlock Rules were applied in determining the preferred location for the EACN Substation and the CSE compounds.

5.3.39 At the time of writing, the NESO is developing new Electricity Design Principles. These have not yet been published and therefore have not influenced the options appraisal process or the consideration of alternatives undertaken for the Project, which has been based on the established Horlock Rules framework as referenced in current policy.

Undergrounding Policy

5.3.40 NPS EN-5 Paragraph 2.11.5 states that *'…the Secretary of State should have special regard to nationally designated landscapes, where the general presumption in favour of overhead lines should be reversed to favour undergrounding'. Paragraph 2.11.6 then goes on to state 'away from these protected landscapes and in locations where there is a high potential for widespread and significant landscape and/or visual impacts, the Secretary of State should be satisfied that the applicant has provided evidence to support a decision on whether undergrounding is or is not appropriate, having considered this on a case-by-case basis, weighing the considerations in paragraph 2.9.24 …*'.

5.3.41 Paragraphs 2.9.20 – 2.9.25 of NPS EN-5 sets out *'the government's position that overhead lines should be the strong starting presumption for electricity networks developments…*' and that *'…this presumption is reversed when proposed developments will cross part of a nationally designated landscape'*. Section 5.3 (Technical Design Requirements) of this DAS discusses further NPS EN-5 paragraphs 2.9.20 and 2.9.23 in relation to the Project.

5.3.42 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.

5.3.43 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.

5.3.44 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.

5.3.45 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.

5.3.46 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

5.3.47 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.

5.3.48 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, CSE compounds, terminal towers and ancillary equipment.

Local Planning Policy

5.3.49 The Project has had regard to the relevant Local Plan Policies (as identified in Section 3.3 of this DAS) as far as been able to. National Grid has had regard to the advice set out in EN-1 in relation to the importance of functional design.

Technical Design Requirements

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

5.3.50 Given the nature of 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:

- The Electricity Act – efficient, co-ordinated and economical
- Transmission licence obligations – connections and security of supply
- NETS SQSS – design safety standards
- Construction (Design and Management) Regulations 2015
- Planning policy as set out in NPS EN-1, NPS for Renewable Energy Infrastructure and EN-5.

5.3.51 The above regulation and legislation provide the framework to decision making when identifying the most appropriate strategic 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.

5.3.52 In the case of Norwich to Tilbury, 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 Section 9 of the Electricity Act, and is supported by national government policies, including NPS EN-1 and EN-5. 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.

5.3.53 Paragraph 2.9.7 of 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'.*

5.3.54 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.

5.3.55 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.

5.3.56 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.

5.3.57 However, in Protected Landscape areas, paragraph 2.9.20 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.*'

5.3.58 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 2.9.23) 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. A full explanation of the mitigation hierarchy is provided in ES Chapter 5: EIA Approach and Methodology (document reference 6.5).

Design Limitations Due to the Nature of Electricity Transmission Infrastructure

5.3.59 EN-1 paragraph 3.3.78 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'.*

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

5.3.61 NPS EN-5, 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'.*

5.3.62 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.'*

5.3.63 Consideration of design for electrical infrastructure is therefore inherently more focussed on those aspects of design (such as colour and design of any buildings) that are not responding to the other well-established design principles set out in EN-1, EN-5 and the referenced Holford Rules (relating to the connection routeing and siting) and Horlock Rules (relating to the siting of substations and similar sites).

Sustainability Vision

5.3.64 EN-1 states at paragraph 4.7.1 *'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.'*

5.3.65 The need for the Project is to support the connection and transfer of green, renewable energy into the NETS network. The Project would support the UK government's (2025) Clean Power 2030 Action Plan to transition the country's energy system to clean power by 2030. Therefore, the operational, medium- to long- term benefits of delivering the Project on a national level are considered to outweigh any short-term effects of Greenhouse Gas (GHG) emissions from material use and construction activities.

5.3.66 In terms of vulnerability of the Project to climate change, overhead lines are designed to withstand extreme weather conditions, such as high winds and ice formation on the conductors. National Grid has previously investigated whether climate change might require overhead lines to be redesigned but found there is more likely to be a reduction in the risk of ice on the wires and intense wind gusts occurring simultaneously. The vulnerability of the Project to future flooding is considered as part of the Flood Risk Assessment (document reference 7.9).

5.3.67 ES Appendix 4.1: GHG Assessment (document reference 6.4.A1) provides a simple estimate of the GHG emissions associated with the construction phase of the Project, comparing this against UK emissions to determine if the Project is likely to have a material effect on the ability of the Government to meet its carbon reduction targets. This approach is in accordance with the EIA Scoping Report (document reference 6.19) and Scoping Opinion (document reference 6.20). The GHG Assessment concludes that the assessment considered only the GHG related directly to the construction and operation (and maintenance) of the Project. The Project would, however, make an important contribution to reducing GHG and reaching the UK government's target of net zero by 2050, by supporting the distribution of greener energy.

5.3.68 National Grid commits to embedding a sustainable approach in the design of the Project. National Grid's Environmental Action Plan for RIIO-T2 (2021-2026) (National Grid, 2024c) focused on four priority areas:

- *'**Net zero carbon emissions**: Climate change is the greatest challenge of our generation, and the next 10 years will be crucial to addressing it. We will reduce scope 1 and 2 emissions in line with science-based targets - 34% reduction by 2026, 50% reduction by 2030 from a 2018 baseline and we will be net zero by 2050. We will also deliver carbon neutral construction.*
- ***Minimise waste and sustainable use of materials**: Waste is choking our oceans, spoiling our landscapes, as well as contributing to landfill and greenhouse gas emissions. We will achieve zero waste to landfill across key areas of waste and use circular economy principles to make the most out of natural resources and our assets.*
- ***Caring for the natural environment**: One of the most important challenges facing humanity alongside the climate emergency, is the global biodiversity crisis.*

We will value nature and will protect and enhance it where possible using 'natural capital' and 'net gain' principles.

- ***Leading the way**: Businesses have a duty to lead the way and deliver change across their industry. We will be environmental leaders in our sector. We will share our expertise and collaborate with stakeholders to advance environmental good practice.'*

5.3.69 On all National Grid Project's, this involves reducing, where possible, material use in construction especially away from 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 at least 10% BNG with wider environmental and societal benefits, further details can be found in the BNG Report (document reference 7.1).

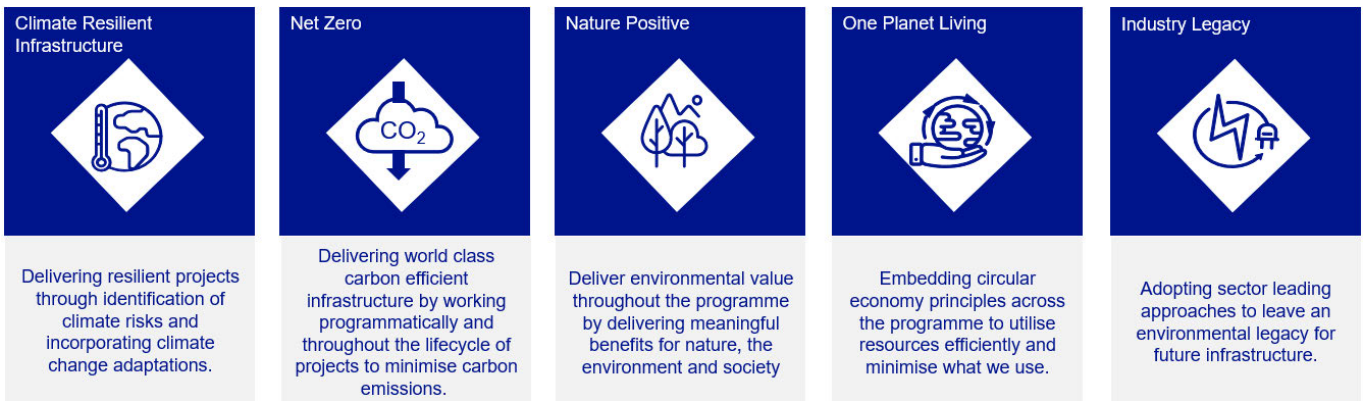
5.3.70 National Grid's vision for the Project links to five pillars and the UN Sustainability Goals. The five pillars are the following:

- Net zero infrastructure
- One planet living
- Nature positive
- Climate resilient infrastructure
- Industry legacy.

5.3.71 How these pillars will be committed to and delivered are set out in Table 5.1. The sustainability framework contained within this Section underpins how the Project design team and the GGP adopt the National Grid framework for sustainability. National Grid are committed to meet certain sustainability requirements as a company, these requirements have been committed to for the Project and its contractors. The infographic in Image 5.6 links to the table highlighting the five pillars.

5.3.72 The sustainability vison ensures that sustainability is embedded through the full life cycle of the Project from design – procurement – construction – operation. Therefore, the Project design team including the GGP will continue to embed National Grid's design principles through to delivery of the Project.

Image 5.6 Embedding sustainability in GGP



5.3.73 To meet the UK government's target of connecting 50 GW of offshore wind by 2030, an unprecedented amount of network infrastructure must be delivered at pace and at scale, but also in a sustainable manner in line with National Grid Responsible Business commitments (National Grid, 2023c). National Grid want to deliver infrastructure as low carbon as possible whilst delivering meaningful benefits for nature. The GGP presents a unique opportunity to drive industry change, taking forward National Grid's sustainability framework and leave a lasting legacy beyond the boundaries of the projects.

5.3.74 Image 5.7 details the GGP organisational design highlighting that National Grid sits within the forefront of the Project and outcome requirements.

Image 5.7 GGP organisational design

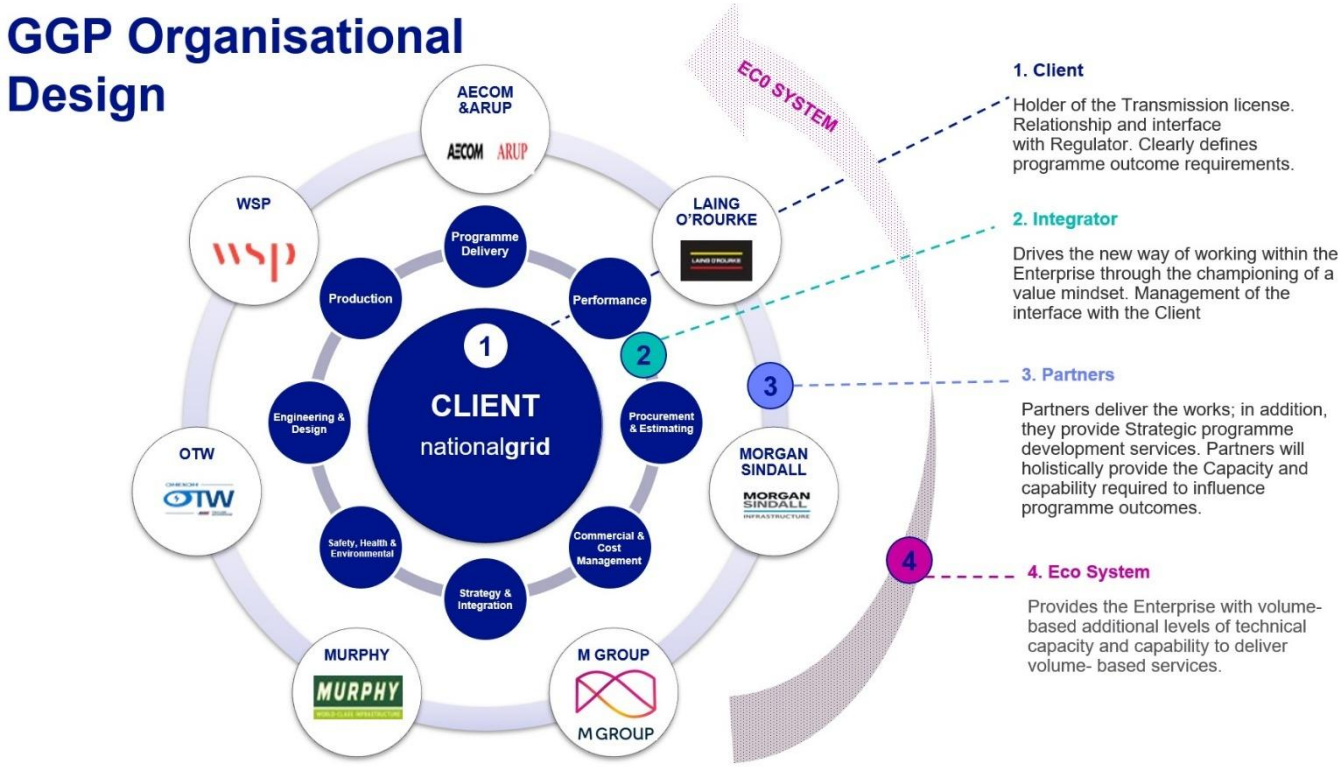


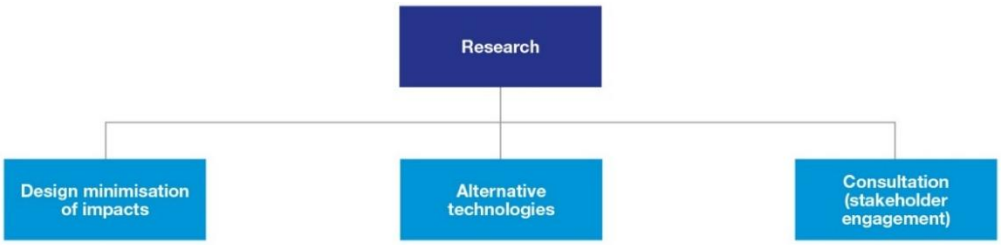
Table 5.1 Summary of the sustainability strategy for project delivery

	Net Zero Infrastructure	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 2080:2023 • Establish industry leading whole life carbon reduction targets, in line with the National Grid Electricity Transmission (NGET) Science Based Target (SBT) • Strive for zero fossil fuel construction sites by leading the transition away from diesel to more sustainable alternatives • Procure low carbon materials • Develop sustainable procurement systems • Establish incentive and reporting mechanisms for activities that realise low carbon infrastructure.	• Take a hierarchical and programmatic approach to resource management across the programme • Beneficially re-use 100% clean excavated material • Undertake a circular economy 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.	• 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 our activities to fully understand the true impact of our decisions • Work towards Science Based Targets Network (SBTN) alignment by first understanding our impact • Integrating constructability early in project development to minimise nature loss • Be the first programme to embed the Building with Nature standards for NGET substations delivering better outcomes for nature.	• Integrating climate adaptation into constructability • Assess and improve design standards to allow for planning for adaptation to a future climate 4 degrees higher than today • Developing adaptation 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.	• 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 supply chain decarbonisation • Leave a legacy for future NGET 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 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.	• Portfolio Resources Management Plan • Temporary works design principles.	• Portfolio Nature Strategy, inclusive of the whole value chain • Embedding nature within design principles • Programmatic environmental licensing and consents.	• Climate design standards • Project climate risk assessments • Asset management and handover plans to include adaptation plans.	• Sustainability Innovations • Industry learning • Sustainable Design Statements • Supply chain engagement and partnerships • Digital systems • Requesting material passports and Environmental Product Declarations (EPDs) to drive industry improvement.

5.4 Research

5.4.1 This section of the DAS sets out how National Grid and the project team has addressed the second stage of the Advice Note on Good Design – Research.

Image 5.8 Advice on Good Design – Research



Design Minimisation of Impacts

5.4.2 In line with national policy requirements, the Project has been designed following the mitigation hierarchy and has avoided impacts where possible through the routeing and siting process informed by the Holford and Horlock Rules. The approach adopted is set out within the 2025 DDR (document reference 5.15) and ES Chapter 3: Alternatives (document reference 6.3). Environmental appraisal has been an integral part of the Project design from the outset, which has meant that the Project has been able to avoid environmentally sensitive features as far as reasonably practicable. The Project has considered sensitive areas and design minimisation of impacts. The Planning Inspectorate's Advice on Good Design sets out the need to mitigate adverse effects. Throughout the Project, assessments have been made that have been based on specific design decisions. Specific consideration has been given to the routeing decision around or through the Dedham Vale National Landscape in accordance with NPS EN-5.

5.4.3 It was considered whether the Bramford to EACN Substation connection should route directly though the Dedham Vale National Landscape (using underground cables within the National Landscape) or take a longer route around it via the Twinstead Tee area. The direct route with underground cables was selected as it halves the connection length, avoids creating a third connection between Bramford and Twinstead, and better complies with the Holford Rules, despite requiring underground cable mitigation through the National Landscape.

Alternative Technologies

5.4.4 Full details on the description of the alternative technologies can be found within the ES Chapter 4: Project Description (document reference 6.4), the 2025 DDR (document reference 5.15), ES Chapter 3: Alternatives (document reference 6.3) and the National Grid CPRSS (2022a). The findings of the CPRSS provided the options and sites that were taken forward to begin the process of iterative design informed by consultation feedback and EIA. This section provides a summary of the technology chosen by the Project and presents an overview of other technologies that could have been considered. ES Chapter 3: Alternatives (document reference 6.3) sets out alternative technologies that were initially considered for the Project, this includes the following:

- **Increasing operating voltage**
- **Alternating current (AC) overhead lines**
- **AC underground cable**
- Alternative overhead AC pylon types
- **Direct Current (DC) underground cable**
- **DC overhead lines**
- **Offshore connections**
- Gas insulated lines (GILs).

5.4.5 Those highlighted in bold were taken forward within the CPRSS based on their ability to meet the reinforcement objectives and were assessed as capable of delivering the required capacity within the necessary timeframe to meet the connection requirements. The remainder of this section focuses on a summary of the technology chosen by the Project, including overhead lines and underground cables.

Technical Studies – Suitability of Proposed Route and Technology Types

5.4.6 NPS EN-5 makes it clear that the government considers overhead lines should be the *'strong starting presumption for electricity networks developments in general'*, although *'this presumption is reversed when developments will cross part of a nationally designated landscape'* (para 2.9.20). It is also noted that EN-5 identifies that there may also be instances outside the nationally designated landscapes, where *'a high potential for widespread and significant adverse landscape and/or visual impacts'* (para 2.9.23) may result in the undergrounding of relevant sections. Whilst this is recognised, with much of the corridor outside such locations, it is considered that the use of underground cable is not justified for the whole route and would be inconsistent with National Grid's duties.

5.4.7 Where the effects of the overhead line have been assessed as being sufficiently high to warrant progression up the mitigation hierarchy National Grid has considered the use of alternative routes, specific mitigation and the use of alternative pylons (low height lattice, T-pylon and undergrounding (referenced in section 5.3 of the DAS)).

5.4.8 The potential for underground cable technology has been considered in localised areas in response to specific feedback (referenced in section 5.3 of the DAS).

Low Height Pylons

5.4.9 Consideration was given to the use of low height pylons; further detail on this is provided within the DDR (document reference 5.15). Low height pylons are useful where height is a strong consideration, however they also occupy a greater footprint and have a bulkier denser profile. They can therefore provide visual benefits in some scenarios, for example where a reduction in pylon height means that views of the tops of pylons are screened by intervening woodland. In other scenarios they can increase adverse visual effects, for example where relatively close to visual receptors without intervening filtering vegetation where they are likely to appear more noticeable in views from residential receptors. Low height lattice pylons have been proposed as necessary to reduce effects in two locations, to the north-east of Little Waltham and to the east of Thurrock airfield (see further details in paragraph 5.4.23 of this DAS).

Use of T Pylons

5.4.10 Whilst there are differences between lattice and T-pylon designs, they share a number of technical characteristics, including:

- They are above ground structures capable of carrying high voltage conductors
- They carry two circuits, one on each side of the structure
- Structures can be adapted for example to suit different terrains and physical obstacles such as river / road crossings
- They maintain statutory clearances.

5.4.11 For lattice pylons, each of the arms supports a conductor bundle and the top of the pylon supports an earth wire. For the T-pylon the conductors and earth wire are supported by the 'diamonds'. A typical suspension T-pylon is shown in Image 5.9.

5.4.12 The T-pylon offers a simplistic structure with increased mass and a reduced permanent footprint when compared against a traditional lattice and low height lattice. The conductors are arranged in a diamond configuration on both sides of the cross beam, with a separate earth wire each side of the pylon, above the conductors.

Image 5.9 Typical suspension T-pylon

5.4.13 Lattice pylon heights can be adjusted by extension pieces, vertically in increments of 3 m as necessary to achieve statutory clearances (e.g. over major crossings). For the T-pylon height extensions are limited to 3 m for suspension pylons and 7 m for angle structures. As T-pylons are shorter than traditional lattice and T-pylons are limited in terms of extensions there may be particular locations where these designs cannot be used as statutory clearances may not be achieved. Other design elements include:

- T-pylons are shorter than traditional lattice
- The maximum angle is 30 degrees therefore multiple T-pylon angle pylons would be required to achieve large changes of direction when compared to traditional lattice pylon overhead line routes
- T-pylon indicative span length is 330 m (the same as traditional lattice).

5.4.14 In response to feedback received as part of the non-statutory consultation in 2023, National Grid considered the potential for T-pylons for the Project. This was published as part of the DDR (2024) included in the 2024 Statutory Consultation. The

report identified locations where it was considered that T-pylons could be used to mitigate landscape and visual effects. This included Tacolneston to Shelfanger (South Norfolk), Diss (South Norfolk / Mid Suffolk), Gislingham to Stowupland (Mid Suffolk), Fuller Street to Coggeshall (Braintree) and Bulphan to Horndon on the Hill (Thurrock). Some of the general advantages of T-pylons that were considered include:

- Average height would reduce between 12 – 14 m in some locations along the route, helping to reduce visibility
- Relatively straight alignment, so fewer additional angle pylons would be required
- Cumulative conflicts with existing infrastructure would be limited.

5.4.15 The general disadvantages of T-pylons in the locations identified above were also considered and included:

- Change in the 2023 preferred draft alignment would be required due to the technical limitations of T-pylons to accommodate changes of alignment around sensitive receptors resulting in the overhead line routeing closer to properties / scheduled moat
- Multiple changes in direction would require more angle pylons
- Small increase in number of angle pylons required, some in close proximity to residential properties
- Would require transition to lattice pylons in some locations
- Potential cumulative conflicts with existing lattice lines.

5.4.16 Although the T-pylons may offer the opportunity to mitigate potential landscape and visual effects when compare with other technologies it is not likely that, for the Project, the overall net benefits of T-pylon (when considering their own disadvantages) would produce an overall favourable alternative to traditional lattice pylons considering all factors that National Grid is required to take into account under its statutory duties. The latest independent report on the Comparison of Electricity Transmission Technologies: Costs and Characteristics (Institute of Engineering and Technology, 2025) confirms that whilst T-Pylons provide an alternative to conventional overhead lines with potential benefits in visual impact and reduced land-take, this is at a higher cost. The build cost is approximately 2 to 2.5 times that of an equivalently rated conventional overhead line, and the lifetime costs are around 1.6 to 1.7 times that of a conventional overhead line. The current arrangements for the oversight of funding by Ofgem requires that the lowest cost acceptable design is taken forward rather than a more expensive design even if that design is perceived to reduce the level of effect.

5.4.17 As such, consideration of their use follows only after establishing a need to mitigate effects of the standard lattice design and after considering the benefit of adopting a low height lattice pylon design. T-pylons themselves are also less adaptable to varied terrains and require more substantial access infrastructure. Furthermore, their resilience and environmental impact are comparable to conventional overhead lines, but with increased carbon intensity due to construction materials. Attention also needs to be given to the transitions between pylon types. Given it is the surrounding context that drives the need for alternative design mitigation, where this is not required along the entire route, any visual break and transition in pylon design also needs to be carefully sited.

5.4.18 Assessment findings have concluded that, where there is not a reversal of the presumption to use overhead lines, the use of lattice pylons (either standard or low height) is consistent with planning policy throughout the route. Whilst there may be some locations (see Appendix A of the 2024 DDR) where there may be a design preference for the use of T pylons, the need to mitigate for unacceptable effects from lattice pylons is not engaged. On this basis T-pylons are not proposed for the Norwich to Tilbury Project.

Description of the 400 kV Overhead Line Technology to Be Used for Norwich to Tilbury

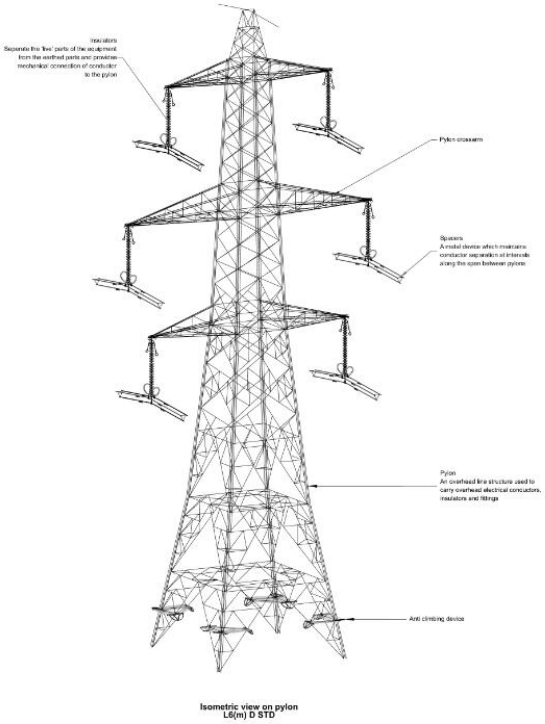
5.4.19 The National Grid standard for overhead lines operating at 400 kV is for pylons carrying two circuits on each side of the pylon, each with three conductors, i.e. a double circuit configuration.

5.4.20 The Project consists of approximately 159 km of overhead line comprising approximately 509 pylons, either standard steel lattice pylons or low height steel lattice pylons, and gantries (typically up to 15 m in height) within proposed CSE compounds. The new overhead line would use triple Araucaria conductors (or alternative technology that performs to the same or better standard in relation to noise on standard lattice pylons). Three types of standard height pylons are proposed as part of the alignment:

- Suspension pylons: used in straight-line positions to suspend the conductor on vertical suspension insulator strings (presented in Image 5.10 and Image 5.11)
- Tension (also called angle) steel lattice pylons: support the overhead line where the line changes direction (presented in Image 5.12). Tension pylons may also be used in a straight-line situation to break up a long section of suspension pylons for loading and stringing purposes
- Terminal pylons: a type of tension pylon used at the ends of overhead lines where they connect to substations or to underground cables via a CSE compound or substation (presented in Image 5.13).

Image 5.10 Typical suspension steel lattice pylon[1]

Image 5.11 Example of a 400 kV double circuit lattice pylon (document reference 2.6.2)



5.4.21 Additionally, to facilitate the overhead line connection at the new Tilbury North Substation to the existing network, modifications to the existing YYJ and ZB overhead line are required. Eleven new pylons are required, and eight existing pylons would be removed. Additionally, two CSE compounds are required to facilitate the short section of underground cable on the ZB route.

5.4.22 The design assumes standard steel lattice pylons for the majority of the alignment which would be approximately 50 m in height (compared to approximately 30 m for the existing 132 kV pylons in the area and of a similar size to the existing 275/400 kV

[1] Image is illustrative and arrangements/layouts within the Project may differ from that presented in this image.

pylons in the area). Pylon extensions would be required in some locations to allow extra height to clear existing features and maintain electrical clearance to the ground.

5.4.23 In two locations, low height steel lattice pylons (Image 5.14 and Image 5.15) are proposed. These have only two cross arms as opposed to three on a standard lattice pylon, thus reducing their height by approximately 10 m (to approximately 40 m) but widening them by approximately 10 m. Low height steel lattice pylons are proposed:

- Between Great and Little Waltham (north of the river) as mitigation for Langleys House (Grade I listed building), and to a lesser extent Langley Registered Park and Garden (Grade II) and Great and Little Waltham Conservation Areas (refer to ES Chapter 11: Historic Environment (document reference 6.11)) – pylon reference TB136 to TB142
  - After consideration of feedback during consultations in 2025 certain technical details are being refined which may result in standard lattice pylons to the south of the River Chelmer being installed. Therefore, flexibility has been retained to revert to standard lattice pylons following further technical details being refined – this may also include removing the need for one of the three pylons and a slight change to the locations of the remaining two pylons within the LoD.
- To the east of Thurrock Airfield to provide overflight clearance mitigation – pylon reference TB238 to TB243.
  - Low height pylons are proposed between TB238 and TB243 to ensure safe operation at Thurrock Airfield. However, should a housing development be brought forwards at Thurrock Airfield and/or the airfield be closed, low height pylons would not be required and standard lattice pylons would be installed instead.

Image 5.12 Typical tension/angle lattice pylon[2]

[2] Image is illustrative and arrangements/layouts within the Project may differ from that presented in this image.

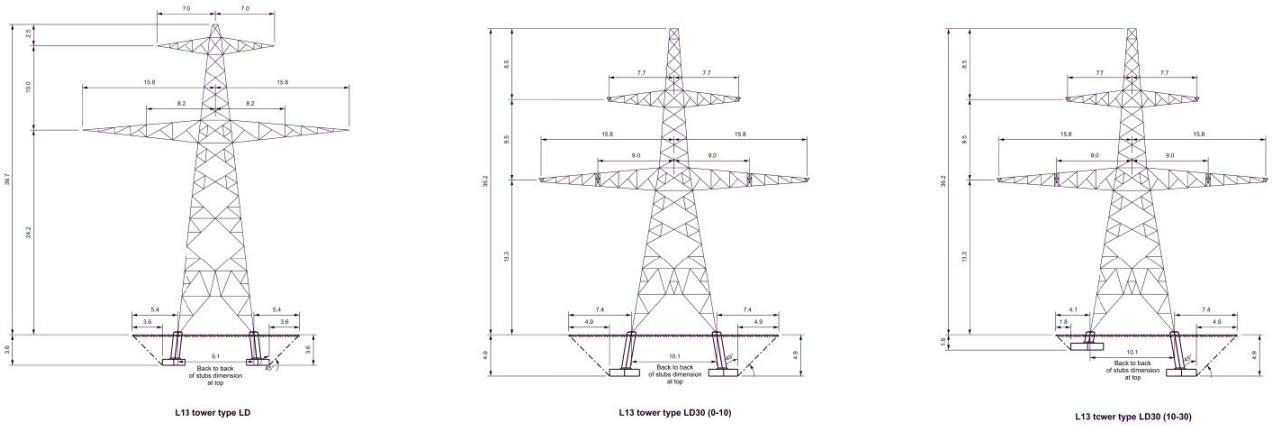
Image 5.13 Typical terminal lattice pylon[3]

Image 5.14 Typical low height lattice pylon (suspension (left) and tension pylon (right))[4] (source: Land Use Consultants, 2024)

[3] Image is illustrative and arrangements/layouts within the Project may differ from that presented in this image.

[4] Image is illustrative and arrangements/layouts within the Project may differ from that presented in this image.

Image 5.15 Low height pylon (document reference 2.6.2)



Description of the Underground Cable Technology to Be Used for Norwich to Tilbury

5.4.24 The underground cables would typically comprise 18 transmission cables. Each cable would be approximately 150 mm diameter and buried within a series of six trenches excavated to a typical minimal depth of 1.2 m and would be surrounded by cement-bound sand to aid dissipation of heat from the cables. This would then be topped with protective warning tiles and tape which helps protect the cables from accidental mechanical damage. One or more of the cable trenches would also include small-diameter communication cables (typically two communications cables in total). Image 5.16 is an example showing typical reinstatement of an open cut cable swathe, with two joint bays.

- Substation extension at the existing Bramford Substation (Section B). The works comprise the installation of 400 kV Full Line Tension (FLT) gantries up to 15 m in height and associated connection/ancillary works within the substation boundary.

Image 5.16 Typical reinstatement of an open cut swathe with two joint bays (Source: Murphy Group, 2019)

5.4.25 The DASSI (document reference 7.16) sets out further details on design guidance that will be taken forward into the detailed design.

Design of the CSE Compounds and Substations

5.4.26 As noted in Chapter 1 of the DAS, the DASSI (document reference 7.16) aims to supplement the DAS and aims to focus on the site-specific infrastructure (non-linear works (e.g. CSE compounds and substations)).

5.4.27 National Grid designs its CSE compounds according to a set of safety instructions, policies, standards and guidance notes based on international standards. A CSE compound layout is designed to protect staff working in it, members of the public outside, protect the equipment in the CSE compound and allow safe access for maintenance and surrounding area. These design requirements and the dimensions of the electric equipment and supporting infrastructure determine the overall size of the CSE compound and therefore there is no scope to vary the size and layout.

5.4.28 The operational requirements for the CSE compounds typically:

- Occupy a footprint of approximately 90 m x 64 m for a 400 kV double circuit compound
- Have two gantries (typically 26 m wide with a maximum height of 15 m)
- Security fencing (typically up to 4 m high) to protect the equipment
- Permanent access road (up to 4 m wide).

5.4.29 The Project will consist of seven CSE compounds (each with permanent access) to connect the overhead lines to the underground cables, including:

- Wenham Grove
- Great Horkesley (EACN Side) and Great Horkesley (Tilbury Side)
- Fairstead (EACN Side) and Fairstead (Tilbury Side)
- Tilbury North (Tilbury Side) and Tilbury North (Warley Side)

5.4.30 The Project will also include:

- A new 400 kV substation on the Tendring Peninsular, referred to as the EACN Substation. This is proposed to be an Air Insulated Switchgear (AIS) substation.
- A new 400 kV substation to the south of Orsett Golf Course in Essex, referred to as the Tilbury North Substation (with a new permanent access). This is proposed to be a Gas Insulated Switchgear (GIS) substation.

5.4.31 Additional interfaces include:

- Connection works into the existing Norwich Main Substation (Section A). The works comprise two new 400 kV Full Line Tension gantries (up to 15 m in height within Norwich Main Substation and installation of new, and modifications to existing apparatus within the footprint of Norwich Main Substation.
- Substation extension at the existing Bramford Substation (Section B). The works comprise the installation of 400 kV Full Line Tension gantries (up to 15 m in height) and associated connection/ancillary works within the substation boundary.

5.4.32 For further detail on the above non-linear works, this is contained within the DASSI.

Consultation (Stakeholder Engagement)

5.4.33 The Project has undergone non-statutory and statutory consultation since 2022. Feedback received during this process has informed the evolution of the Project design. Further details of the consultation are included within the ES Chapter 3: Alternatives (document reference 6.3) and the Consultation Report (document reference 5.1). Below is a summary of consultation carried out to date.

5.4.34 In spring 2022, a non-statutory public consultation was held for a period of eight weeks, between April 2022 and June 2022. National Grid presented information on how the Project was evolving from the evaluation of strategic options to a preliminary preferred graduated swathe within which new infrastructure (pylons and underground cables) could be located as well as a proposed new substation site on the Tendring Peninsula, as described within the National Grid CPRSS (2022a).

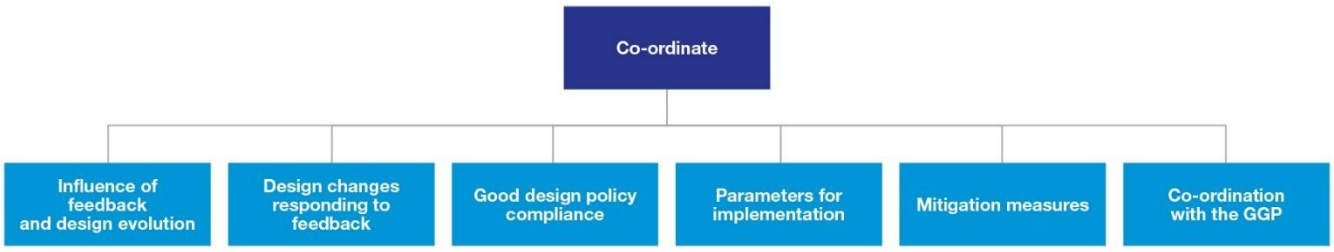
5.4.35 In summer 2023, an additional non-statutory public consultation was held for a period of eight weeks, between June 2023 and August 2023. The 2023 non-statutory consultation presented a preferred draft alignment which included proposed pylon locations, CSE compound locations, locations of underground cables and the proposed location for the new EACN Substation. Changes to the proposed plans, both inside and outside of the 2022 preferred corridor, were presented as part of this information shared for this round of consultation.

5.4.36 Statutory consultation was held in 2024, between April and July 2024. As part of the statutory consultation material, a Preliminary Environmental Information Report was prepared. The statutory consultation presented the 2024 preferred draft alignment which incorporated permanent and temporary elements of the Project.

5.5 Co-ordinate

5.5.1 This section of the DAS sets out how National Grid and the project team has addressed the third stage of the Advice Note on Good Design – Co-ordinate.

Image 5.17 Advice on Good Design – Co-ordinate



Influence of Feedback and Design Evolution

5.5.2 National Grid has had due regard to the feedback received during the non-statutory and statutory consultations and this has informed the Project design. Full details are contained within the Consultation Report (document reference 5.1) and 2025 DDR (document reference 5.15) and ES Chapter 3: Alternatives (document reference 6.3). Each consultation was accompanied by a DDR which set out the changes of the Project as a result of the previous consultation.

5.5.3 National Grid has progressively modified the design and provided increasing levels of detail as the design has matured. National Grid presented information on how the Project was evolving from the evaluation of strategic options to a preliminary preferred graduated swathe within which new infrastructure (pylons and underground cables) could be located as well as a proposed new substation site on the Tendring Peninsula, as described within the National Grid CPRSS (2022a).

5.5.4 The 2023 preferred draft alignment (including pylon locations, areas of underground cable, CSE compounds and the location of the EACN Substation) was subject to further non statutory consultation. Following the 2023 non-statutory consultation feedback the Project was developed to form the 2024 preferred draft alignment – including an overhead line alignment (with pylon locations), sections of underground cable, locations of CSE compounds, the location of the EACN Substation, third party utilities diversion works, permanent access roads (where necessary), permanent drainage, environmental mitigation and areas identified for onsite BNG (known as 'Environmental Areas') and all associated temporary works associated with the construction and operation (and maintenance) of the Project. Following this, further targeted consultation was undertaken in 2025.

5.5.5 The development of the Project was an iterative process with regular reviews incorporated to ensure that the decisions made and the basis upon which those decisions were made remained valid. Full details of the review process are set out in the DDRs (National Grid, 2023a, 2024a and document reference 5.15). These reviews considered whether any changes that had occurred would have resulted in a different outcome for the CPRSS, considering factors such as changes to legislative context, Project assumptions and parameters, customer connection agreements, baseline data and changes proposed in feedback to consultations. Whilst some changes were noted, it remained the conclusion that the preferred Strategic Proposals which provided the context for the National Grid CPRSS (2022a) remained valid and an appropriate basis to take the Project forward.

Environmental Impact Assessment

5.5.6 The project team have applied the mitigation hierarchy to minimise residual impacts and the need for the Project strongly outweighs those impacts. The mitigation hierarchy has been applied throughout development of the Project as part of the iterative EIA process which has informed the routeing and siting process. The Project has been designed to avoid, reduce, compensate or mitigate potentially significant adverse residual effects. The application for development consent is supported by an ES (document reference 6.1-6.18) which demonstrates that the mitigation hierarchy has been applied throughout the design and development of the Project. The ES provides a description of the measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant effects on the environment, where residual effects is still significant after mitigation then compensation is provided.

Design Changes Responding to Feedback

5.5.7 Following each consultation the feedback received was carefully reviewed and considered alongside ongoing technical work on the engineering design and the environmental impact assessment process. Feedback was carefully considered in the context of National Grid's legal duties, the Holford and Horlock Rules, national policy, environmental, socio economic constraints and opportunities, engineering feasibility, cost and planning considerations. The process of considering the changes comprised

an initial filter for benefit and feasibility, an assessment incorporating inputs from relevant technical experts, and further stages of additional study if required. The outcome of the consideration of potential design changes was either that it informed the draft proposals, or the change was not considered further following balanced and informed consideration.

5.5.8 Full details of the feedback received is set out in the 2022 and 2023 Non-Statutory Feedback Reports and Consultation Report (document reference 5.1).

5.5.9 A DDR was published in 2023, 2024 and 2025. The document describes how the Project had evolved since the last consultation undertaken in response to feedback to that consultation and further environmental and engineering studies. A summary of the main changes identified within the consultations, subsequent development of the Project design, and further technical assessment is contained within the National Grid DDRs (2023a, 2024a and document reference 5.15) and ES Chapter 3: Alternatives (document reference 6.3).

5.5.10 The reasons for taking some changes forward and not others are set out in the Consultation Report (document reference 5.1). Typically, such small changes encompass examples such as, in-line pylon moves, repositioning of temporary works within the same fields or minor adjustments to pylon positions. The feedback from all the consultations has helped inform the final designs which have been put forward in the application for development consent.

Good Design Policy Compliance

5.5.11 Compliance within good design policy is considered within the Planning Statement (document reference 5.6) and Policy Compliance Document (document reference 5.7). Paragraph 4.1.3 of NPS EN-1 sets out a presumption in favour of granting consent for energy NSIPs. There is also a presumption that the urgent need for CNP infrastructure, such as the Project, will '*in general outweigh any other residual impacts not capable of being addressed by the application of the mitigation hierarchy*' (paragraph 3.3.63). The Project will help meet the urgent need for CNP infrastructure to meet '*energy objectives, together with the national security, economic, commercial, and net zero benefits*' (Paragraph 3.3.63 of NPS EN-1 (DESNZ, 2024a)).

5.5.12 Whilst it did not inform the design of the Project (as the project was designed by the time the Advice note was released) the project team has sought to respond to the guidance contained within the Advice on Good Design (Planning Inspectorate, 2024d). Chapter 5 of this DAS is set out to reflect the four stages of good design in the Planning Inspectorates Advice on Good Design: 'assemble, research, co-ordinate and secure'. The DAS seeks to describe the evolution of the principal components and the Project-wide factors and feedback which have influenced the design and location. Appendix C sets out National Grid's response of how the project is meeting and addressing good design against the considerations of Annex A of the NSIPs Advice on Good Design (Planning Inspectorate, 2024d).

5.5.13 Similarly to the Advice on Good Design, the NIC Design Principles have been given due regard during the development of the Project. Table 5.2 sets out how the Project has considered the overarching NIC Design Principles.

Table 5.2 NIC Design Principles

NIC Design Principle	Project Consideration
Climate	National Grid has assessed potential impacts of climate change and incorporated adaptation/resilience throughout the lifetime of the Project. Section 5.3 of the DAS sets out the 'sustainability vision' of the Project and details how the Project has been designed to be resilient to climate change. BNG plays a pivotal role in climate change mitigation and adaptation. The Project has committed to delivering at least 10% BNG further details can be found in the BNG Report (document reference 7.1). The Project would make an important contribution to reducing GHG and reaching the UK government's target of net zero by 2050, by supporting the distribution of greener energy.
People	The Project will deliver resilience, security and diversity of supply that will deliver secure, diverse mix of clean energy to homes, businesses, hospitals and schools. Extensive non-statutory, statutory and targeted consultation have taken place since 2022. Further details are set out in Section 5.4 and 5.5 of this DAS and within the Consultation Report (document reference 5.1). Section 5.6 of this DAS sets out details in relation to the appointment of a community relations team to act as the main point of contact during the delivery phase of the Project. National Grid have considered the potential impact of the Project to local people and receptors in the ES, specifically in the Residential Visual Amenity Assessment (RVAA) (ES Appendix 13.4: RVAA (document reference 13.4.A4)) which assesses the potential impact of the proposals upon residential amenity. The assessment concludes that the residential visual amenity threshold would not be breached by the Project.
Places	Placemaking is a broad concept and for this type of infrastructure is addressed by incorporating community feedback into the design process, the design change process is set out within the Consultation Report (document reference 5.1). Key placemaking principles, include: Community engagement, collaboration, sustainability, flexibility and responding to nature. The Project has committed to achieve a minimum of 10% BNG (through onsite and offsite BNG) and undertaken a BNG assessment which is presented in the BNG Report (document reference 7.1). The Project is for new electricity infrastructure that when delivered will have wider benefits to the community, delivering clean, secure and affordable clean power to the benefit of communities/society. Section 5.6 of this DAS sets out the DCO (Requirements) which include maintenance requirements for landscape, including reinstatement planting plans, supporting the natural environment to be in place for the life of the Project.

NIC Design Principle	Project Consideration
Value	To deliver the Project Section 5.3 of this DAS sets out the Project Team that consists of a multi-disciplinary design team who have worked on the Project since the Strategic Option Stage up to submission. The GGP has been set up by National Grid to support the delivery of the Project. In order to deliver the Project it requires a huge range of skills and this has been through both the design and delivery phase. The consultation that has taken place since 2022 has included technical consultees that has helped shape the development of scheme alongside the non-statutory, statutory and targeted consultation (detailed in the Construction Report (document reference 5.1)). Section 2.2 of this DAS sets out the need for the Project, the Planning Statement (document reference 5.6) sets out the overall benefits of the Project in relation to the planning balance. National Grid have appointed a Development Design Champion to provide oversight and advocacy for ongoing good design through the DCO process, and will appoint a second Delivery and Detail Design Champion to support the development and implementation of the Project. National Grid will also appoint a community relations team to act as the main point of contact for local residents, businesses and stakeholders during both pre-construction and construction phases. Further details are set out in Section 5.6 of this DAS.

5.5.14 The analysis of planning policy compliance demonstrates that the need for the Project is supported by national planning policy and other national energy and environmental policy, and that the Project addresses relevant national, marine and local planning policies through its design, avoiding sensitive areas and limiting adverse impacts where practicable.

5.5.15 In terms of the overall planning balance, the clear and substantial benefits of the Project clearly outweigh any adverse impacts. The presumption in favour of consent in NPS EN-1 sets out that these residual impacts are unlikely to outweigh the urgent need for this type of infrastructure and that any tests set out in the NPS or other planning policy are to be treated as if they have been met.

Parameters for Implementation

5.5.16 The Project design submitted as part of the application for development consent represents the culmination of extensive design development, environmental assessment, consultation and engagement with a wide range of stakeholders (please see Consultation Report, document reference 5.1). The design principles summarised in this report have been and will continue to be adopted throughout the implementation of the Project.

5.5.17 There is however always the necessity for some flexibility once construction begins. This is to account for evolving environmental constraints such as unexpected ground conditions, ongoing engineering optimisation and coordination with other infrastructure or land uses they may only become fully defined during detailed design stages of the Project.

5.5.18 Case law relating to EIA (established through R. v Rochdale MBC ex parte Milne (No.1) and R v Rochdale MBC ex parte Tew [1999] and R. v Rochdale MBC ex parte Milne (No.2) [2000]) recognises the need for flexibility in project design, which can be addressed through the use of a 'Design Envelope' also known as a 'Rochdale Envelope'. The Design Envelope describes the relevant parameters within which the Project will operate. The Planning Inspectorate has produced Advice Note 9 on the Rochdale Envelope (Planning Inspectorate, 2018).

5.5.19 The Order Limits are defined as the maximum extent of land within which the Project, as defined within the ES Chapter 4 (document reference 6.4), may be carried out, and includes both permanent and temporary land required to build, operate and maintain the Project.

5.5.20 The Order Limits include LoD which represent the maximum deviation for permanent features, such as the overhead line, pylons, CSE compounds, new substations and underground cables. This allows for adjustment to the final positioning of Project features to avoid localised constraints or unknown or unforeseeable issues that may arise.

5.5.21 The assessment presented within the ES (document references 6.1 – 6.18) is based on the design and LoD as shown on the Works Plans (including parameter tables) (document reference 2.3), Figure 4.1: Proposed Project Design (document reference 6.4.F1) and Figure 4.2: Proposed Project Design – Permanent Features (document reference 6.4.F2). However, it should be noted that the permanent aspects of the Project, including pylon locations, are not fixed and could be located anywhere within the LoD, as defined on the Works Plans (document reference 2.3) (unless a commitment has been made to restrict the LoD – details of which are outlined within the CoCP (document reference 7.2)). The location and orientation of the CSE

compounds, new EACN Substation, new Tilbury North Substation and underground cables may also change within the LoD. The associated temporary construction works would also change to the revised locations, albeit within the Order Limits.

5.5.22 Each environmental topic chapter within the ES (document references 6.6 to 6.18) include an assessment of flexibility of the Project design within the LoD. For example, changes to the location or height of permanent features such as pylons, within the LoD (other than where locations of specific pylons are committed to, as detailed within the CoCP (document reference 7.2). This identifies if any changes to the design within the LoD would result in changes to effects of the design presented within the DCO application.

5.5.23 To ensure that detailed design matters that can only be understood when finalising the design ahead of construction are both in accordance with the approved parameters and also agreed with the relevant local planning authority where considered necessary, Schedule 3 of the Draft DCO imposes requirements upon National Grid to provided details pertaining to detailed design to submitted and approved before construction can commence. This is explained further in the "secure" section below.

Mitigation Measures

5.5.24 If National Grid is granted development consent for the Project, its powers under the DCO would apply to specified land within the 'Order Limits' as shown on the plans submitted with the application. The Project would include embedded mitigation measures and standard mitigation measures as set out in the ES Chapter 4: Project Description (document reference 6.4) and within the CoCP (document reference 7.2).

5.5.25 Environmental appraisal has been an integral part of the Project design process since conception. National Grid has embedded mitigation measures into the design of the Project as matter of internal policy to avoid or reduce significant effects that may otherwise be experienced during construction. ES Chapter 4: Project Description (document reference 6.4) details the embedded mitigation measures. Some of these measures are summarised below:

- The Project has committed to delivering at least 10% BNG with wider environmental and societal benefits
- Sensitive routeing and siting of the alignment and Order Limits – avoids and reduces as far as practicable effects on identified environmental (including landscape and visual, ecology and heritage assets) and socio-economic receptors
- Underground cable – proposed in four locations – particularly through Dedham Vale National Landscape, the underground cables will reduce the effects on views and setting
- The Project would include triple Araucaria conductors (or alternative technology that performs to the same or better standard in relating to noise on standard lattice pylons) for new transmission infrastructure
- The Project has been designed to comply with design safety standards including the NETS SQSS and the suite of National Grid policies and processes which contains details on design standards required to be met when designing, constructing, and operating its projects

- The design includes a largely continuous temporary haul road along the proposed alignment to support efficient construction of the Project having regard to the number of HGV movements
- Two new permanent non-motorised user (NMU) routes are proposed, along Bentley Road and Ardleigh Road in Essex and Holford Road in Thurrock. The NMU routes would comprise provision of an off-road path to separate vulnerable users from the construction traffic. The NMU routes are proposed due to the expected increase in construction traffic and subsequent impacts that would have on NMUs that currently share the carriageway
- Rationalisation and mitigation of existing electricity transmission infrastructure. As an example, achieving the change requires the replacement of an extended length of the 132 kV PKF overhead line by 132 kV underground cable back to PKF35, removing an additional five pylons over a distance of around 1.9 km. The extent of 132 kV overhead line replacement with underground cable is governed by technical factors and to some degree by a beneficial reduction in potential cumulative effects and reduces the potential inconsistency with Holford Rule 6 in respect of wirescape.

Co-ordination with the GGP

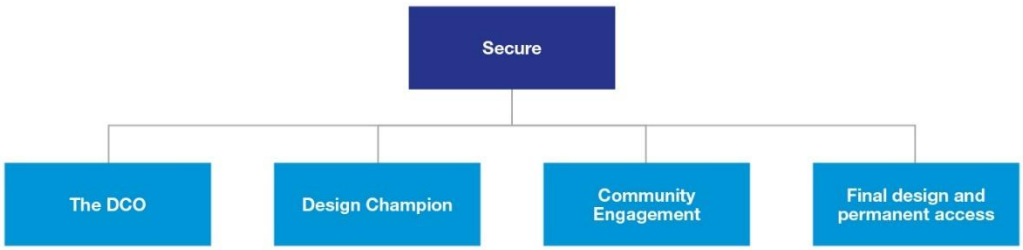
5.5.26 The GGP have not been the front end engineering design contractor at the development stage however, Early Contractor Involvement (ECI) has been undertaken specifically at reviewing the design. The GGP will transition to developing the detailed design for construction following the grant of consent. ECI has provided a valuable role in supporting good design outcomes for the Project. In this advisory role, the coordination with the GGP has sought to achieve the following:

- Buildability checks: identify design elements that may be difficult, costly, or inefficient to construct, prompting early adjustments that avoid major redesign later to ensure the evolving design is practical and grounded in real-world construction experience
- Risk identification: Early review to flag construction-related risks (e.g. access constraints, temporary works, sequencing issues) that might not be apparent to the design team. Addressing these early helps protect design integrity and avoid reactive changes during construction
- Cost and programme assurance: highlight areas where the design may drive up costs or extend the programme unnecessarily. This enables the design team to adjust details—such as construction methods, materials, or interfaces—while still aligning with the design principles secured through the DCO
- Design compliance monitoring: reviewing design at the development stage to help ensure that the detailed design remains within the scope of what is to be secured by the DCO
- Technical feasibility feedback: review any changes potentially required to temporary works assumptions or utility diversions that improve efficiency and safety—without materially changing the design intent or appearance.

5.6 Secure

5.6.1 This section of the DAS sets out how National Grid and the project team has addressed the fourth stage of the Advice Note on Good Design – Secure.

Image 5.18 Advice on Good Design – Secure



The DCO

5.6.2 The draft DCO (document reference 3.1) is a critical mechanism for ensuring that good design is secured. It ensures that the design retains flexibility to respond to site conditions, innovation, and stakeholder feedback whilst embedding enforceable design commitments that provide clarity, certainty, and accountability. This section explains how the DCO ensures that the final built outcome secures the design aspirations assessed during examination and meets the expectations of stakeholders and the public.

5.6.3 Should the application for development consent be approved by the SoS, Article 3 will give the legal authorisation for the development. Schedule 1 of the DCO will define the authorised development – the specific works and infrastructure that are granted development consent under the DCO. Schedule 1 lists individual work numbers which describe the key elements of the project, such as overhead transmission electric line and underground transmission electric line. The works in Schedule 1 are the only activities that can lawfully be carried out using the powers granted by the DCO.

5.6.4 Whilst Schedule 1 defines the works, the Works Plans (document reference 2.3) show the spatial location of those works and identify the LoD of each work number listed in Schedule 1. The scope of the LoD were developed having regard to all relevant factors in considerations including engineering and technical considerations and environmental including consultation and are defined in writing in article 5 of the DCO (LoD). This is described in more detail in the 2023 DDR (National Grid, 2023b), the 2024 DDR (National Grid, 2024b) 2025 DDR (document reference 5.15). The Works Plans also include the table of parameters which state the maximum height and upward extent of vertical LoD for permanent infrastructure.

5.6.5 Schedule 18 (certified plans) lists all the documents that are formally “certified”. They become legally binding reference material for the development and become the definitive version of what the National Grid must follow. Other parts of the DCO, especially Schedule 3 (requirements), often refer to specific certified documents.

5.6.6 Schedule 3 of the DCO (Requirements) controls how the Project is built by securing conditional control relating to design. The requirements secure mitigation commitments from the ES, provide the mechanism for agreeing detailed design where necessary, provide legal certainty and compliance controls and provide practical controls for the construction and operation phase.

5.6.7 Table 5.3 below describes each requirement and its purpose where relevant to design.

Table 5.3 DCO requirements

Requirement	Name	Description
4	Construction Management Plans	Requires submission, approval and implementation of a suite of construction management plans, some of which have already been developed into an outline format to deliver mitigation commitments made in the ES into a practical set of controls and procedures that the contractor must follow on site. The outline management plans already drafted are to be certified as part of the application and listed in Schedule 18 and final versions must be substantially in accordance with the outline.
5	Archaeology	To ensure National Grid minimise impacts upon designated and non-designated heritage assets, this requirement mandates the approach to investigate, mitigate and monitor before any irreversible construction works take place. This may lead to design adjustments and prevents National grid from finalising a design in ignorance of buried archaeology.
6	Design and layout plans	Requires the authorised development to be carried out in general accordance with the design and layout plans that have been certified under Schedule 18 of the DCO. These plans present an indicative representation of cable sealing end compounds and substations based upon the Project Description as set out in Chapter 4 of the ES. The authorised development will not be in general accordance with the design and layout plans to the extent that any departure from the design and layout drawings gives rise to any materially new or materially different environmental effects from those assessed in the environmental statement. This ensures that flexibility in design is still retained but does not go unchecked.
8	Retention and removal of trees, woodland and hedgerows.	This requirement ensures that the detailed design phase of the project reflects the certified “trees and hedgerows to be removed or managed” plans (reference 2.16), maintaining alignment with what was assessed in the ES. This requirement prevents the premature or excessive clearance of trees, woodland and hedgerows by requiring submission of these finalised plans prior to commencement of development. This requirement also ensure that the removal of trees, woodland and hedgerows is carried out in accordance

Requirement	Name	Description
		with measures captured within the Landscape and Ecological Management Plan, a final version of which will be agreed prior to commencement of development under requirement 4 (construction management plans).
9	Reinstatement planting plans	This requirement ensures that the reinstatement planting design following construction activities includes appropriate restoration of temporarily disturbed areas in a way that is consistent with the approved LEMP.
10	Reinstatement schemes	This requirement mandates that land used temporarily for construction is to be reinstated to a condition suitable for its former use, reinforcing the design principle of reversibility of temporary impacts. It helps maintain the continuity of land use and encourages integration of reinstatement works with the staged delivery of the Project, so that reinstatement works are timely. This requirement also provides flexibility by recognising that not all land can be fully reinstated (e.g. near cable routes) but limits this through clear geographical exceptions and ensures that any deviation from the original condition must be justified and approved, preserving design control.
11	Approval of details having regard to the design approach for site specific infrastructure	This requirement recognises that whilst there is generally very limited flexibility regarding scale, layout and appearance of substations give their technical restrictions, the proposed Tilbury North GIS substation does offer more flexibility regarding the final colour finish than other substation sites. In addition to this, it also recognises that with the switchgear building being the most visually prominent feature of this site, the relevant the local planning authority may wish to agree the final colour of the building and other ancillary buildings on site to ensure visual cohesion.
12	Design of permanent building	This requirement ensures that the final appearance of permanent buildings is consistent with the approved design principles in the DASSI as certified under Article 59 (certification of documents), Schedule 18. It provides a mechanism for enforceable design-led detailing post consent, ensuring matters agreed during examination are delivered throughout construction whilst still allowing flexibility for innovation at detailed design stage.
13	Decommissioning	This requirement provides a design aligned framework for the responsible removal and restoration of the authorised development at the end of its life. It ensures that design principles continue to apply through the Project's final

Requirement	Name	Description
		phase maintaining accountability and quality over the full life cycle of the infrastructure. It requires the written decommissioning scheme to be based on laws and regulations applicable at the time ensuring that the approach is future proof and adaptable to updated design and environmental standards.

Design Champion/s

5.6.8 To support the DCO application, National Grid appointed an Internal Design Review to impartially assess the emerging project against the Good Design principles and requirements, as supported by NPS EN-1, NIC Design Principles and the Planning Inspectorate Advice on Good Design.

5.6.9 In anticipation of the Project moving to the delivery stage, National Grid need a clear, visible mechanism to demonstrate that the Project has an accountable individual advocating for Good Design during examination and into later stages of detailed design, construction and handback.

5.6.10 This being achieved through two linked roles that together will deliver the role of *Design Champion:*

- 2a **Development Design Champion** – from the existing project team; and
- 2b **Delivery and Detail Design Champion** – from the GGP / Lot 1 Design Partner (Principal Designer).

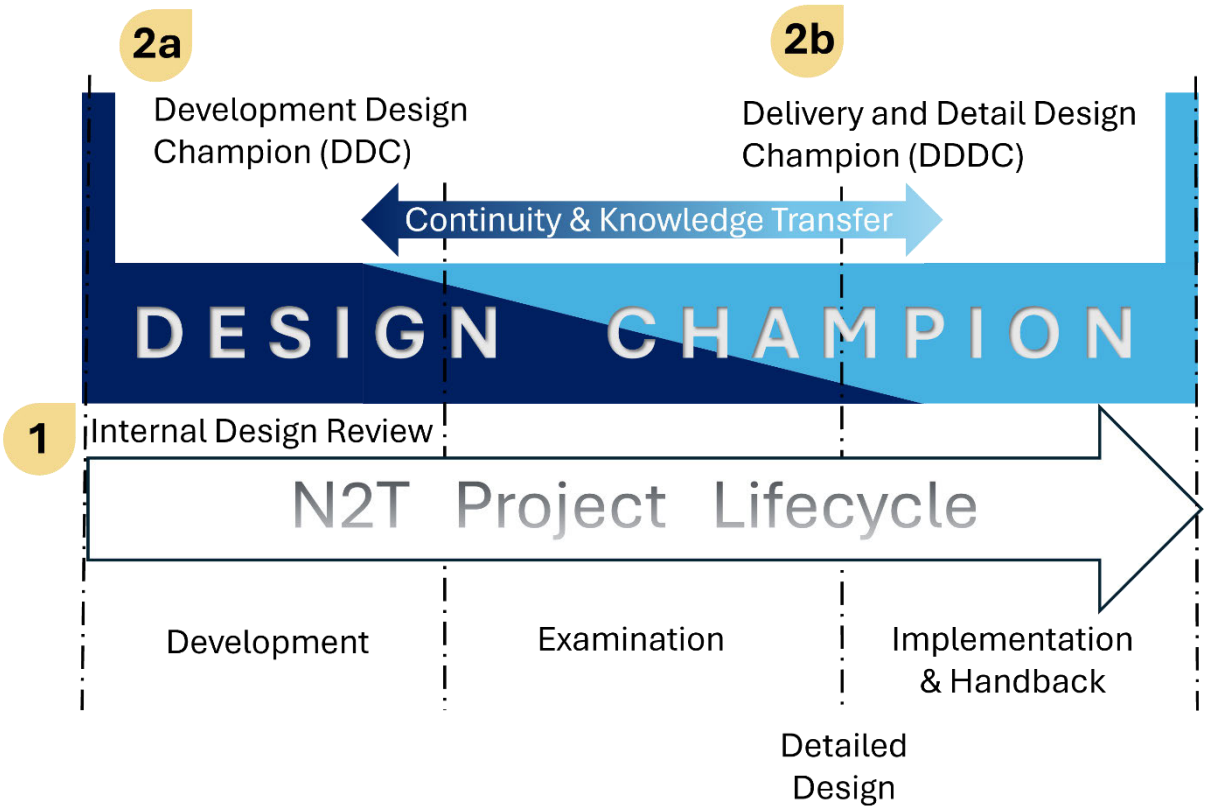
5.6.11 National Grid have appointed a Development Design Champion (DDC) to provide independent oversight and advocacy for ongoing good design throughout the DCO process. In addition, they will also appoint a Delivery and Detail Design Champion (DDDC) to ensure Good Design principles assessed and during examination and secured through the DCO is carried through to implementation of the Project to meet the expectations of stakeholders and the public. Together they will act in unison, with each dovetailing across the others role to ensure Good Design continuity throughout the project lifecycle. The DDC is appointed from within the existing project team, and is an individual with extensive knowledge of the Project, bringing this benefit to the DCO and examination process. Both design champions will provide a critical friend role, ensuring the commitment to design principles secured is upheld. The appointment of a design champion is supported by NPS EN-1, NIC Design Principles and the Planning Inspectorate Advice on Good Design.

5.6.12 The model for championing design is intentionally integrated into the technical development process, rather than independent – good design is delivered through existing roles, assurance processes and Design Control Points, not a parallel review panel.

The Development of the Design Champion Role over the Project Lifecycle

5.6.13 The Design Champion function is delivered through two complementary roles whose emphasis changes over time. Image 5.19 illustrates how responsibility transitions across the lifecycle, with an intentional overlap and two-way flow of knowledge to maintain continuity of Good Design intent.

Image 5.19 Transition of the Design Champion role through the Project Lifecycle



5.6.14 As shown in Image 5.19, the Design Champion – Development role (2a) is most influential during Project Development and Consent and Examination Stage, before responsibility transitions to the Design Champion – Delivery and Detail Design (2b) during Detailed Design, Construction and Handback. An overlap period enables two-way continuity and knowledge transfer, ensuring that agreed Good Design principles are both safeguarded and pragmatically embedded into delivery.

The Design Champion Role

5.6.15 The Design Champion has been appointed to provide leadership to secure high-quality, sustainable outcomes and drive, monitor and champion design quality from inception to post-consent. Key aspects of the Design Champion role will include:

- **Core Responsibilities:**
  - **Advocacy:** Championing design quality to senior Project decision-makers
  - **Vision Setting:** Articulating and maintaining the Project's design vision and quality aspirations
  - **Guidance:** Ensuring design objectives are embedded in briefings, contracts, and throughout the Project life
  - **Evaluation:** Reviewing design quality at key stages
- **Role in NSIPs:** The NIC (2023) requires this role to ensure that major projects, which are subject to DCOs, deliver wider public benefits and align with NIC Design Principles.
- **Relationship to Governance:** Design Champions are critical for providing a "golden thread" of design, especially post-consent.

5.6.16 The **DDC** (2a, Image 5.19), is a senior internal figure who will safeguard the Project's Good Design intent as it moves from the consent to delivery stage. They maintain a clear statement of design aims from the DAS, guide decision-making, and advocate the design narrative with stakeholders such as local authorities and community groups. Acting as a bridge between the Development and Consenting Phase team and the GGP delivery team, they ensure continuity and alignment without replacing technical design assurance or approvals. The role focuses on internal advocacy and transition support, not on technical assurance or independent design approval.

5.6.17 The **DDDC** (2b, Image 5.19), is a senior figure within the GGP Lot 1 Design Partner who will embed the Project's Good Design principles into detailed design and delivery. They use established design frameworks and control mechanisms to prevent design drift and ensure design intent from the DAS and DASSI (certified document) is maintained. The role supports the Design Champion – Development by providing delivery insights and collaborates with functional teams to integrate sustainability, safety, and social value. Operating within existing processes, it does not replace technical approvals. The role is vital through detailed design, construction, and handback to uphold the agreed design vision.

How the two Norwich to Tilbury Dual Design Champion Roles Work Together

- A **synergistic relationship**, not duplication:
  - The Design Champion – Development transfers knowledge and safeguards intent.
  - The Design Champion – Delivery and Detailed Design embeds that intent into delivery systems and implementation.
- Together they:
  - Support orderly transition from Development to Delivery
  - Give confidence that Good Design will endure beyond consent
  - Avoid the need for separate or external design governance structures (unless later agreed)

Community Engagement

5.6.18 Community engagement in the context of good design will be secured by National Grid appointing a community relations team to act as the main point of contact for local residents, businesses and stakeholders during both pre-construction and construction phases. They will provide updates on project progress, timelines and potential impacts (e.g. traffic, noise and access). They shall manage public enquiries and complaints. They shall also facilitate community events, newsletters and information sessions where required. The community relations team supports the principle of inclusive design, minimising disruption through design allowing the GGP to understand potential community impacts and also helping the project evolve in a way that is sensitive to its live context.

5.6.19 The appointment of a community relations team is secured by way of a Stakeholder Communications Plan, forming part of the Code of Construction Practice to be discharged by way of a DCO requirement. An outline Stakeholder Communications Plan is available at Appendix E of the CoCP (Document 7.2).

Final Design and Permanent Access

Permanent Access Proposals

5.6.20 Permanent vehicular accesses shall be required to all CSE compounds and substations to facilitate operational, inspection, and maintenance activities at these locations. These will include permanent access junctions to be provided from the Public Highway, as well as permanent private access roads away from the Public Highway. In some locations, permanent improvement works may also be required on the Public Highway to facilitate access to these facilities from the Strategic Road Network.

5.6.21 Norwich Main Substation has an existing permanent access from Mangreen, which will be used without modifications. Locations with permanent access proposals are presented on Figure 4.2: Proposed Project Design – Permanent Features (document reference 6.4.F2 and comprise:

- Bramford Substation near Bramford, Suffolk - permanent access for the existing substation site to be provided from Bullen Lane via the existing substation access gate. Permanent widening works on Bullen Lane are also proposed between the existing substation gate and the junction with the B1113 Loraine Way, in order to improve operational access to the substation for large vehicles
- Wenham Grove CSE Compound, near Raydon, Suffolk - permanent access to be provided from Raydon Road via access bellmouth JC-B013
- Great Horkesley East CSE Compound near Great Horkesley, Essex - permanent access to be provided from Boxted Road via access bellmouth TB-B022
- Great Horkesley West CSE Compound near Great Horkesley, Essex - permanent access to be provided from Crabtree Lane via bellmouth TB-B035
- Fairstead CSE Compounds near Fairstead, Essex - permanent access for both CSE compounds in this area to be provided from Fairstead Road via bellmouth TB-B079
- Tilbury CSE Compounds near Chadwell St Mary, Essex - permanent access for both CSE compounds in this area to be provided from Brentwood Road via a new permanent access route
- EACN Substation near Little Bromley, Essex - permanent access for the proposed substation site to be provided from Little Bromley Road via bellmouth JC-B070. An additional private permanent access road for large vehicles is to be provided between Bentley Road (bellmouth JC-B072) and Ardleigh Road (bellmouth JC-B071), with widening also proposed on the Public Highway on Bentley Road and Ardleigh Road to the junction with the A120
- Tilbury North Substation near Chadwell St Mary, Essex - permanent access for the proposed substation site to be provided from either Brentwood Road via bellmouth TN-B007, or from Buckingham Hill Road via bellmouth TN-B014.

Image 5.20 Illustrative Abnormal Indivisible Load delivery vehicle

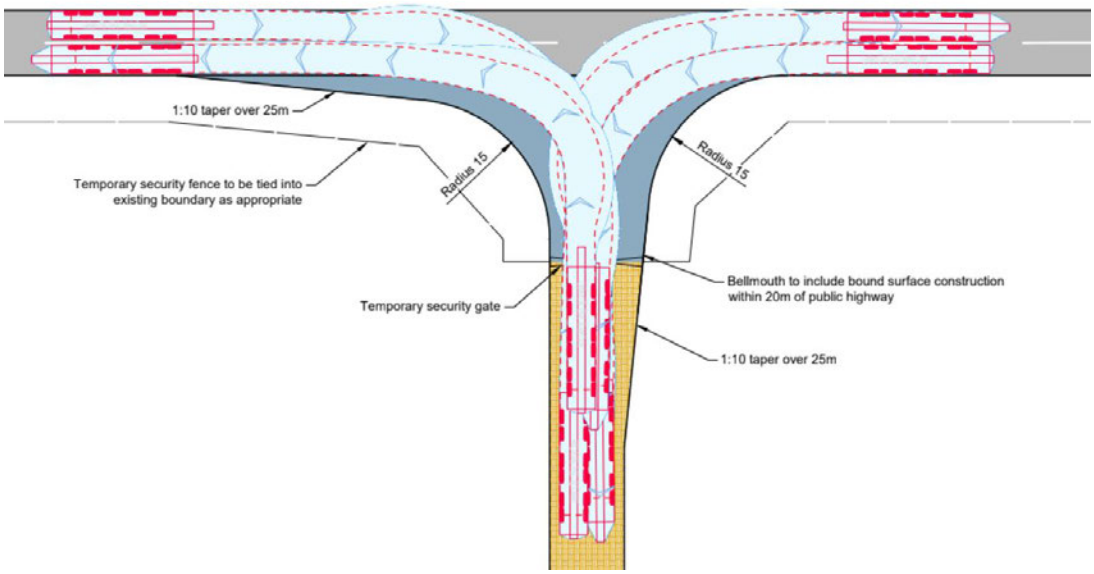
5.6.22 Two new permanent NMU routes are proposed, along Bentley Road and Ardleigh Road in Essex and Hoford Road in Thurrock. The NMU routes would comprise provision of an off-road path to separate vulnerable users from the construction traffic. The NMU routes are proposed due to the expected increase in construction traffic and subsequent impacts that would have on NMUs that currently share the carriageway.

5.6.23 Permanent access bellmouths have been designed in line with the typical access arrangements shown in Design and Layout Plans - Traffic and Transport (document reference 2.6.3). These have been positioned to provide adequate visibility, with suitable mitigation where necessary. Where practicable permanent and construction accesses have been aligned to minimise the overall footprint of the Project.

5.6.24 Permanent access bellmouth designs have been developed for each location (i.e. CSE compounds or substations) on the basis of Design Manual for Roads and Bridges standard CD 123 - Geometric design of at-grade priority and signal-controlled junctions (2021). Stage 1 Road Safety Audits have been undertaken for each of these locations, overseen by the relevant Local Highway Authorities. An illustrative bellmouth is shown in Image 5.21.

5.6.25 Due to the requirement for abnormal indivisible loads (AIL) (as shown in Image 5.20) the minimum road width for a substation permanent access is 5 m. This will increase locally at bends in the alignment to a minimum of 6 m to allow for the safe tracking of the required AIL vehicle. Widening may also be provided locally for passing places subject to the length, alignment, visibility and proposed use of the access (Part 3, Article 14 of the draft DCO (document reference 3.1) provides the powers to alter layout, etc. of streets).

Image 5.21 Illustrative bellmouth – mobile crane swept path



5.6.26 The CSE compound permanent accesses shall be provided with a minimum width of 4 m to enable the safe access for fire and rescue services. As with the substation permanent access roads the accesses to the CSE compounds will be widened locally at bends and for the inclusion of passing places.

5.6.27 Permanent accesses are usually provided as impervious construction using a flexible or rigid pavement such as asphalt or concrete respectively. Permeable pavement alternatives are permissible but must meet the loading requirements of the access road, which can be a challenge for existing systems on the market, and they must be resistant to deformation and rutting over the design life of the substation or CSE compound, precluding the use of unbound aggregate as a surface course.

5.6.28 Where the permanent accesses are impervious a sustainable drainage system (SuDS) will be installed to collect, treat, attenuate and discharge the runoff from the road. SuDS best practice shall be used including the prioritisation of infiltration techniques close to the source where possible. Image 5.22 shows an example of a SuDS attenuation pond.

Image 5.22 SuDS attenuation pond

5.6.29 As predominately unstaffed sites the substations and CSE compounds do not generate a significant amount of traffic for the access roads, however regular inspection and maintenance visits are required. The frequency of visits will vary across the different facilities with substations being visited more frequently than the CSE compounds. CSE compound inspections would typically occur every month and maintenance visits every three months, with more major maintenance activities arranged as and when required. More frequent visits may be required on substations where facilities such as oil separators and septic tanks would require regular monitoring.

5.6.30 In the majority of cases inspections and maintenance visits would be undertaken using light vehicles including cars and vans only. Regular tanker visits may be required depending on the facilities at the substations and HGVs such as low loaders may be required to supply mobile elevation working platforms and other equipment when required for maintenance activities. Tanker visits may be required depending on the facilities at the substations for purpose of draining septic tanks and replacing oil within the transformers and other equipment. Infrequently more major maintenance activities will be planned which will require more frequent movement of staff, plant and equipment. These major maintenance activities could require vehicles similar to those detailed for the construction phase of the Project.

5.6.31 In the majority of cases lighting, security and electronic access controls if used are limited to the compounds and the immediate access point into them and are not required along the permanent access road. A secure gate will be located at the access off the local highway network to prevent unauthorised use. This gate would be set back from the highway to enable a car or van to completely clear the highway before stopping to open the gate. Drainage, fence and or hedgerows will be used to line the access preventing unauthorised use. In some instances, third party use of the access will be permitted, i.e. where landowners require access.

5.6.32 Where Public Rights of Way (PRoWs) interact with permanent access infrastructure, it is intended that disruption to these PRoWs should be minimised, in line with the strategy set out in the Outline PRoW Management Plan (document reference 7.6). Due to limited anticipated operational traffic flows, it will be suitable for PRoW users to cross over or travel along relevant sections of the proposed permanent access roads without specific separate infrastructure being provided. Interactions between permanent accesses and PRoWs are as follows:

- Wenham Grove CSE Compound, near Raydon, Suffolk - no PRoW interaction
- Great Horkesley East CSE Compound near Great Horkesley, Essex - Great Horkesley Footpaths 135-49 and 135-31 are to be managed on their existing alignments
- Great Horkesley West CSE Compound near Great Horkesley, Essex - no PRoW interactions
- Fairstead CSE Compounds near Fairstead, Essex - no PRoW interactions
- Tilbury CSE Compounds near Chadwell St Mary, Essex - Thurrock Footpath 78 to be managed on existing alignment
- Bramford Substation near Bramford, Suffolk – no PRoW interactions

- EACN Substation near Little Bromley, Essex - Little Bromley Footpaths 172-13 and 172-14 alignments to be amended locally to provide more suitable crossing arrangement over permanent access route
- Tilbury North Substation near Chadwell St Mary, Essex - Thurrock Footpath 43 Crossing to be managed on existing alignment.

5.6.33 In addition to the permanent accesses to the CSE compounds and the substations, permanent rights of access shall also be required along the length of the cable installation and overhead line alignment. These shall use existing field accesses to provide light vehicle, 4x4 or tractor and trailer access to the cable alignment or overhead line alignment for inspection and monitoring purposes.

5.6.34 The Outline PRoW Management Plan (to be secured through DCO requirements) also details the approach to the management of PRoWs during construction. It details the PRoWs to be affected during construction. Any temporary PRoW diversions are expected to be largely unsurfaced, in line with existing PRoWs. Open Access Land (OAL) will be temporarily affected by the Project during construction. The right to roam across the affected OAL will be maintained. However, access to areas where construction activities are being undertaken will be subject to restrictions on safety grounds that will be managed by the contractor. The affected areas of OAL are shown in the Open Access Land Plans (document reference 2.15).

5.7 Summary

5.7.1 The purpose of this chapter of the DAS has been to describe the factors that have influenced the design of the Project. It has been prepared in consideration of the Planning Inspectorate's Nationally Significant Infrastructure Projects: Advice on Good Design guidance, NIC Design Principles, NPS EN-1 and EN-5 and has highlighted how the Project has embedded good design throughout the Project. Whilst the Advice on Good Design has not informed the design of the Project, the project team has sought to respond to the guidance to ensure that the Project is able to demonstrate that it adheres to good design through both process and outcomes. This chapter has demonstrated how the design principles have informed the design evolution of the overhead lines and underground cables as well as the non-linear elements of the Project, as set out in the DASSI (document reference 7.16). This chapter has also set out how National Grid has considered consultation feedback with reference to the DDR (document reference 5.15) and Consultation Report (document reference 5.1) and made amendments where feasible and justified, and how National Grid has developed a sustainable proposal which will be durable and adaptable and which is sensitive to its local environment. The chapter concludes by setting out how the Project's good design will be secured.

6. Conclusions

6.1.1 National Grid owns and maintains the national high voltage electricity transmission network throughout England and Wales. The transmission network connects the power from where it is generated to the regional DNO who then supply businesses and homes.

6.1.2 EN-1 sets out the Government's overarching policy about the development of NSIPs in the energy sector. It emphasises the need for new energy projects to contribute to a secure, diverse, reliable and affordable energy supply.

6.1.3 Paragraph 4.7.6 of EN-1 explains that the applicant may not have any or very limited choice in the physical appearance of some energy infrastructure, but there may be opportunities to demonstrate good design in terms of siting relative to existing landscape character, land form and vegetation. Much of the infrastructure proposed by National Grid is restricted in terms of its form by operational and technical requirements that are set out in this DAS for safe and functional design as set out in the NPS. East Anglia's 400 kV electricity transmission network was built in the 1960s. It was built to supply regional demand, centred on Norwich and Ipswich. This generation capacity has recently been added to by several offshore windfarms with the existing generation totalling 6,552.4 MW of installed capacity. This is expected to grow substantially in coming years. Without reinforcement, the capacity of the East Anglia and South East existing network is insufficient to accommodate the connection of the proposed new power sources. The design principles adopted by National Grid relate to defining routes and selecting sites which will minimise adverse environmental and socio-economic impacts.

6.1.4 EN-1 recognises that in discussing 'good design' the concept is more than simply a consideration of visual appearance. Through the adoption of good design principles, National Grid has sought to develop its proposals in an iterative manner, considering local constraints or concerns.

6.1.5 The Nationally Significant Infrastructure Projects: Advice on Good Design explains why good design is important, what might success look like and how it might be delivered in NSIP applications. The advice states that given the scale and impact of NSIP developments, achieving well-designed Project outcomes addressing sustainability and climate change is essential. It sets out the design process through four stages: '*assemble, research, co-ordinate and secure*' which should be considered during the pre-application and are to be addressed within the NSIP application. The NIC Design Principles are based on four core pillars: climate, people, places and value. Similarly to the Advice on Good Design, these core pillars have been given due regard during the development of the Project.

6.1.6 The alignment of the overhead line has been identified through routing and siting studies carried out in accordance with the Holford and Horlock Rules. While minor design details can be agreed through the DCO process, overall design and layout flexibility is limited. Policy supports this by encouraging good aesthetics 'as far as possible', but only within the bounds of technical constraints.

6.1.7 The development of the Project was an iterative process with regular reviews incorporated to ensure that the decisions made and the basis upon which those decisions were made remained valid. The feedback received during consultation for the Project was carefully reviewed and considered alongside ongoing technical work on the engineering design and the environmental impact process.

6.1.8 National Grid, through the application of the Holford and Horlock Rules and underground policy is able to demonstrate that it has applied the principles of good design in terms of siting relative to existing landscape character, landform and vegetation.

6.1.9 It is concluded that this DAS demonstrates that the Project satisfies the Good Design criteria identified within NPS EN-1 and EN-5, as well as detailing how the PINS Advice on Good Design and NIC Design Principles have been given due regard during the development of the Project.

Abbreviations

Abbreviation	Full Reference
AC	Alternating Current
AIL	Abnormal Indivisible Loads
AIS	Air Insulated Switchgear
ASTI	Accelerated Strategic Transmission Investment
AONB	Area of Outstanding Natural Beauty
BNG	Biodiversity Net Gain
CNP	Critical National Priority
CoCP	Outline Code of Construction Practice
CPRSS	Corridor and Preliminary Routeing and Siting Study Report
CSE	Cable Sealing End
DAS	Design and Access Statement
DASSI	Design Approach for Site Specific Infrastructure
DC	Direct Current
DCO	Development Consent Order
DDR	Design Development Report
DESNZ	Department for Energy Security and Net Zero
DNO	Distribution Network Operators
EACN	East Anglia Connection Node
ECI	Early Contractor Involvement
EPD	Environmental Product Declarations
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESO	Electricity System Operator
FLT	Full Line Tension
GIS	Gas Insulated Switchgear
GIL	Gas Insulated Lines
GGP	Great Grid Partnership
GHG	Greenhouse Gas

Abbreviation	Full Reference
kV	Kilovolt
LoD	Limits of Deviation
LIR	Local Impact Report
MITS	Main Interconnected Transmission System
NESO	National Energy System Operator
NETS	National Electricity Transmission System
NETS SQSS	National Electricity Transmission System Security and Quality of Supply Standard
NGET	National Grid Electricity Transmission
NIC	National Infrastructure Commission
NMU	Non-motorised User
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
Ofgem	Office of Gas and Electricity Markets
PRoW	Public Rights of Way
SBT	Science Based Target
SBTN	Science Based Targets Network
SOBR	Strategic Options Backcheck and Review
SoS	Secretary of State
SQSS	Security and Quality of Supply Standard
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage System

Glossary

Term	Description
Abnormal Indivisible Loads	A large load which cannot 'without undue expense or risk of damage' be divided into two or more smaller loads for the purposes of being transported by road, and which exceeds limits set out in terms of weight (>44 tonnes), length (>18.65 m), and width (>2.9 m).
Alignment	The proposed overhead line and underground cable route.
Ancient woodland	Land that has been continually wooded since at least 1600 in England. Regarded as 'irreplaceable habitat' in national planning policy and guidance. Ancient woodland greater than 2 ha is recorded on the Natural England Ancient Woodland Inventory.
Angle/tension pylon	Pylon where a horizontal insulator string attaches the conductors. Tension or 'angle' pylons are used at points where the overhead line alignment changes direction.
Bellmouth	A flared vehicular access point connecting a construction site to the public highway, designed to accommodate turning movements by large vehicles.
Biodiversity	The variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems.
Biodiversity Net Gain	An approach for developments to ensure habitats for wildlife are left in a measurably better state than they were before the development.
Circuit	A set of wires along which current flows and returns. It is necessary to have a complete circuit for current to flow. The National Grid standard for overhead lines operating at 400 kV is for pylons to carry two circuits, each consisting of three phases, i.e. a double circuit configuration.
Cable	An insulated conductor designed for underground installation.
Cable Sealing End	Structures used to transfer transmission circuits between underground cables and overhead lines.
Cable Sealing End compound	Electrical infrastructure used as the transition point between overhead lines and underground cables. A compound on the ground acts as the principal transition point.
Code of Construction Practice	A code of construction practice sets out the standards and procedures to which a developer (and its contractors) must adhere in order to manage the potential effects of construction works.
Conductor	The overhead wire that carries electricity from one place to another, for example the line between two pylons.

Term	Description
Conservation Area	An area of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance as defined in s69(1)(a) in the Planning (Listed Building and Conservation Areas) Act 1990.
Design Approach for Site-Specific Infrastructure	Document developed by National Grid to outline the design principles that can be taken forward into the detailed design, set out an approach to the design of site-specific infrastructure of non-linear works, and to detail those elements of the design which have some flexibility in their appearance.
Development Consent Order	A statutory instrument which grants consents and other rights to build a Nationally Significant Infrastructure Project, as defined by the Planning Act 2008.
Distribution Network Operator	Companies that own and operate the power lines and infrastructure that connect the National Grid network to individual properties.
Embedded design measures	Mitigation measures are those that are intrinsic to and built into the design of the Project.
Environmental Statement (ES)	The main output from the EIA process, an ES is the report required to accompany an application for development consent (under the Infrastructure Planning (EIA) Regulations 2017) to inform public and stakeholder consultation and the decision on whether a project should be allowed to proceed. The EIA Regulations set out specific requirements for the contents of an ES for Nationally Significant Infrastructure Projects.
Full line tension gantries	Types of gantries which allow conductors to connect into a substation or compound directly from a pylon, without requiring a bulky terminal pylon. This allows a larger span between the final pylon and the gantry.
Gantry	An overhead bridge-like structure supporting electrical equipment. A transition point from overhead line equipment to equipment in a compound.
Greenhouse gases	The term 'greenhouse gases' refers to a number of chemicals in the earth's atmosphere such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O).
Haul road	A route used by construction traffic within the Order Limits to access a working area from a site access point.
Heavy Goods Vehicles	Goods vehicles weighing more than 3,500 kg.
High voltage	275,000 volts and over. National Grid's transmission lines generally operate at 275,000 and 400,000 volts. Lower voltage lines, such as 132,000 volts and 33,000 volts, are generally owned by local distribution companies.
Insulator	Used to attach the conductors to the pylons, preventing electrical discharge to the steelwork.

Term	Description
Kilovolt	1,000 volts
Landscape character	A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.
Lattice pylon	Pylon type widely used on the national electricity transmission networks. Both standard lattice pylons (approximately 50 m in height) and low hight lattice pylons (approximately 40 m in height) are proposed on the Project.
Limits of Deviation (LoD)	LoD allow for adjustment to the final positioning of the permanent features, for example to avoid localised constraints or unknown or unforeseeable issues that may arise. This could include previously unidentified poor ground conditions which require a pylon to be moved slightly for geotechnical reasons, such as ground stability. The horizontal LoD define the parameters within which the position on the ground of proposed permanent features may deviate from the position shown on the plans. This applies to both linear (for example overhead lines and underground cables) and non-linear (for example the new EACN Substation and CSE compounds) proposed infrastructure. Vertical LoD limit the maximum vertical height, or the depth below ground, of any new infrastructure.
Listed building	A measure of a building's special architectural and historic interest. There are three categories of listed buildings, Grades I, II* and II, depending on the level of interest.
Local Nature Reserve	Sites dedicated by the local authority under Section 21 of the National Parks and Access to the Countryside Act 1949 for nature conservation which have wildlife or geological features that are of special interest locally.
Local Planning Authority	The public authority whose duty it is to carry out specific planning functions for a particular area.
Mitigation	The action of reducing the severity and magnitude of change (impact) to the environment. Measures to avoid, reduce, remedy or compensate for significant adverse effects.
National Electricity Transmission System Security and Quality of Supply Standard	The NETS SQSS sets out a coordinated set of criteria and methodologies that the Transmission Licensees shall use in the planning and operation of the National Electricity Transmission System.
National Landscape (an Area of Outstanding Natural Beauty)	Formally designated under the National Parks and Access to the Countryside Act of 1949 to protect areas of the countryside of high scenic quality that cannot be selected for National Park status due to their lack of opportunities for outdoor recreation (an essential objective of National Parks). As of November 2023, all AONBs became 'National Landscapes'. This reflects ambitions for the areas to play a key part in the international '30 by 30' commitment (to protect and conserve a minimum of 30% of land and sea for biodiversity by 2030).

Term	Description
Nationally Significant Infrastructure Project	Typically a large scale development of national importance that requires development consent from the Secretary of State, under the Planning Act 2008.
Order Limits	The maximum extent of land within which the authorised development may take place.
Overhead line	Conductor (wire) carrying electric current, strung from pylon to pylon.
Permanent access	Access required to infrastructure during the operational phase of the Project, for operational and maintenance purposes.
Project Section	Geographical 'sections' have been identified that break the Project down into smaller units for ease of description within the documentation. These Project Sections are broken down into eight sections based largely on Local Planning Authority boundaries.
Public Right of Way (PRoW)	A footpath, bridleway or byway accessible to all members of the public.
Pylon	Structures that support the overhead line (conductors).
Scoping	Scoping is the process of determining the content and extent of matters that should be covered in the Environmental Impact Assessment.
Scoping Report	Report determining the content and extent of matters that should be covered in the Environmental Impact Assessment.
Standard mitigation measures	Comprise management activities and techniques, which would be implemented throughout construction of the Project to limit effects through adherence to good site practices.
Substation	Substations are used to control the flow of power through the electricity system. They are also used to change (or transform) the voltage from a higher to lower voltage to allow it to be transmitted to local homes and businesses.
Suspension pylon	Pylon where conductors are suspended by a vertical insulator string. Suspension pylons support the conductors on straight stretches of overhead line.
Terminal pylon	Pylons erected at the end of the overhead line to terminate the line at substations or where overhead lines are connected to underground cables. Because of the uneven load on one side of the pylons, much deeper and heavier foundations are required on the unloaded side.
Transmission line	A National Grid overhead line and underground cable which transmits electricity between National Grid's substations. Power is transmitted at high voltages (275 kV or above) between power stations where it is generated and the local electricity supply networks of the regional Distribution Network Operators where it is transformed to lower voltages (132 kV or below) for supply via distribution lines to local communities.

Term	Description
Triple Araucaria conductors	Triple Araucaria conductor design is the least electrically stressed conductor system that National Grid uses. It is the best design for reducing the effects of line crackle (corona discharge).
Temporary construction compounds	Temporary compounds installed during the construction phase of the Project. Each compound may contain storage areas including laydown areas, soils storage and areas for equipment and fuel, drainage, generators, car parking and offices and welfare areas (portacabins).
Underground cable	An insulated conductor carrying electric current designed for underground installation. Underground cables link together two Cable Sealing End compounds.
Voltage	The electrical potential difference between two points.

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Town and Country Planning Act 1990 (c.8) Available at: https://www.legislation.gov.uk/ukpga/1990/8/contents (Accessed 29 April 2025).

The Town and Country Planning (Development Management Procedure) (England) Order 2015 (SI 2015/595) Available at: https://www.legislation.gov.uk/uksi/2015/595/contents (Accessed 29 April 2025).

Appendix A. Guide to the Approach on Design

nationalgrid

Guide to the approach on design

This Guide to the approach on design includes the key documents that form the project's design approach.

While there is no statutory requirement to produce design-related documents, paragraph 4.7.7 of EN-1 (2024) states that:

"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 favored choice has been selected."

This is not the interactive version of the Guide to the approach on design.

To view the interactive version of this guide please visit https://www.nationalgrid.com/electricity-transmission/network-and-infrastructure/infrastructure-projects/norwich-to-tilbury/document-library

Advice issued by the Planning Inspectorate also states that the applicant can submit any document that could help assist in meeting requirements of a National Policy Statement including a design and access statement among other supporting design documents.

Given the linear nature of the proposed electricity transmission project that comprises various components, the following documents have been prepared to capture the design process:

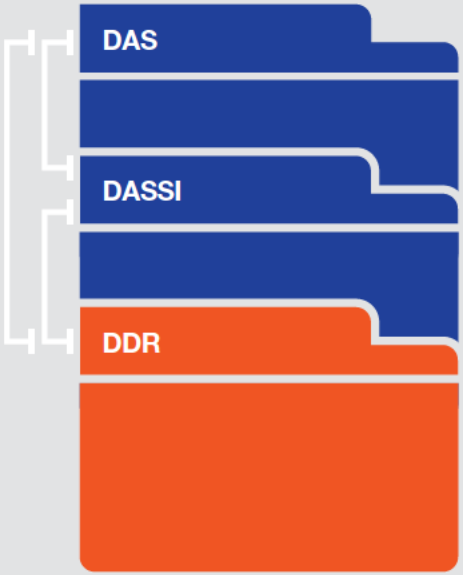
- **DAS –** Design and Access Statement (document reference 7.15)
- **DASSI –** Design Approach Site Specific Infrastructure (document reference 7.16)
- **DDR –** Design Development Report (document reference 5.15)

As you move to the main page of each design document by clicking on the centralised interactive folder to each report, the purpose behind the document and interactions between each report is explained.

The interactive folder therefore provides a central repository to help those interested in understanding where to find key information on design and linkages to other documents that have helped shape and inform the design approach. Access to each design related document and the contents of the report is set out to assist those wanting to access and understand more about the way in which the project design addresses the policy, advice note requirements, regulatory and statutory duties.

Guide to the approach on design

Document



THIS IS AN INTERACTIVE PDF

To explore one of our DCO documents, relating to design click on a folder. To return to the home screen, please click the home icon, top right.

We've produced this interactive PDF to show the design documents that underpin our design approach.

Click on one of the folders on the left to view the document, read a summary and find out more information on our design approach.

Guide to the approach on design

Document

THIS IS AN INTERACTIVE PDF

To explore one of our DCO documents, relating to design click on a folder. To return to the home screen, please click the home icon, top right.

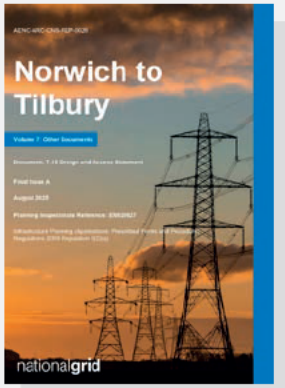
Summary

The Design and Access Statement (DAS) describes the factors that influence design in relation to the permanent linear elements of the Project. The DAS sets out the background to the Project, the design principles applied by National Grid and summarises the approach to and development of good design. It also provides details on the permanent access for both the substations and Cable Sealing End Compounds.

The DAS provides an evaluation and review of the Good Design Process summarising how the design and location have been informed by the Design Principles with reference to the 'Planning Inspectorates Nationally Significant Infrastructure Projects: Advice on Good Design' and the National Infrastructure 'Commission Design Guidance'. It also includes an Internal Design Review Note.

The report acts as the 'central' design Document that links closely with the DDR and DASSI.

Overview



The report is structured as follows:

- **Chapter 1** – Introduction
- **Chapter 2** – Overview of the Project
- **Chapter 3** – Legislation, Policy and Guidance Context
- **Chapter 4** – Physical Context
- **Chapter 5** – Good Design Process
- **Chapter 6** – Conclusions

Guide to the approach on design

Document

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To explore one of our DCO documents, relating to design click on a folder. To return to the home screen, please click the home icon, top right.

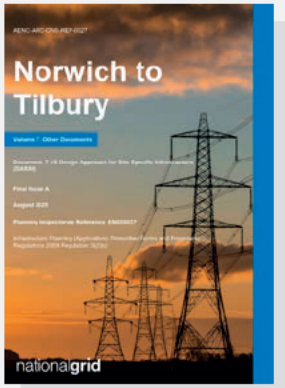
Summary

The Design Approach to Site Specific Infrastructure (DASSI) relates to the details of the site specific infrastructure of the nonlinear works included in the Project, such as the substations and Cable Sealing End Compounds (CSEC's).

This document outlines the design principles that can be taken forward into the detailed design stage, sets out an approach to the design of site specific infrastructure of non-linear works, and details those elements of the design which have some flexibility in their appearance. The document links closely with the DAS and DDR. The DASSI differs from the DDR in that it provides site specific details for non-linear infrastructure.

The document is closely linked with the 'detailed design' Requirement in the draft Development Consent Order (dDCO) and is a "certified" document under Schedule 18.

Overview



The report is structured as follows:

- **Chapter 1** – Introduction
- **Chapter 2** – Site Location and Context
- **Chapter 3** – Examples of Existing Infrastructure
- **Chapter 4** – DCO Design and Operational Function
- **Chapter 5** – Design Principles and Scope for Variation in Developing the Detailed Design
- **Chapter 6** – Approach to Detailed Design and Approval Process

Guide to the approach on design

Document

If you wish to view previous versions of the DDR or a copy of the Consultation Report you can view them in the documents section of the **Planning Inspectorate's website**.

THIS IS AN INTERACTIVE PDF

To explore one of our DCO documents, relating to design click on a folder. To return to the home screen, please click the home icon, top right.

Summary

The Design Development Report (DDR) provides an overview of the main changes in route alignment, infrastructure siting, and technology for the Norwich to Tilbury Project, based on feedback from the 2024 statutory consultation and targeted consultations in 2025.

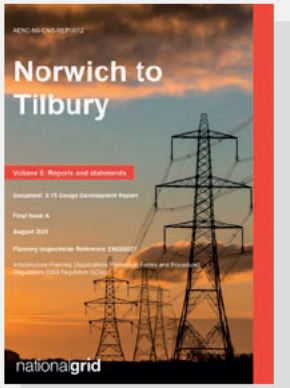
This report highlights the key changes requested in feedback received from consultations, taking into account various factors to ensure balanced decision-making.

It is important to note that the DDR does not encompass all changes, particularly smaller adjustments such as minor pylon relocations, which are addressed in the Consultation Report.

The DDR details the changes being sought, outlines the National Grid's responses, and explains the rationale behind decisions to either proceed with or forgo specific changes.

The DDR provides the details on the linear route and siting with close links to the Consultation Report.

Overview



The report is structured as follows:

- **Chapter 1** – Introduction
- **Chapter 2** – Project wide considerations relevant to the design development
- **Chapter 3** – Overview and Summary of Changes Taken Forwards
- **Chapter 4** – Section A South Norfolk
- **Chapter 5** – Section B Suffolk
- **Chapter 6** – Section C Babergh and Tendring
- **Chapter 7** – Section D Colchester
- **Chapter 8** – Section E Braintree
- **Chapter 9** – Section F Chelmsford
- **Chapter 10** – Section G Brentwood and Basildon

Appendix B. Internal Design Review Note

nationalgrid

Purpose and Preparation of the Internal Design Review Note

1.1 This Design Review (DR) note is prepared in support of the DCO application for *The Great Grid Upgrade: Norwich to Tilbury Project*, (the Project) by National Grid (NG). Prepared by a technical design expert at Arcadis, the note below sets out a brief review of how the project is meeting and addressing good design and, therefore, why a full Design Review Panel is not considered necessary for the Project.

1.2 A Senior Technical Director at Arcadis and Fellow of the Landscape Institute, the individual has been a judge for various awards, is currently a member of a review panel, has successfully presented on numerous occasions to project Design Review Panels, and is a Chief Assessor for the Landscape Institute professional memberships. The individual has had no prior involvement in the Project and has provided an impartial design review. He has interviewed a number of team members and document authors in the preparation of this note.

1.3 The project work to date has been comprehensive. To reduce repetition, this note sign-posts to relevant documents where appropriate. Extracts and duplications are limited in support of this note.

1.4 Annex A of the Advice on Good Design (Planning Inspectorate, 2024) sets out good design issues applicants should consider before submitting a NSIP application for examination. In respect of three questions regarding Independent Design Review coming from Annex A on Good Design (Planning Inspectorate, 2024), responses are as follows:

Issue	Considerations	Response
Independent design review	Has the design development been the subject of an independent design review?	No
	If so, what were the main comments and how has the design responded to them?	-
	Is it the intention to include design reviews post-consent? If so, how are these secured?	No. The Project is deemed to be achieving and meeting Good Design, both process and outcomes, as set out in this note, including how Good Design is being secured post-consent.

"Design requires rigour and process, and good outcomes never come out of haphazard thinking."

Professor Sadie Morgan OBE Chair, National Infrastructure Design Group,
National Infrastructure Commissioner (NIC)

The Project

1.5 The Project is a proposal by National Grid to upgrade the electricity transmission system in East Anglia between Norwich and Tilbury via National Grid's existing Bramford substation and a new substation on the Tendring Peninsular that is to connect two new offshore windfarms and an interconnector to the national transmission network. An overview of the Project is provided in Section 2 of the Design and Access Statement and a Project Description is set out in ES Chapter 4: Project Description (document reference 6.4). In summary the Project consists of:

- A new 400 kilovolt (kV) electricity transmission connection of approximately 180 km overall length from Norwich Main Substation to Tilbury Substation via Bramford Substation, a new East Anglia Connection Node (EACN) Substation and a new Tilbury North Substation, including:

  - Approximately 159 km of new overhead line supported on approximately 509 pylons, either standard steel lattice pylons (approximately 50 m in height) or low height steel lattice pylons (approximately 40 m in height) and some of which would be gantries (typically up to 15 m in height) within proposed Cable Sealing End (CSE) compounds or existing or proposed substations
  - Approximately 21 km of 400 kV underground cabling, some of which would be located through the Dedham Vale National Landscape (formerly an Area of Outstanding Natural Beauty (AONB)

- Up to seven new CSE compounds (with permanent access) to connect the overhead lines to the underground cables
- Modification works to connect into the existing Norwich Main Substation and a substation extension at the existing Bramford Substation
- A new 400 kV substation on the Tendring Peninsula, to connect two new offshore windfarms, referred to as the EACN Substation (with a new permanent access). This is proposed to be an Air Insulated Switchgear (AIS) substation
- A new 400 kV substation to the south of Orsett Golf Course in Essex, referred to as the Tilbury North Substation (with a new permanent access). This is proposed to be a Gas Insulated Switchgear (GIS) substation
- Modifications to the existing National Grid Electricity Transmission overhead lines to facilitate the connection of the existing network into the new Tilbury North Substation to provide connection to the Tilbury Substation
- Ancillary and/or temporary works associated with the construction of the Project.

1.6 In addition, third party utilities diversions and/or modifications would be required to facilitate the construction of the Project. There would also be land required for environmental mitigation and Biodiversity Net Gain (BNG).

1.7 As well as the permanent infrastructure, land would also be required temporarily for construction activities including, for example, working areas for construction equipment and machinery, site offices, welfare, storage and temporary construction access.

1.8 The Project would be designed, constructed and operated in accordance with applicable health and safety legislation. The Project will need to comply with design safety standards including the Security and Quality of Supply Standard (SQSS), which sets out the criteria and methodology for planning and operating the National Electricity Transmission System (NETS). This informs a suite of National Grid policies and processes, which contain details on design standards required to be met when designing, constructing and operating assets such as those proposed for the Project.

1.9 For ease of reference sections have been identified along the route of the Project from north (Norwich – Section A) to South (Tilbury - Section H):

- Section A – South Norfolk Council
- Section B – Mid-Suffolk District Council
- Section C – Babergh District Council, Colchester City Council and Tendring District Council
- Section D – Colchester City Council
- Section E – Braintree District Council
- Section F – Chelmsford City Council and Brentwood Borough Council
- Section G – Basildon Borough Council and Brentwood Borough Council (and part of Chelmsford City Council)
- Section H – Thurrock Council

Good Design: A Statutory Requirement

1.10 It is a statutory requirement for all Nationally Significant Infrastructure Projects (NSIPs) to demonstrate good design, and to contribute to sustainable development, mitigating and adapting to climate change; In accordance with the Planning Inspectorate advice note, National Policy Statements (NPSs) and the National Planning Policy Framework (NPPF).

1.11 Section 3 of the DAS sets out in detail the legislation, policy and guidance context for good design, including, for example:

- The Overarching National Policy Statement for Energy (EN-1) (DESNZ, 2024)
- National Policy Statement for Electricity Networks Infrastructure (EN-5) (DESNZ, 2024)
- Draft: Overarching National Policy Statement for Energy (EN-1) (DESNZ, 2025) (Overarching National Policy Statement for energy (EN-1) - GOV.UK)
- Draft: National Policy Statement for Electricity Networks Infrastructure (EN-5) (DESNZ, 2025) (National Policy Statement for electricity networks infrastructure (EN-5) - GOV.UK)
- National Planning Policy Framework – February 2025
- Nationally Significant Infrastructure Projects: Advice on Good Design - GOV.UK
- National Infrastructure Commission – Design Principles for National Infrastructure

1.12 The Holford Rules - National Grid guidelines on overhead line routeing. (The Holford Rules) and The Horlock Rules - National Grid guidelines on siting and design of substations and non-linear infrastructure (Horlock Rules) are also referenced throughout the DAS.

> *'The creation of high quality, beautiful and sustainable buildings and places is fundamental to what the planning and development process should achieve. Good design is a key aspect of sustainable development, creates better places in which to live and work and helps make development acceptable to communities. Being clear about design expectations, and how these will be tested, is essential for achieving this. So too is effective engagement between applicants, communities, local planning authorities and other interests throughout the process.'*
>
> NPPF February 2025 Para. 131

> *'Whilst the applicant may not have any or very limited choice in the physical appearance of some energy infrastructure, there may be opportunities for the applicant to demonstrate good design in terms of siting relative to existing landscape character, landform and vegetation. Furthermore, the design and sensitive use of materials in any associated development such as electricity substations will assist in ensuring that such development contributes to the quality of the area. Applicants should also, so far*
>
> *as is possible, seek to embed opportunities for nature inclusive design within the design process'.*
>
> Paragraph 4.7.6 of NPS EN-1

> *'Consideration of good design for energy infrastructure' is of particular relevance to this DAS. Paragraph 2.4.3 states: '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 a*
>
> *plication to the fullest possible extent – including in its avoidance and/or mitigation of potential adverse impacts… - the functional performance of the infrastructure in respect of security of supply and public and occupational safety must not thereby be threatened'.*
>
> Paragraph 2.4. and 2.4.4 NPS EN-5

'The National Infrastructure Strategy commits government to embedding good design into all NSIPs. The National Infrastructure Commission (NIC) Design Group 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

Multiple beneficial outcomes'.

Nationally Significant Infrastructure Projects: Advice on Good Design

Design Principles

1.13 The National Infrastructure Commission (NIC, now known as National Infrastructure and Service Transformation Authority (NISTA)) design group published the Design Principles (NIC-Design-Principles.pdf) for National Infrastructure in 2020. The Design Principles are based on four core pillars: climate, people, places and value. A summary of each principle is set out below:

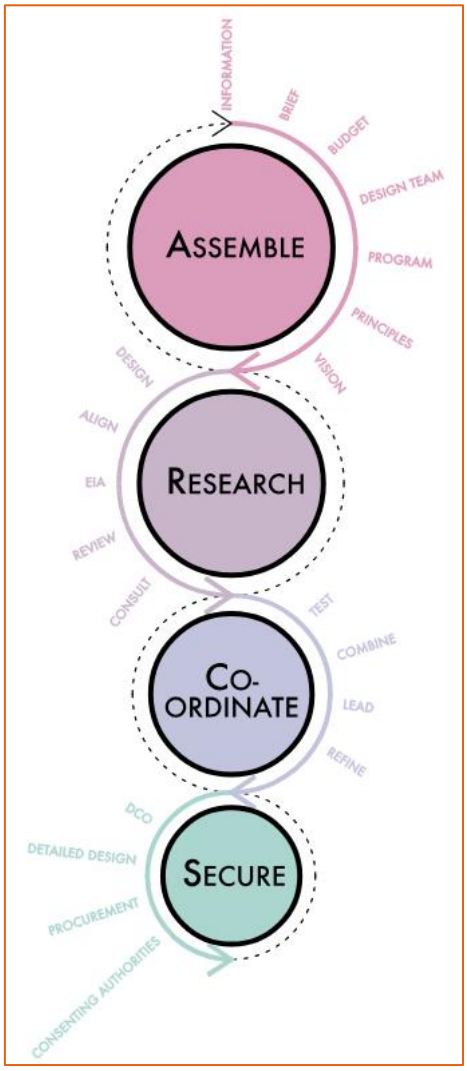
- Climate: mitigate greenhouse gases and adapt to climate change, enable decarbonisation
- People: reflect what society wants, improve quality of life and health/wellbeing as well as take into account the views of affected communities
- Places: create a sense of identity and improve the environment, provide a positive contribution to the local landscape, protect and enhance biodiversity and achieve biodiversity net gain
- Value: achieve multiple benefits and solve problems, seek opportunity to add value and solve multiple problems with one solution.

Extract from NIC Design Principles

1.14 The Nationally Significant Infrastructure Projects: Advice on Good Design was published in October 2024 (Planning Inspectorate, 2024); whilst not part of legislation or formal policy it gives advice that explains why good design is important, what success might look like and how it might be delivered in NSIP applications.

1.15 The advice sets out that a good design process is iterative with a structured approach which problem solves and secures good design outcomes. It states that achieving good design '*requires a holistic approach to deliver high quality, sustainable infrastructure that responds to place and takes account of often complex environments'.* The advice also emphasises the importance of Environmental Impact Assessment (EIA) as a decision-making tool.

1.16 The advice sets out four principles for good design, including assemble, research, co-ordinate and secure. These principles should be considered during pre-application and are advised to be addressed within the NSIP application.



Extract from the Nationally Significant Infrastructure Projects: Advice on Good Design

Key DCO Application Design Documents and Drawings

1.17 This review has been prepared with particular reference to the following key documents and drawings that address design matters (albeit not exclusively) for the Norwich to Tilbury DCO application:

- Design and Access Statement (DAS), (document reference 7.15) – Includes Good Design considerations for the linear and non-linear (site-specific) infrastructure.
- Design Approach for Site-Specific Infrastructure (DASSI) (document reference 7.16) – Includes more detail on Good Design considerations for non-linear or site-specific infrastructure, such as Cable Seal End (CSE) compounds and sub-stations.
- Design Development Report (DDR) (document reference 5.15).

- Environmental Statement (ES) (document reference 6.1 to 6.17)
- Outline Code of Construction Practice (CoCP) (document reference 7.2).
- Planning Statement (PS) (document reference 5.6)
- Draft Development Consent Order (DCO) (document reference 3.1), The purpose of the DCO requirements is to ensure that all subsequent detailed design work complies with the parameter plans and design principles (see Requirement 3 relating to design drawings and Requirement 8 relating to landscape mitigation planting).
- Consultation Report (CR) (document reference 5.1)
- Landscape Proposals Drawings for non-linear infrastructure (LUC - sequence Reference 12055)
- Landscape and Ecological Management Plan (LEMP) (document reference 7.4)
- Statements of Common Ground (SoCG) (document reference 5.9)

How The Project is Addressing and Meeting Good Design

1.18 The DAS, DASSI, DDR and ES are provided to demonstrate how National Grid has taken into account the criteria for good design contained primarily within Advice on Good Design (Planning Inspectorate 2024), NIC Design Principles, and NPS EN-1 and EN-5.

1.19 The design review has considered that the Project is addressing and meeting good design through:

1) Regulatory Obligations

1.20 Design limitations due to the nature of electricity transmission infrastructure, and National Grid's regulatory and other constraints (such as operational, safety and security requirements), are recognised in DAS Section 6.4.34.

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

2) Good Design Process and Outcomes

1.22 NPS EN-1 requires good design, and National Grid and the Project team have been responding to these, and following the Holford Rules and the Horlock Rules, specifically referenced in the NPS, in developing the Project. Whilst the Advice on Good Design (Planning Inspectorate, 2024) has not informed the design of the Project (as the Project was already largely designed by the time the Advice note was released), the Project team has since sought to also respond to its guidance to ensure that the Project is able to demonstrate that it adheres to good design through both process and outcomes. It does this in a number of ways:

- The DAS Appendix A provides a guide to the approach on design of key documents that form the Project's design approach.
- Demonstrably through the four stages of Assemble, Research, Co-ordinate, and Secure (See DAS sections 5.3 to 5.6), as promoted in the Advice on Good Design (Planning Inspectorate, 2024).

1.23 Success in good design comes from a combination of securing both good process and good outcomes. The process planned and followed has been effective, intentional, transparent, and deliverable to achieve good design outcomes, demonstrated through the DAS, DASSI, DDR, and ES. These design outcomes are further secured through the CoCP and the LEMP, and will be delivered through the future detailed design process.

1.24 The DAS is comprehensive and draws together all aspects of project design. It describes the design of the Project and the various components of associated development in a proportionate way and how the design has evolved. The DASSI describes the proposed design and considerations for the non-linear and other associated infrastructure, such as Cable Sealing End (CSE) compounds. The DDR explains design decisions made in response to statutory and non-statutory consultation and, iteratively, also describes how the design has evolved.

3) Establishing Design Principles

1.25 Although the opportunities are limited by the core nature of the Project to provide a new electrical connection, using standard linear and non-linear infrastructure, National Grid has, nonetheless, have had regard to NIC's Design Principles throughout the Project process and development. Furthermore, and in accordance with NSIP Advice on Good Design, a number of Project Level Design Principles, Assumptions and Parameters for Implementation have been established and followed through consultation and review and are secured in the DCO application. These are noted in DAS section 5.3, DDR section 2.4.18, and the DASSI section 6.

1.26 Holford Rules 1, 2, 3 and 7 have been particularly relevant in the selection of strategic options, route corridor and the alignment design for the Project. Holford Rules 4, 5 and 6 have been relevant in the consideration of possible landscape and visual effects that may arise from the Project.

1.27 The project development has had regard to the Horlock Rules in respect of siting and design of EACN sub-station and CSEs. For example, Rule 2 in siting EACN and CSEs to avoid the Dedham Vale National Landscape.

Order Limits and Limits of Deviation

1.28 The Order Limits are defined as the maximum extent of land within which the Project, as defined within the ES (Volume 6 of the DCO application), may be carried out, and includes both permanent and temporary land required to build and operate (and maintain) the Project.

1.29 The Order Limits include LoD which represent the maximum deviation for permanent features, such as the overhead line, pylons, CSE compounds, new substations and underground cables. This allows for adjustment to the final positioning of Project features to avoid localised constraints or unknown or unforeseeable issues that may arise.

1.30 New infrastructure would be constructed within specified LoD, which identify a maximum distance or measurement of variation within which the works must be constructed. These comprise lateral (i.e., on the ground) and vertical limits (in relation to height). The location and orientation of the permanent aspects of this Project could be located anywhere within the LoD, as defined on the Works Plans (document reference 2.3) (unless a commitment has been made to restrict the LoD, – details of which are outlined within the CoCP (document reference 7.2). Specified LoDs are set out in Table 4.3 of the ES Chapter 4: Project Description (document reference 6.4).

1.31 The design evolution and the LoDs have iteratively informed each other through the Project process, such that the LoDs reflect our design and the anticipated construction processes.

4) Embedded Measures

1.32 Fundamentally, the routeing of the transmission corridor and the siting of the site-specific infrastructure has been optimised to balance function and aesthetics, minimising environmental impact, including landscape and visual. This has been the approach from the outset of the Project through the strategic optioneering process, as documented in the Strategic Options Backcheck and Review (SOBR) Report, and carried on through detailed design of the Project as detailed in the 2023 Design Development Report (DDR) (National Grid, 2023), the 2024 DDR (National Grid, 2024) and the 2025 DDR (document reference 5.15). Environmental appraisal was an integral part of the Project design from the outset, which has meant that the Project was able to avoid environmentally sensitive features as far as reasonably practicable. Through

this process National Grid has also embedded measures into the design of the Project to avoid or reduce significant effects that may otherwise be experienced during construction and operation (and maintenance) of the Project. Embedded measures are those that are intrinsic to and built into the design of the Project. These are set out in the ES Chapter 4: Project Description (document reference 6.4), where examples include:

- Sensitive routeing and siting of the alignment and Order Limits – as far as practicable, effects on identified environmental (including landscape and visual, ecology and heritage assets) and socio-economics receptors have been avoided and reduced.
- Underground cabling of the route in four locations, including through Dedham Vale National Landscape, where the effects on views and setting would be reduced. Further information about undergrounding is provided in the DDR (document reference 5.15) and Consultation Report (document reference 5.1A and B).
- Pylon structure options have been explored and selected to optimise the balance between function and aesthetics, minimising environmental impact, including landscape and visual.
- A commitment to a minimum of 10% BNG is made within the design proposals, including associated 30 years post-completion management plan.
- Gas Insulated Switchgear (GIS) substation solutions allow the high voltage equipment to be much closer together, enabling the substation to have a much smaller footprint than an Air Insulated Switchgear (AIS solution). Key design features of GIS substations are the compact design, higher reliability, greater resilience and minimal maintenance. Use of GIS over AIS have been considered, such as at Tilbury North substation.

5) Functionality, Aesthetics, and Sustainability

1.33 Paragraph 4.7.10 NPS EN-1 - The Secretary of State should satisfy itself that 'the applicant has considered both **functionality** (including fitness for purpose and **sustainability**) and **aesthetics** (including its contribution to the quality of the area in which it would be located, any potential amenity benefits, and visual impacts on the landscape or seascape) as far as possible' in the undertaking of the Project.

1.34 The Project has been designed to meet the Strategic Proposal, DAS sections 1.1.4 to 1.1.7 justifies the needs case for an onshore reinforcement between Norwich Main Substation and Tilbury Substation via Bramford Substation, a new East Anglia Connection Node (EACN) Substation and a new Tilbury North Substation.

1.35 Fitness for purpose is demonstrated through the Project design in line with the National Grid options appraisal process (National Grid, 2012), as outlined DAS Chapter 3: Alternatives (document reference 6.3). Good design of the Project transmission infrastructure has been governed by application of the Holford and Horlock rules, alongside an iterative design approach informed by the Environmental Impact Assessment, in accordance with NSIPs Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements (updated March 2025).

1.36 The design approach is also set within technical limitations to meet safety, security, cost effectiveness and operational requirements. These limit the scope for aesthetic or architectural customisation. Key elements like pylon size, overhead line alignment, substation and CSE compound layout are fixed by these functional needs.

1.37 A Residential Visual Amenity Assessment (RVAA) (ES Appendix 13.4: Residential Visual Amenity Assessment (document reference 13.4.A4)) for residential properties that fall within 200m of the centre line of the Project has been undertaken, to test if the Project would breach the Residential Visual Amenity Threshold (RVAT) at any of these locations (i.e. would it affect the use and enjoyment of the property overall to such an extent that it would be rendered an unattractive place to live?). This assessment takes into account worst case Limits of Deviation (LoD) scenarios. The RVAA found that the Project will not breach RVAT for any properties.

1.38 The CoCP (document reference 7.2) will be submitted with the Application which secures the implementation of measures during construction, operation and maintenance, which would seek to avoid or reduce risks relating to pollution and emissions.

1.39 The vision for sustainability of the Project is set out in DAS Chapter 5.3, and the sustainability strategy summarised in table 5.1. This sets out National Grid's strategic commitments to the Project against five UN sustainability goals:

- Net zero infrastructure
- One planet living
- Nature positive
- Climate resilient infrastructure
- Industry legacy.

1.40 The objective is to deliver sustainable infrastructure that meets safety, technical and operational needs while ensuring that the design is adaptable to future needs.

6) Meaningful Engagement

"People ignore design that ignores people"

Frank Chimero, Designer

1.41 With reference to the Consultation Report, National Grid's approach to engagement in support of the Project has been to carry out non-statutory, statutory, targeted and landowner consultation, according to the requirements of the PA 2008. National Grid prepared an Adequacy of Consultation Milestone (AoCM) report which detailed how statutory consultation and subsequent consultations had been caried out in accordance with the components set out in the Programme Document and the SoCG.

1.42 National Grid has adopted a multi-phased consultation approach, comprising of non-statutory consultations, statutory consultation and targeted consultation. This approach has sought consultation feedback throughout the development of the Project and on all aspects of the proposed development, enabling feedback to influence the design evolution.

1.43 Over the course of the consultations undertaken since 2022, numerous changes to the design were proposed by respondents through consultation feedback. Further potential changes arose as a result of ongoing environmental and engineering assessment work as the design progressed. The proposed amendments were considered by the Project team and as a result, the design evolved iteratively to include key changes

1.44 The design of the Project has been an iterative process, influenced by an extensive process of stakeholder engagement and Environmental Impact Assessment. The Consultation Report details the project engagement. The DAS and the DDR sets out the changes that have been accepted and those that were considered as result of consultation but rejected for one or more technical reasons, including siting and routeing alternatives considered.

1.45 The DDR does not cover all the changes made to the Project as many of the changes are small scale and comprise localised adjustments that do not drive or change the environmental effects of the Project in the geographic vicinity of the change or the Project more widely. The reasons for taking forward some minor changes and not others are set out within the Consultation Report (document reference 5.1). Typically, such small-scale changes include in-line pylon moves; repositioning of temporary works within the same fields; or minor adjustments to pylon positions, alignment or the Order Limits published at Statutory Consultation, changes of technology, geographically more extensive changes as well as those where there has been a particular focus of feedback including on alternative technologies and routes. Other changes responding to individual circumstances (e.g. responding to potential future minerals plan outcomes) that require more extended explanation are also addressed.

1.46 Feedback has often raised the question of why only the preferred option (i.e. the preferred corridor and graduated swathe, or preferred alignment and infrastructure positioning) was consulted upon and not the other less favoured options. National Grid is required to consult on the proposal and provide the opportunity for the feedback to influence scheme design. It would be disingenuous and not beneficial to present alternatives that may be preferred by those consulted, in circumstances where they would fail to meet National Grid's duties and thus could not be progressed. NG, nonetheless, present the alternatives considered with reasons for the identification of preference within documents such as the various DDRs, Consultation feedback reports and ES Chapter 3: Alternatives (document reference 6.3).

1.47 Several rounds of consultation have been undertaken and considerable effort made to respond to the requests. National Grid state that they undertake technical and environmental appraisals to identify the most viable and credible solution to respond to the feedback based on balancing various factors, including cost, environmental impact, the needs of the network and National Grid's statutory duties. This process appears to have been followed for The Project.

1.48 To support Good Design, it is apparent that emphasis has been placed through the entire process from strategic proposals stage, which has sought to minimise impacts. Key to this has been the Landscape and Visual Impact Assessment (LVIA) and proposed landscape mitigation. Landscape-focussed Project Engagement and Consultation has included:

- Numerous landscape focussed workshops held with local planning authorities (LPAs) in May, July, September, October and November 2024, and April 2025, to discuss sensitive receptors and routing.
- 2 No stakeholder workshops held with LPAs on landscape mitigation in 2024 and Jan 2025.
- Focus meeting with National Landscape teams and discussion around mitigation in connection to these in October 2024.
- Public consultations – page 39 onwards of the Consultation Report gives information about these and changes made to the proposals as a result.

1.49 The Statements of Common Ground set out an agreed position with each Local Planning Authority, including on design matters, and also any items yet to be agreed. Each Song includes a table which details 'Matters Agreed, Not Agreed or Under Discussion in relation to project development, description and design matters'.

7) Securing Good Design

1.50 Mitigation areas for landscape planting (and Biodiversity Net Gain) around permanent features are labelled 'Environmental Areas' and are shown on Figure 4.1: Proposed Project Design (document reference 6.4.F1) and Figure 4.2: Proposed Project Design - Permanent Features (document reference 6.4.F2). The LEMP also incorporates both landscape and visual impact mitigation proposals, and Biodiversity Net Gain (BNG) proposals.

1.51 The Project allows for landscape planting around CSE compounds, the new EACN Substation, south of the new Tilbury North Substation and the existing Norwich Main Substation and its extension. These are shown as 'Environmental Areas' on Figure 4.1: Proposed Project Design (document reference 6.4.F1) and Figure 4.2: Proposed Project Design – Permanent Features (document reference 6.4.F2). Further details including landscape plans and planting schedules are provided in the Outline Landscape and Ecological Management Plan (LEMP) (document reference 7.4).

1.52 Replacement planting would be undertaken at the earliest opportunity given the right planting season, to mitigate, where practicable, vegetation removed during construction.

1.53 Whilst there is a limitation to how good design can be secured through this type of transmission infrastructure, National Grid has considered the proposed materials and colour palette for the CSE compounds and new substation / substation extension, including buildings, security fencing, equipment, and surfacing to be sensitive to the environment they are located in, where practicable.

1.54 The CoCP sets out the four iterative stages of the CoCP evolution, where the CoCP will be secured by Requirement 4 in the draft DCO (document reference 3.1), together with being a contractual obligation the appointed Main Works Contractor(s) will have to follow. The CoCP will help to secure Good Design beyond the DCO application.

Annex A – Good design issues to consider

Table 1.1 Good design issues to consider

Issue	Considerations
Design Approach Document (DAD)	Is a DAD provided?
	Does the DAD address the brief, the design process, the design principles, and beneficial outcomes?
	If a DAD is not provided, where are the design process and design principles set out?
Analysis, Research	How has the development site been analysed to inform a good design approach?
	What are the main conclusions from this analysis that inform the design at this stage and as it develops?
Response	What are the main significant adverse effects of the proposed development and how are they addressed to enable good design?
Vision	What is the vision for the completed development and its surroundings? Where is it set out?
	Set out the narrative, how the vision will achieve sustainability, create a new place and hold the design together.
Skills	What professional disciplines and skill sets are being and will be working on the design of the project?
	Is there a design champion designated for this project, and if so, who is it and what are their skills?
Developing the design	Describe the approach to good design and explain how the design has (and will continue) to evolve.
	How is any required flexibility being addressed?
	What design choices have (and will be) made?
	What are the emerging design principles and how have the principles directly informed decision making?
	Is there a hierarchical approach to elements of the proposal (for example in designing major and less important bridges in a highways scheme)?
	Have digital techniques, including algorithms and AI been used in design development? If so, explain the tools and data used.
	Is there a coherent narrative of how the approach to design has evolved?
	Where are design outcomes set out?
	Will additional value beyond the site boundary be incorporated?

Issue	Considerations
Independent design review	Has the design development been the subject of an independent design review?
	If so, what were the main comments and how has the design responded to them?
	Is it the intention to include design reviews post-consent? If so, how are these secured?
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?
	Is there a design consultation plan to engage the community following consent of the DCO?
	Is there an agreed process for post-consent decisions with local planning authorities and others, where required?
Place	How is placemaking being addressed?
	How will this be a distinctive place and how will the community benefit from it?
	Describe what the quality of place outcome will be, how this relates to the vision and how it will be secured?
People	What consultation has taken place with statutory and local authorities, communities and people with an interest in the land?
	How will their views be incorporated in the design evolution and where will this be set out?
Integrated design approach	Explain how an integrated, holistic approach to the project's design will be achieved.
	Where is it shown in the documentation? Is there a masterplan?
	How will this be secured?
National Policy Statements (NPSs)	How have the requirements for good design in the relevant NPS (or NPSs) been met?
Design Principles	Set out the good design principles being applied to the project.
	Are the design principles structured or grouped logically?
	How will they be developed prior to consent?
	How will they be illustrated and secured?
National Infrastructure Commission (NIC) 'principles'	Is there a response to the NIC's four principles of good design?
	If not, what design principles have been adopted?
	What process has been used to develop and embed project level design principles?

Internal Design Review: Conclusion

1.55 This design review has considered that the Project is proportionately addressing and meeting good design through the DCO application process. It achieves this in a number of ways:

- With reference to the Strategic Proposal, DAS sections 1.1.4 to 1.1.7 justifies the needs case for an onshore reinforcement between Norwich Main Substation and Tilbury Substation via Bramford Substation, a new East Anglia Connection Node (EACN) Substation and a new Tilbury North Substation.
- The Project follows relevant design guidance, including NPS EN-1, NIC Design Principles, the Holford Rules, the Horlock Rules. and demonstrably, through the four stages of Assemble, Research, Co-ordinate, and Secure (DAS sections 5.3 to 5.6 describes how), as promoted in the Advice on Good Design (Planning Inspectorate, 2024).
- The routeing of the transmission corridor and the siting of the site-specific infrastructure has been optimised from the outset through the strategic optioneering process, to balance function and aesthetics, minimising environmental and landscape and visual impact, as documented in the Strategic Options Backcheck Review (SOBR) Report.
- Environmental Appraisal has been an integral part of the Project design from the outset, which has meant that the Project was able to avoid environmentally sensitive features as far as reasonably practicable, as set out in the comprehensive ES, including a Residential Visual Amenity Assessment, over and above the LVIA. The EIA process has embedded measures into the design of the Project to avoid or reduce significant effects that may otherwise be experienced during construction and operation (and maintenance), such as underground cabling through Dedham Vale National Landscape, and a commitment to a minimum of 10% BNG. Landscape and visual mitigation and ecological proposals are incorporated into the LEMP.
- To support good design the Project has been developed through an iterative process, influenced by extensive stakeholder engagement with LPAs and other stakeholders and consultees. The Consultation Report details the Project engagement. The DAS and the DDR set out the changes that have been accepted and those that were considered as result of consultation but rejected for one or more technical reasons, including siting and routeing alternatives considered.
- The DAS is comprehensive and draws together all aspects of project design in how it has been development in a proportionate way and how the design has evolved. The DASSI describes the proposed design and considerations for the non-linear and other associated infrastructure, such as Cable Sealing End (CSE) compounds.
- The Project secures appropriate Limits of Deviation proportionate to the design of the transmission infrastructure, landscape and environmental sensitivity, and the anticipated construction process.
- Fitness for purpose is demonstrated through the Project design in line with the National Grid options appraisal process (National Grid, 2012), as outlined in DAS Chapter 3: Alternatives Considered (document reference 6.3). The design approach is also set within technical limitations of standard transmission infrastructure to meet safety, security, cost effectiveness and operational requirements.
- The CoCP (document reference 7.2) will secure design standards and measures that will be implemented during the construction process and operation to ensure a consistent and effective approach to managing potential environmental impacts.
- The Statements of Common Ground set out an agreed position with each Local Planning Authority, including on design matters, and also any items yet to be agreed. Each SoCG includes a table which details 'Matters Agreed, Not Agreed or Under Discussion in relation to project development, description and design matters'.
- The Project sustainability is set out in DAS Chapter 5.3, and the strategy summarised in table 5.1, demonstrating National Grid's strategic commitments to The Project against five UN sustainability goals.

1.56 This review, therefore, concludes that an independent design review prior to the application being submitted is not considered necessary. A design champion will be appointed for the implementation and construction phase.

[redacted], **Senior Technical Director, Arcadis**

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Date…15 July 2025……

Appendix C. Compliance with Planning Inspectorate's Advice on Good Design and NIC Design Principles

nationalgrid

Appendix C
Compliance with Planning Inspectorate's Advice on Good Design and NIC Design Principles

Table C.1 Compliance with Planning Inspectorate's Advice on Good Design and NIC Principles

Issue	Considerations	National Grid Response
Design Approach Document (DAD)	Is a DAD provided?	No - due to the scale and linear nature of the Project the design approach is set out in the following documents: • DDR (document reference 5.15); • Design and Access Statement (DAS) (document reference 7.15) and • DASSI (document reference 7.16).
	Does the DAD address the brief, the design process, the design principles, and beneficial outcomes?	DDR provides an overview of the main changes in route alignment, infrastructure siting, and technology, based on feedback from the 2024 statutory consultation and targeted consultations in 2025. DAS sets out the design process and design principles for the Project. DASSI outlines the design details that can be taken forward into the detailed design stage, sets out an approach to the design of site-specific infrastructure of non-linear works, and details those elements of the design which have some flexibility in their appearance.
	If a DAD is not provided, where are the design process and design principles set out?	As mentioned above, the design process and principles are set out in the DDR, DAS and DASSI.
Analysis, Research	How has the development site been analysed to inform a good design approach?	The development site has been analysed through various studies, including Corridor Preliminary Routing and Siting Study (CPRSS); the DDR in accordance with the Holford Rules and Horlock Rules and the EIA process. These consider local landscape character, environmental constraints, and technical requirements to inform a good design approach.

Issue	Considerations	National Grid Response
	What are the main conclusions from this analysis that inform the design at this stage and as it develops?	The main conclusions include the need for sustainable infrastructure, the importance of minimising adverse impacts, and the iterative nature of the design process that incorporates stakeholder feedback and technical assessments. This has resulted in key design outcomes achieved at each stage of the project development process to date as set out in the Planning Statement.
Response	What are the main significant adverse effects of the proposed development and how are they addressed to enable good design?	Likely significant adverse effects include potential landscape and visual impacts. These are addressed through careful routing and siting, applying the mitigation hierarchy. The Project aims to achieve good design by combining the technical, safety and functional requirements with aesthetic considerations where feasible. The ES sets out the embedded measures built into the design of the Project.
Vision	What is the vision for the completed development and its surroundings? Where is it set out?	The vision is to support the connection and transfer of green, renewable energy contributing to the UK's Clean Power 2030 Action Plan.
	Set out the narrative, how the vision will achieve sustainability, create a new place and hold the design together.	The narrative is to deliver sustainable infrastructure that meets safety, technical and operational needs while ensuring that the design is adaptable to future needs.
Skills	What professional disciplines and skill sets are being and will be working on the design of the project?	The project involves multi-disciplinary teams to ensure all aspects of the design are considered within the preparation and delivery stages.
	Is there a design champion designated for this project, and if so, who is it and what are their skills?	Yes, National Grid have appointed a design champion to provide independent oversight and advocacy for good design. A further design champion will be appointed to focus on detailed design and implementation at the appropriate stage in the project lifecycle.
Developing the design	Describe the approach to good design and explain how the	The approach to good design is iterative and is aligned with the different stages (assembly, research,

Issue	Considerations	National Grid Response
	design has (and will continue) to evolve.	coordination, and securing outcomes) as set out in the Planning Inspectorate guidance on Nationally Significant Infrastructure Projects: Advice on Good Design and NIC Design Principles. It has continued to evolve through ongoing collaboration and feedback.
	How is any required flexibility being addressed?	The required flexibility is set out in the Parameters for Implementation section within DAS.
	What design choices have (and will be) made?	Design choices include the consideration of alternative technology, alignment of overhead lines, siting of substations and the incorporation of community feedback within an iterative design process.
	What are the emerging design principles and how have the principles directly informed decision making?	The emerging design principles are set out in the Planning Statement, DAS and DASSI. The key components include sustainability, community engagement and minimising likely adverse impacts. These principles have guided decision making to date.
	Is there a hierarchical approach to elements of the proposal (for example in designing major and less important bridges in a highways scheme)?	Yes, there is a hierarchical approach that prioritises safety and functionality while also considering aesthetic aspects where feasible.
	Have digital techniques, including algorithms and AI been used in design development? If so, explain the tools and data used.	No
	Is there a coherent narrative of how the approach to design has evolved?	Yes, see relevant sections of the Planning Statement, DAS, DASSI and DDR.
	Where are design outcomes set out?	Design outcomes are set out in the DDR (overhead line routing and siting) and DASSI (site specific infrastructure). A summary of the design outcomes in relation to the design evolution is summarised in the Planning Statement.

Issue	Considerations	National Grid Response
	Will additional value beyond the site boundary be incorporated?	Yes, the project aims to deliver additional value beyond the site boundary, for example by providing offsite Biodiversity Net Gain.
Independent design review	Has the design development been the subject of an independent design review?	No
	If so, what were the main comments and how has the design responded to them?	-
	Is it the intention to include design reviews post-consent? If so, how are these secured?	Despite the project being recognised for achieving and meeting Good Design as outlined in this Internal Design Review note, including the measures for securing Good Design post-consent, National Grid have, nevertheless, already appointed a design champion. This individual will provide independent oversight and advocacy for ongoing good design, ensuring that the design principles established through the DCO are upheld, in partnership with a second design champion, who will focus on the detailed design development and implementation phases. Together they will safeguard Good Design throughout the Project lifecycle.
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?	A full explanation of how the final design will be delivered is explained in section 5.6 above and relates to both design related to temporary and permanent works. This framework for securing design includes the DASSI (document reference 7.16) which provides an approach to the design of site-specific infrastructure of non-linear works; this includes the proposed substations, works to substations and Cable Sealing End (CSE) compounds.
	Is there a design consultation plan to engage the community following consent of the DCO?	There is a Stakeholder Communications Plan provided as Appendix E of the Outline Code of Construction Practice (document reference 7.2). Whilst this does not directly relate to design specifically, it sets out the approach to community

Issue	Considerations	National Grid Response
		engagement during the construction of Norwich to Tilbury. It explains the approach to engaging with local communities, what resources will be available and how people can get in touch with the community relations team
	Is there an agreed process for post-consent decisions with local planning authorities and others, where required?	Yes. Schedule 3 of the draft DCO (requirements) provides a series of matters considered necessary to be secured or agreed with local planning authorities where relevant. Schedule 4 of the draft DCO (discharge of requirements) sets out the framework for applications made under Schedule 3.
Place	How is placemaking being addressed?	Placemaking is a broad concept and for this type of infrastructure is addressed by incorporating community feedback into the design process, the design change process is set out within the Consultation Report (document reference 5.1). Key placemaking principles, include: Community engagement, collaboration, sustainability, flexibility and responding to nature.
	How will this be a distinctive place and how will the community benefit from it?	The scheme is for new electricity infrastructure that when delivered will have wider benefits to the community, delivering clean, secure and affordable clean power to the benefit of communities/society.
	Describe what the quality of place outcome will be, how this relates to the vision and how it will be secured?	This will be secured through adherence to the design principles and ongoing community engagement. See secure section of this DAS.
People	What consultation has taken place with statutory and local authorities, communities and people with an interest in the land?	Extensive statutory, non-statutory and targeted consultations have occurred with local authorities, communities and people with an interest in the land. Feedback has been incorporated into the design, full details are set out in the Consultation Report (document reference 5.1) and this DAS.

Issue	Considerations	National Grid Response
	How will their views be incorporated in the design evolution and where will this be set out?	Potential design refinements are identified through stakeholder feedback, the results of non-statutory and statutory consultation, on-going discussions with landowners and reviews by the engineering and environmental team as additional baseline information has been collated. This is set out in the Consultation Report (document reference 5.1).
Integrated design approach	Explain how an integrated, holistic approach to the project's design will be achieved.	The integrated approach is set out as change control process that has been developed to ensure that each identified design refinement is considered and assessed by National Grid's specialist teams covering environment, design and construction and land rights.
	Where is it shown in the documentation? Is there a masterplan?	The integrated approach is documented in the Consultation Report and has informed the DDR.
	How will this be secured?	The secure stage is set out in the DAS (section 5.6).
National Policy Statements (NPSs)	How have the requirements for good design in the relevant NPS (or NPSs) been met?	Requirements have been met by following principles in the National Policy Statements (NPS EN-1 and EN-5) that requires good design as set out in the DAS and Policy Compliance Document (document reference 5.7).
Design Principles	Set out the good design principles being applied to the project.	Good design of transmission infrastructure is primarily governed by application of the Holford and Horlock rules within technical limitations to meet safety, security, cost effectiveness and operational requirements. However, the consideration has also been given to sustainability, community engagement, minimising adverse impacts, and ensuring functionality and safety.
	Are the design principles structured or grouped logically?	Yes, the design principles are logically structured and these are set out in this DAS.

Issue	Considerations	National Grid Response
	How will they be developed prior to consent?	See above.
	How will they be illustrated and secured?	See secure section of this DAS.
National Infrastructure Commission (NIC) 'principles'	Is there a response to the NIC's four principles of good design?	Yes, the project aligns with the NIC's principles of climate, people, places, and value. See Table 5.2 in the DAS.
	If not, what design principles have been adopted?	N/A
	What process has been used to develop and embed project level design principles?	The process involves an iterative design approach that incorporates stakeholder feedback, technical assessments, and adherence to established design principles. This ensures that the principles are embedded throughout the project lifecycle.

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