The Great Grid Upgrade

Sea Link

# Sea Link

**Volume 7: Other Documents**

**Document 7.12.2 Design Principles – Kent**

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**Version: B**
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**Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5(2)(q)**

nationalgrid

# Contents

| Version History | | | |
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| **Date** | **Version** | **Status** | **Description / Changes** |
| 14.03.2025 | A | FINAL | For DCO submission |
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# Executive Summary

Ex1.0.1 These Design Principles have been prepared to identify the objectives of the design process for the Sea Link Project. The Project Level Design Principles (PLDPs) are common to both the Suffolk and Kent Onshore Schemes and are intended to provide broad guidelines for development. The Converter Station and Substation Design Principles (CSSDPs) within this document cover the Kent converter station and substation, and their relationship to the site access and landscape mitigation proposals around them.

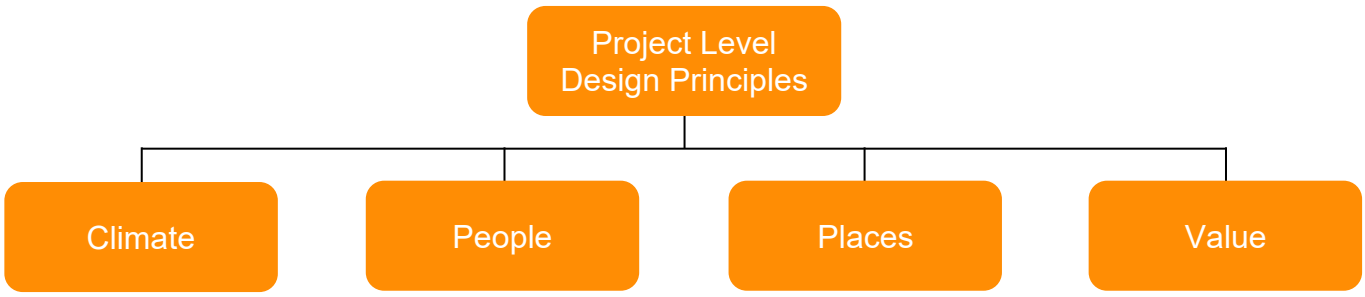
Ex1.0.2 **Application Document 7.12.1 Design Principles – Suffolk** has been prepared which separately addresses the Suffolk converter station and Friston substation.

Ex1.0.3 The introduction to the document includes a description of the Proposed Project and identifies the policies and guidance that the Design Principals respond to. This includes:

- Responding to planning policy; National Policy Statements EN-1, EN-3 and EN-5, local policy including the Thanet District Council Local Plan, and Dover District Local Plan.
- Other guidance relating to the structuring and scope of Design Principles, principally the National Infrastructure Commission (NIC) Design Group – Design Principles for National Infrastructure, the National Design Guide (NDG) alongside the National Model Design Code (NMDC), and the Planning Inspectorate's Nationally Significant Infrastructure Projects: Advice on Good Design and the Kent Design Guide.
- Notes and Table 1.1 of Critical Design Constraints which inform the Design Principles.

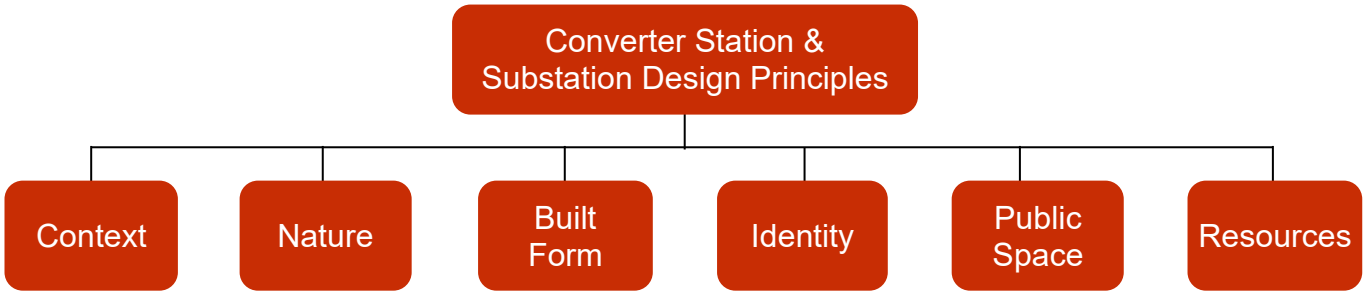
Ex1.0.4 Section 2 of this document sets out the Proposed Project Design Vision and the PLDPs and other project level information such as:

- National Grid Strategic Priorities, Proposed Project Design Vision and role of the design champion.
- Table 2.1 containing Overarching Design Principles that bridge the CDCs and vision with the PLDPs including the relationship to siting.
- Table 2.2 containing the PLDPs set out as per the structure in Plate Ex 1.1 below which follows the recommendations of the NIC Design Group.



## Plate Ex 1.1: Structure of PLDPs

Ex1.0.5 Section 3 of the document sets out the guiding narrative and Table 3.1 of CSSDPs for the Kent converter station and substation near Minster. The structure of the CSSDPs, as shown in Plate Ex 1.2 below, follows the relevant characteristic headings from the NDG using the NMDC guidance to help codify the areas of design that will need consideration.




## Plate Ex 1.2: Structure of CSSDPs

Ex1.0.6 Key Design Principles in column 3 of Table 3.1 are secured, as specified in Requirement 3 of the draft Development Control Order (DCO). The CSSDPs in Table 3.1 only apply to the Kent converter station (Work No. 9B) and the Kent substation (Work No. 11). Table 3.1 also includes column 4 suggesting potential activities associated with each Key Design Principle.

Ex1.0.7 The Minster substation is colocated with the Kent converter station, and their compounds are directly adjacent to each other. The structure of the Design Principles is intended to assist with design coordination across the two parts of the Proposed Project and deliver a holistic design led approach to the whole site.

Ex1.0.8 Only the Key Design Principles in column 3 of Table 3.1 are formally secured and the rest of the document is provided for guidance only.

# 1. Introduction

1.1.1 The Sea Link Project (hereafter referred to as the 'Proposed Project') is a proposal by National Grid Electricity Transmission plc (hereafter referred to as National Grid) to reinforce the transmission network in the South East and East Anglia. The Proposed Project is required to accommodate additional power flows generated from renewable and low carbon generation, as well as accommodating additional new interconnection with mainland Europe.

1.1.2 National Grid owns, builds and maintains the electricity transmission network in England and Wales. Under the Electricity Act 1989, National Grid holds a transmission licence under which it is required to develop and maintain an efficient, coordinated, and economic electricity transmission system.

1.1.3 This would be achieved by reinforcing the network with a High Voltage Direct Current (HVDC) Link between the proposed Friston substation in the Sizewell area of Suffolk and the existing Richborough to Canterbury 400kV overhead line close to Richborough in Kent.

1.1.4 National Grid is also required, under Section 38 of the Electricity Act 1989, to comply with the provisions of Schedule 9 of the Act. Schedule 9 requires licence holders, in the formulation of proposals to transmit electricity, to:

*1.1.5 Schedule 9(1)(a) '…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*

*1.1.6 Schedule 9(1)(b) '…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'.*

1.1.7 The purpose of this document is to:

- Provide a guiding narrative to the Proposed Project through establishing a set of Overarching and Project Level Design Principles (PLDPs) for the Kent Onshore Scheme in line with the latest National Infrastructure Commission (NIC) Design Group guidance of defining principles that relate to climate, people, places and value.
- Provide Key Design Principles in column 3 of Table 3.1 Converter Station and Substation Design Principles (CSSDPs) - Kent, for Work No. 9B Kent converter station and Work No. 11 Kent substation, near Minster, in line with Requirement 3 of the draft Development Control Order (DCO).
- **Application Document 7.12.1 Design Principles – Suffolk** provides an equivalent set of the Overarching Design Principles and PLDPs for the Suffolk Onshore Scheme. It also contains Key Design Principles for the Suffolk converter station and Friston substation.

## 1.2 The Proposed Project

1.2.1 The Proposed Project would comprise the following elements:

## The Suffolk Onshore Scheme

- A connection from the existing transmission network via Friston Substation, including the substation itself. Friston Substation already has development consent as part of other third-party projects. If Friston Substation has already been constructed under another consent, only a connection into the substation would be constructed as part of the Proposed Project.
- A high voltage alternating current (HVAC) underground cable of approximately 1.9 km in length between the proposed Friston Substation and a proposed converter station (below).
- A 2 GW high voltage direct current (HVDC) converter station (including permanent access from the B1121 and a new bridge over the River Fromus) up to 26 m high plus external equipment (such as lightning protection, safety rails for maintenance works, ventilation equipment, aerials, similar small scale operational plant, or other roof treatment) near Saxmundham.
- A HVDC underground cable connection of approximately 10 km in length between the proposed converter station near Saxmundham, and a transition joint bay (TJB) approximately 900 m inshore from a landfall point (below) where the cable transitions from onshore to offshore technology.
- A landfall on the Suffolk coast (between Aldeburgh and Thorpeness).

## The Offshore Scheme:

- Approximately 122 km of subsea HVDC cable, running between the Suffolk landfall location (between Aldeburgh and Thorpeness), and the Kent landfall location at Pegwell Bay.

## The Kent Onshore Scheme:

- A landfall point on the Kent coast at Pegwell Bay.
- A TJB approximately 900 m inshore to transition from offshore HVDC cable to onshore HVDC cable, before continuing underground for approximately 1.7 km to a new converter station (below).
- A 2 GW HVDC converter station (including a new permanent access off the A256), up to 28 m high plus external equipment such as lightning protection, safety rails for maintenance works, ventilation equipment, aerials, and similar small scale operational plant near Minster. A new substation would be located immediately adjacent.
- Removal of approximately 2.2 km of existing HVAC overhead line, and installation of two sections of new HVAC overhead line, together totalling approximately 3.5 km, each connecting from the substation near Minster and the existing Richborough to Canterbury overhead line.

1.2.2 The Proposed Project also includes modifications to sections of existing overhead lines in Suffolk (only if Friston Substation is not built pursuant to another consent) and Kent, diversions of third-party assets, and land drainage from the construction and operational

footprint. It also includes opportunities for environmental mitigation and compensation. The construction phase will involve various temporary construction activities including overhead line diversions, use of temporary towers or masts, working areas for construction equipment and machinery, site offices, parking spaces, storage, accesses, bellmouths, and haul roads, as well as watercourse crossings and the diversion of public rights of way (PROWs) and other ancillary operations.

## 1.3 Structure of the Design Principles

1.3.1 The design principles have been split into two documents:

- **Application Document 7.12.1 Design Principles – Suffolk** and,
- **Application Document 7.12.2 Design Principles – Kent** (this document).

1.3.2 Both documents follow a similar structure:

- Section 1 – Introduction: includes high-level references to planning policy (with local policy and guidance relevant to each site), responses to national guidance from the National Infrastructure Commission's (NIC) Design Group, National Design Guide (NDG), National Model Design Code (NMDC), the Planning Inspectorate Nationally Significant Projects: Advice on Good Design, and addressing Critical Design Constraints (CDCs) for the Proposed Project.
- Section 2 – Design Vision and Project Level Design Principles (PLDPs): includes National Grid's Strategic Priorities, the Proposed Project Design Vision and role of the design champion, how design development of the converter station has been managed, Table 2.1 of Overarching Design Principles, and Table 2.2 of PLDPs in line with the NIC guidance.
- Section 3 – Converter Station and Substation Design Principles (CSSDPs): includes guidance and Table 3.1 containing Key Design Principles for the Kent converter station and substation in this document; with the Suffolk converter station Key Design Principles presented in the other document for the Suffolk Onshore Scheme.

1.3.3 The design principles hierarchy has been developed in consultation with the Local Planning Authorities (LPAs). This process has identified the need to differentiate between constraints, where designs need to meet a regulatory or functional requirement, and principles where choices are defined. The CDCs in Table 1.1 are high-level and address the main groups of constraints rather than a list of regulations and standards that need to be adhered to as this will be provided in technical specifications. The Overarching Design Principles in Table 2.1 are strategic to National Grid and sit above the PLDPs in Table 2.2 which are subdivided into the four areas identified in the NIC guidance and apply across the Proposed Onshore Project.

1.3.4 The CSSDPs are divided into two parts: the first includes introductory notes providing guidance split into the six headings relating to the structure of the NMDC; and the second includes Table 3.1 of which column 3 contains the Key Design Principles, (also split int the six headings from the NMDC), which are to be secured, as specified in Requirement 3 of the draft DCO. Column 4 includes potential activities that could be associated with each Key Design Principle. The scope of Table 3.1 has been limited to design principles relating to the layout, scale and external appearance of the Kent converter station (Work No. 9B) and substation (Work No. 11). This is to avoid duplication of what is defined by other (outline) management plans.

1.3.5 Only the Key Design Principles in Table 3.1 are secured and the rest of the document is provided for guidance only.

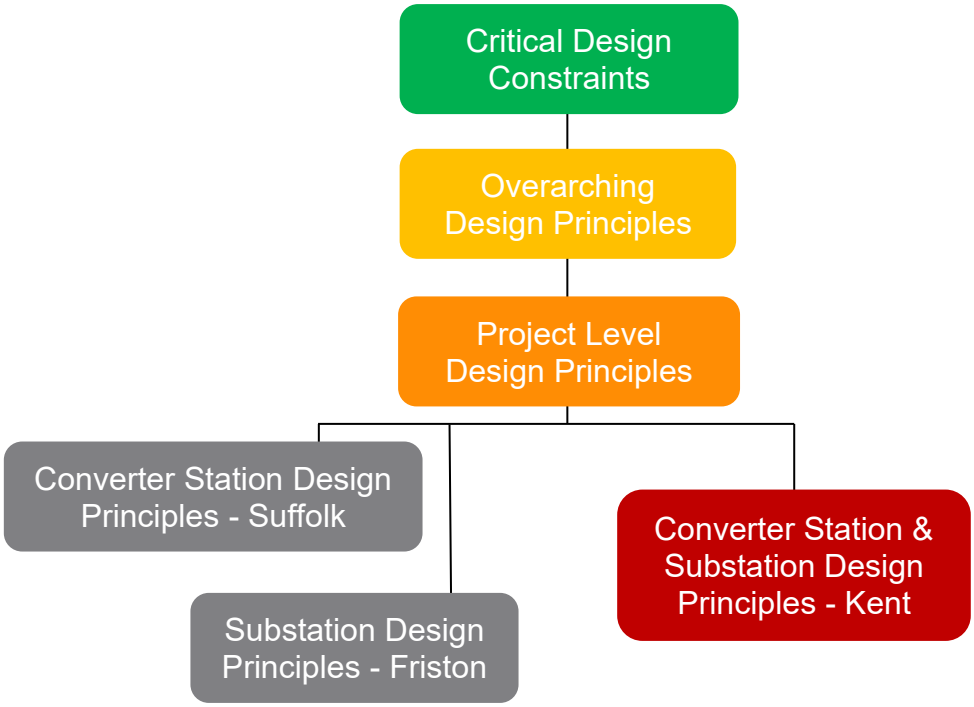



**Plate 1.1 Hierarchy of Critical Design Constraints and Design Principles**

## 1.4 Responding to Planning Policy

1.4.1 National and local planning policy has influenced the design process including the Design Principles set out in this document. This section provides an overview of the relevant policy documents. The **Application Document 7.3 Design Development Report** explains the key policy influences on the design process. Compliance with planning policy relevant to design is set out in **Application Document 7.1 Planning Statement**.

### National Policy Statements

1.4.2 The Design Principles have been developed to address the requirements of planning policy and design guidance. The policy requirements relating to achieving good design are set out in the National Policy Statements (NPS) relevant to the Proposed Project which are summarised below:

#### Overarching NPS for Energy (EN-1)

1.4.3 Section 4.7 covers the Criteria for good design in Energy Infrastructure. It starts by stating the requirement for a balanced approach. *'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 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.'*[1]

### NPS for Renewable Energy Infrastructure (EN-3)

1.4.4 Overall, this technology specific NPS covers renewable electricity generation, however it relates to the Proposed Project in the following way: *'…it will apply to offshore transmission infrastructure projects in English waters which are directed into the NSIP regime under section 35 of the Planning Act 2008.'*[2] This NPS refers to the criteria for achieving good design set out in section 4.7 of NPS EN-1 and also states that "*proposals for renewable energy infrastructure should demonstrate good design, particularly in respect of landscape and visual amenity, opportunities for co-existence/co-location with other marine and terrestrial uses, and in the design of the project to mitigate impacts such as noise and effects on ecology and heritage".*[3]

### NPS for Electricity Network Infrastructure (EN-5)

1.4.5 This technology specific NPS refers to converter stations[4] in the list of infrastructure it covers and therefore is relevant to these design principles. It covers factors influencing site selection and design, for example *'applicants must take into account Schedule 9 to the Electricity Act 1989, which places a duty on all transmission and distribution license holders, in formulating proposals for new electricity infrastructure to 'have regard for 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 …do what [they] 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.''*[5]

## Responding to Local Planning Policies and Guidance

### Thanet District Council Local Plan

1.4.6 The TDC Local Plan was adopted in July 2020. The site is in the parish of Minster, near to the River Stour which marks the boundary with Dover district (and the parish of Ash).

1.4.7 The TDC Local Plan has policies that relate to Landscape Character Areas, biodiversity and geodiversity, Climate Change resilience, Sites of Special Scientific Interest, innovative modern design that enhances identity and character, surface water management, renewable energy, and light pollution.

### Dover District Local Plan

1.4.8 Whilst the site is not in Dover District it is close to the district boundary and some of the identified Key Views are from within the district, particularly near the Richborough Roman Fort.

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[1] EN-1 4.7.1

[2] EN-3 1.6.3

[3] EN-3 2.5.2

[4] EN-5 1.6.1

[5] EN-5 2.2.10

## 1.5 Responding to Other Guidance

### NIC Design Group – Design Principles for National Infrastructure

1.5.1 *'The National Infrastructure Commission Design Group was established in 2019 to inspire renewed ambition for the quality of the UK's infrastructure. Its mission is to inspire, promote and champion design excellence on all major infrastructure projects, helping to deliver infrastructure which has social value and responds creatively to the needs of people, places and the environment.'*[6]

1.5.2 The new guidance released in May 2024 establishes design principles as part of a vision for improving infrastructure design. As the Proposed Project has developed the structure of the PLDPs has been aligned with this guidance. The four categories of PLDPs in the handbook have been used as headings within Table 2.2:

- *'**Climate** – seek opportunities to enable the decarbonisation of society through the mitigation of emissions, and allow the project to adapt over time to build resilience.'*
- *'**People** – design infrastructure for people, not architects or engineers; make it human scale, easy to navigate and instinctive to use, helping to improve quality of life.'*
- *'**Places** – provide a strong sense of identity and improve the natural and built environment; make a positive contribution to landscapes within and beyond the project boundary.'*
- *'**Value** – achieve multiple benefits and solve problems well; add value by defining issues clearly from the outset and providing overall direction for everyone working on the project.'*[7]


**Plate 1.2: Icons from NIC Design principles guide for national infrastructure**

### The National Design Guide and National Model Design Code

1.5.3 The NDG and NMDC use an established structure for defining good design principles or design codes under ten characteristics. Not all of these are applicable to this type of infrastructure project, namely, 'Homes and Buildings', 'Movement' and 'Uses', which are targeted at other types of development. The following six characteristics have been used as headings in Table 3.1 of CSSDPs, with Lifespan being covered in the Value section of the PLDPs:

- *'Context – enhances the surroundings*

[6] Project Level Design Principles – Guidance from the National Infrastructure Commission, Design Group, page 3

[7] Project Level Design Principles – Guidance from the National Infrastructure Commission, Design Group, page 21

- *Identity – attractive and distinctive*
- *Built Form – a coherent pattern of development*
- *Nature – enhanced and optimised*
- *Public Spaces – safe, social and inclusive*
- *Resources – efficient and resilient'*[8]

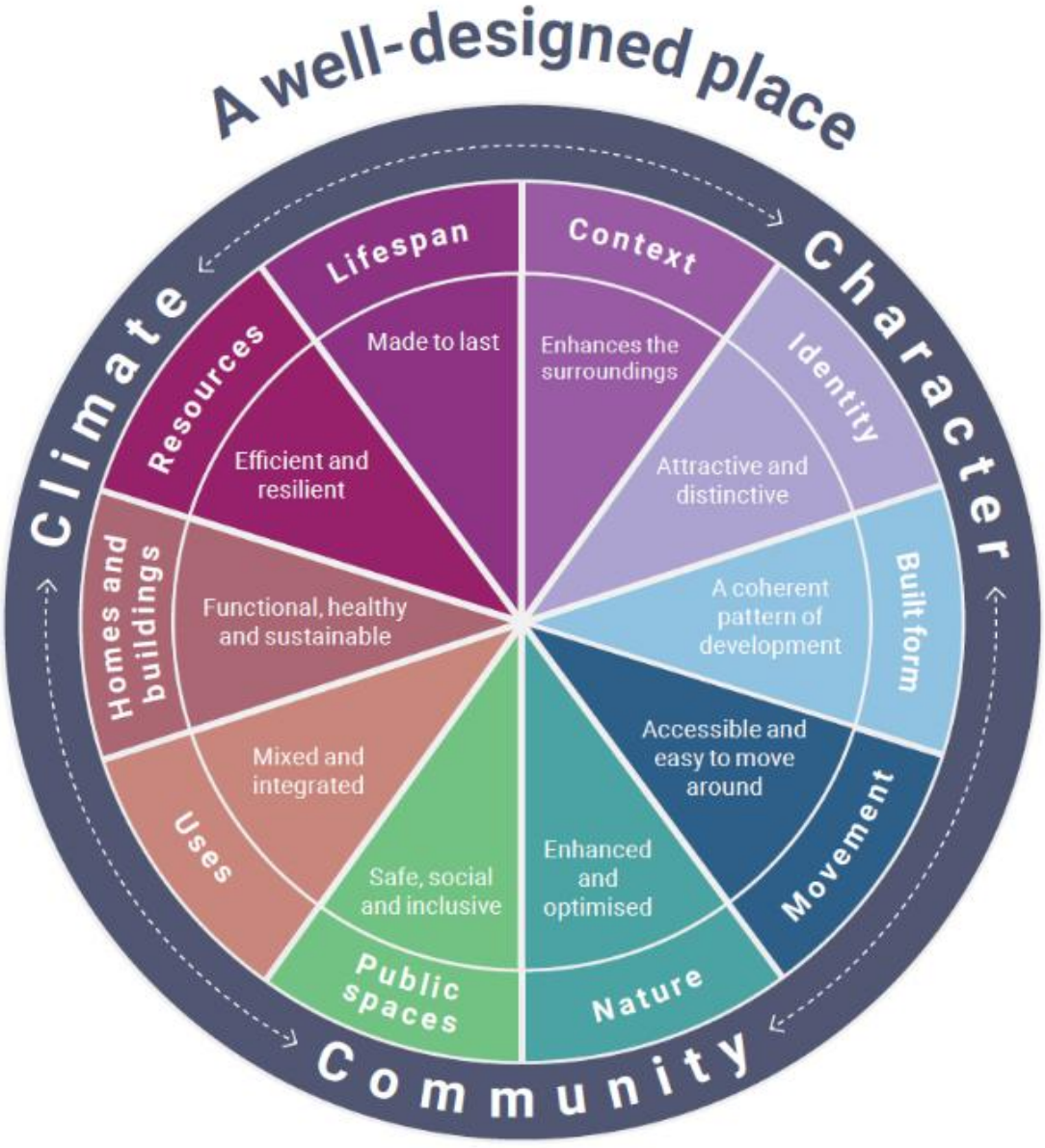


**Plate 1.3: The ten characteristics of well-designed places, National Design Guide, page 8**

## Planning Inspectorate – Nationally Significant Infrastructure Projects: Advice on Good Design

[8] National Design Guide, page 8

1.5.4 On 23 October 2024 the Planning Inspectorate published an update of advice for good design on the UK Government website. This concluded that, *'Good design is essential for achieving sustainable, well-designed, and inclusive infrastructure projects, and applicants should follow the recommendations and considerations outlined in the advice.'*[9]

1.5.5 In line with this advice the structure and scope of the design related documents was updated to include two Design Approach Documents. These include analysis of the converter station sites and design process that has informed these design principles. They also include illustrations of design approaches to inform how the design principles could be interpreted when the detailed designs are developed post-consent.

- **Application Document 7.11.1 Design Approach Document – Suffolk**
- **Application Document 7.12.1 Design Approach Document – Kent**

## Responding to Local Design Guidance

### Kent Design Guide

1.5.6 The Kent Design Guide was adopted as a Supplementary Planning Document by Thanet District Council in 2006 and forms part of the development plan for Thanet. *'It aims to encourage well considered and contextually sympathetic schemes…'*[10] *'through a common approach to the main principles which underlie LPA's criteria for assessing planning applications.'*

### Suffolk Coast & Heaths Area of Outstanding Natural Beauty - Guidance on the selection and use of colour in development

1.5.7 This guidance does not relate specifically to the area of the Kent site, but the premise and structure are still a useful reference, informing the design process in the design principles for selecting materials where there is flexibility over the colour.

### Lighting Design Guide - Dedham Vale National Landscape and Coast and Heaths National Landscape

1.5.8 The Kent site is not in the area that this guide was written for, so it is not directly applicable to the Proposed Project. However, it provides useful guidance in relation to reducing light pollution and protecting dark skies so has been considered in the preparation of these design principles. The guide is comprehensive, covering a range of different lighting needs and advice on how these can be achieved whilst reducing potential impacts. The guide also refers to other standards and guidance that need to be considered.

# 1.6 Addressing Critical Design Constraints

1.6.1 The CDCs have been identified as obligations the Proposed Project is required to meet, whether they be regulatory or commitments established in other parts of the DCO submission and as such they have been separated from the design principles. It is not an exhaustive list of criteria but is intended to help identify the scope of the design

[9] https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-good-design#conclusion

[10] Kent Design Guide - Foreword

principles. The relationship between the constraints and design principles is clarified in the Overarching Design Principles.

1.6.2 The CDCs have been placed at the top of the hierarchy in recognition 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.'*[11] However as stated in NPS EN-1 designs should *'demonstrate good aesthetics as far as possible.'*[12] Therefore the Overarching Design Principles in Table 2.1 have been written to establish the balance required, and how design principles can be used to achieve good design by addressing the constraints in a considered way.

## Risks associated with innovative design approaches

1.6.3 Public and LPA feedback on the design approaches presented at the Statutory Consultation showed a strong preference for green roofs to be included in the proposals. At the time of writing the Applicant has not been able to find a working example of this type of roof installed on a converter station with the closest related examples being data centres. Due to the functional and operational constraints of a converter station a cautious approach is required, and it is not possible to commit to including these systems at this point as technical studies with equipment supplier input are required and not available yet. In recognition of the potential benefits of green roofs the design principles in Table 3.1 have been written to keep the option, should it be determined to be appropriate, possible, and in line with other design principles to incorporate into the design.

### Table 1.1 Critical Design Constraints

| ID | Constraint | Activity |
|---|---|---|
| C.1 | OFGEM regulation | The design principles will be interpreted in line with National Grid's statutory duty under the Electricity Act 1989, to comply with the provisions of Schedule 9, as stated in the document introduction. |
| C.2 | Delivery programme | The design principles will be interpreted in such a way that good design is achieved without adding risk to the Proposed Project programme and the licensed date by which the system is due to be activated. |
| C.3 | Functional Requirements | The designs will not impede the function of the equipment and the overall performance of the Proposed Project. |
| C.4 | Operational and Maintenance Requirements | The designs will not impede the safe and practical construction, operation and decommissioning of the Proposed Project, in compliance with CDM Regulations 2015, nor will they complicate maintenance, particularly |

[11] EN-5 2.4.3

[12] EN-1 4.7.2

| ID | Constraint | Activity |
|---|---|---|
| | | working from height, where this cannot be justified by the balance of benefits. |
| C.5 | Colocation | The minimum distance between converter stations will be determined by an asset risk assessment to ensure resilience of the overall electricity transmission system. (Suffolk only) |
| C.6 | Environmental | The designs will be developed in accordance with the Environmental Statement chapters and management plans in the DCO application. |
| C.7 | Security | The design and specification of fences, gates, CCTV, lighting, clearances, and related items will meet National Grid technical and security requirements as determined necessary for the facility and location. |
| C.8 | Construction and Temporary Works | The design principles are focused on the permanent works but need to be interpreted in accordance with management plans relating to construction and temporary works. |
| C.9 | Water Framework Directive | The Proposals will be developed in consultation with the Environment Agency (EA) where they relate to The Water Environment (Water Framework Directive) Regulations 2017. This is of relevance to the design constraints of the proposed River Fromus crossing. (Suffolk only) |

# 2. Project Vision & Project Level Design Principles

## 2.1 National Grid Strategic Priorities

2.1.1 *Our vision is to be at the heart of a clean, fair and affordable energy future. Our strategic priorities set out what we need to do to deliver that vision. Given the scale of changes in the external environment and the massive investment needed to deliver the energy transition, we have updated our strategic priorities. They now better reflect the change we need to drive right through our business. They are also more aligned with the performance outcomes we want – customer satisfaction, cost efficiency, network capacity and reliability, and workforce diversity and capability.[13] "The world and industry around us is transforming so we need to transform ourselves at the same time."[14]*

2.1.2 *Through our updated strategic framework, we are better positioned than ever to achieve the transformational change needed to deliver the clean energy transition.*


**Plate 2.1 National Grid strategic framework[15]**

[13] Delivering our vision through our updated strategic priorities - National Grid, March 2024

[14] John Pettigrew, CEO of National Grid

[15] Delivering our vision through our updated strategic priorities - National Grid, March 2024, page 16

## 2.2 The Proposed Project Design Vision

2.2.1 The Proposed Project's design vision:

- Design will be responsive and respectful to the character of the local setting in terms of landscape, ecology, heritage and community, and will seek opportunities to provide enhancements to the area through engagement with stakeholders.
- Design will be high quality, taking an integrated multi-disciplinary approach that balances the need for durability with the benefits of creativity and innovation. The ambition for the sustainable design of the Proposed Project should match the ambition of the Great Grid Upgrade, showing leadership through example.
- Design will meet functional, safety, and maintenance requirements and provide good value for consumers over the lifetime of the Proposed Project.

2.2.2 The design principles have been developed as a reflection of the design vision and to provide a clear design narrative and ambition for the Proposed Project. The Overarching Design Principles and PLDPs operate at a more strategic level, providing an outline framework to guide and then capturing early-stage decision making across all disciplines. The CSSDPs are a more detailed response to the PLDPs, developed alongside site analysis and design development. These have been written to set clear success criteria, to ensure detailed designs are developed, constructed and operated in line with the Proposed Project Design Vision.

### Design Champion

2.2.3 In line with the recommendations of NPS EN-1[16] and guidance from the NIC Design Group on developing project level design principles, a design champion has been assigned to the Proposed Project to provide oversight of the ongoing design process and delivery.

2.2.4 The role of the design champion for the Proposed Project has been defined in line with the recommendations of the Defining and Developing the Design Champion Role: Research Report issued by the Institute of Civil Engineers (ICE). *'The role of a design champion is to champion the value of design on their project. This means that they understand and care deeply about good design, promoting a holistic approach and driving the value that a project will bring. This should be both in terms of meeting the design objectives of a specific infrastructure project and in terms of the wider, longer-term outcomes. Their role is therefore accountable, with clear benefits to the public.'*[17]

2.2.5 In summary the key responsibilities of the design champion are:

- Setting the right brief.
- Developing a project-specific design vision.
- Developing design governance.
- Oversight of design in project delivery.
- Defining the structure of the executive design team.

[16] EN-1 4.7.5

[17] https://www.ice.org.uk/areas-of-interest/infrastructure-delivery/defining-and-developing-design-champion-role-report

- Challenging decisions for better outcomes.
- Measuring and evidenced design value.

2.2.6 As recommended, the design champion is an advisory role, independent of the design team, as part of a tripartite governance structure:

- Design champion.
- Design executive (the design team).
- Independent design review panel.

2.2.7 The role of the design champion extends beyond the DCO stage to define and lead the governance structures through to construction to ensure design principles are not diluted.

2.2.8 The design champion will track performance of the Proposed Project design against existing National Grid policy commitments such as:

- National Grid's environmental targets for the 2021-2026 period as set out in the Environmental Action Plan.[18]
- National Grid's ten commitments to carrying out work in the UK from Our stakeholder, community and amenity policy.[19]

## 2.3 Overarching Design Principles

2.3.1 The Overarching Design Principles in Table 2.1 are at strategic level and define the relationship between the CDCs and the Proposed Project Design Vision, and how the PLDPs, CSSDPs should be interpreted and applied.

### Siting

2.3.2 Whilst the Overarching Design Principles and PLDPs are applied at a high-level across the Suffolk and Kent Onshore Schemes this document is mainly focused on design principles for the converter station and how the design relates to its context including the landscape mitigation proposals. The principles of siting and cable routes, and how these have been developed is covered in **Application Document 7.3 Design Development Report**. This process has determined the selected site, the Limits of Deviation including Rochdale Envelope defining vertical limits, and Indicative Drawings for the converter station that these design principles have been developed to address.

2.3.3 The siting and routing decisions are also guided by the following rules:

- *'The Holford Rules – guidelines for the routing of new overhead lines – were originally set out in 1959. These guidelines, intended as a common-sense approach to overhead line route design, were reviewed and updated by the industry in the 1990s, and they should be embodied in the applicants' proposals for new overhead lines'*[20] Whilst intended for overhead lines these rules can also be applied where applicable to buried High Voltage cables.

[18] https://www.nationalgrid.com/electricity-transmission/who-we-are/our-environmental-plan-and-performance

[19] https://www.nationalgrid.com/electricity-transmission/document/81026/download

[20] NPS EN-5 2.9.16

- *'The Horlock Rules – guidelines for the design and siting of substations – were established by National Grid in 2009 in pursuance of its duties under Schedule 9 to the Electricity Act 1989.'*[21] Whilst intended for substations these rules can also been applied where applicable to converter stations, particularly the external equipment which is similar to that found in a substation.

## Table 2.1 Overarching Design Principles

| ID | Design Principle | Activity |
|---|---|---|
| OA.1 | Design Vision | Design throughout the life of the Proposed Project will be guided by the Design Vision to ensure a cohesive and optimal outcome that meets the ambitions set out at the early stages. |
| OA.2 | Critical Design Constraints | The design will address the CDCs identified in Table 1.1 whilst maintaining principles of good design to mitigate the impact of those constraints on design outcomes. |
| OA.3 | Planning Policy Compliance | The design will seek to comply with relevant national and local policy where possible and appropriate given the nature of the development. |
| OA.4 | Mitigation Hierarchy | The mitigation hierarchy will be applied as an overarching principal in strategic decision making on the detailed design of the Proposed Project to address significant adverse effects, where the first option is to avoid, the second is to minimise, the third to reduce, and the last option to offset.[22] |
| OA.5 | Integrated Design | The design will be coordinated through collaboration of all disciplines within the National Grid team to achieve synergy and efficiency of design solutions that reduces the overall impact and adds value to the Proposed Project, place, and local community. |
| OA.6 | Coordination (Suffolk only) | Opportunities for coordination, (and where appropriate collaboration) with other projects will be sought and consideration given to whether the detailed design can incorporate measures that facilitate future projects whilst avoiding detriment to the Proposed Project. |
| OA.7 | Design Guardianship | The design champion will establish a structure for National Grid to monitor compliance with the design principles through the delivery of the Proposed Project to completion. |

[21] NPS EN-5 2.9.18

[22] Wording here reflects terminology in the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. It is noted that the definition in the glossary of the Overarching National Policy Statement for Energy (EN-1) is slightly different, instead referring to avoid, reduce, mitigate and compensate.

## 2.4 Project Level Design Principles

2.4.1 The PLDPs in Table 2.2 are provided to give guidance and narrative to the design of the Suffolk and Kent Onshore Schemes and do not relate directly to any discharge requirements. They are used to inform the CSSDPs in Table 3.1 which contains Key Design Principles related to the defined Works.

2.4.2 Table 2.2 has been developed in line with the guidance from the NIC and has been organized under the four headings of Climate, People, Places and Value. Plate 2.2 below shows how the PLDPs fit into the hierarchy of constraints and design principles.

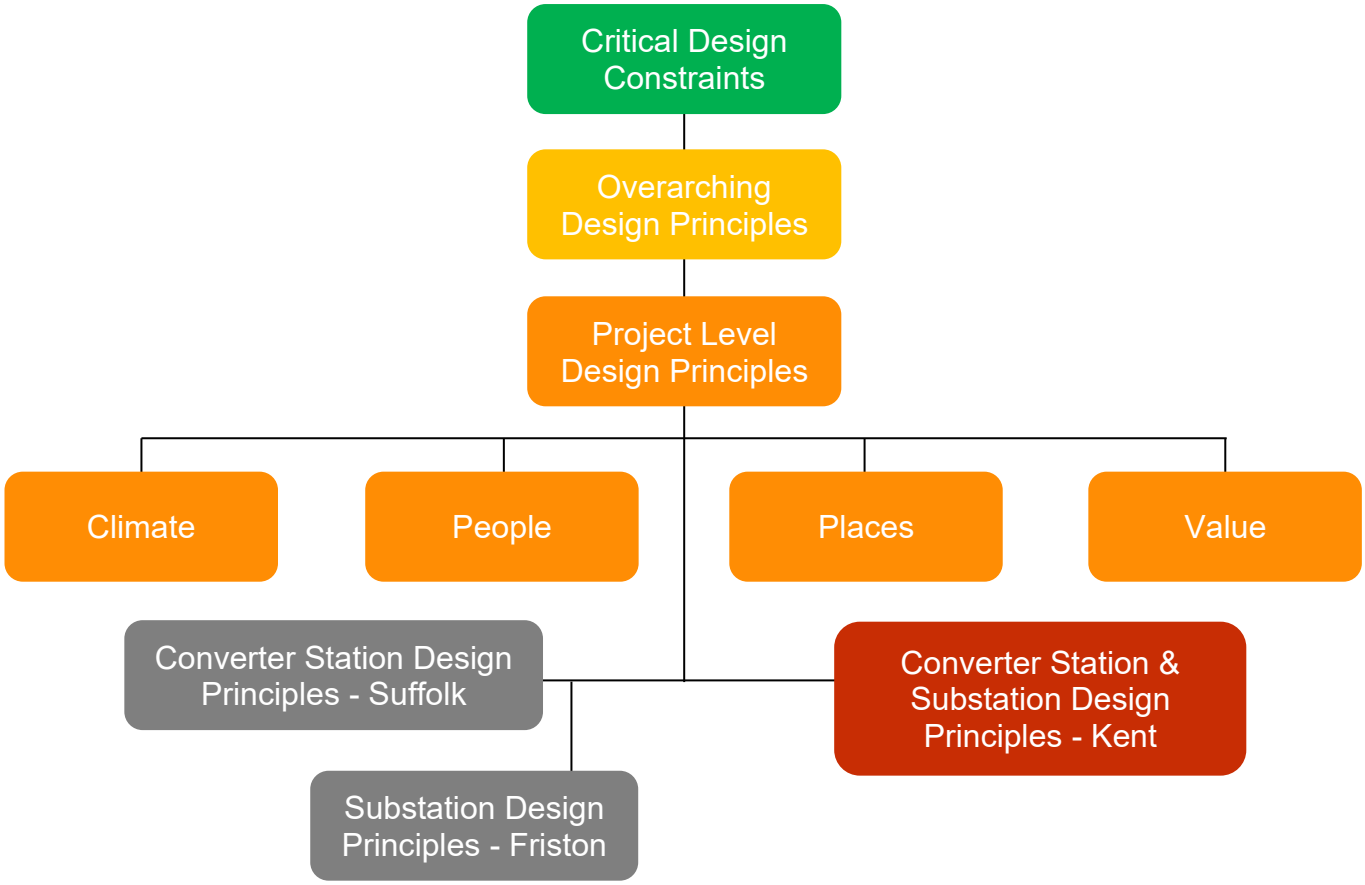


**Plate 2.2 Structure of Project Level Design Principles**

## Table 2.2 Project Level Design Principles

| ID | Heading | Design Principle |
|---|---|---|
| **Climate** | | |
| CL.1 | Approach to net zero | The Proposed Project is an essential part of The Great Grid Upgrade works to help the UK reach net zero faster. In line with National Grid's Environmental Plan, the Proposed Project design will also aim to reduce carbon emissions in construction, operation, and decommissioning where appropriate and where it does not conflict with the CDCs. |
| CL.2 | Strategy for Biodiversity Net Gain (BNG) | National Grid is committed to playing its part in halting and reversing the decline of biodiversity in the UK and to achieving 10% biodiversity net gain (BNG) on major projects. National Grid has made this commitment on a voluntary basis in advance of the requirement being mandatory for Nationally Significant Infrastructure Projects.<br>The initial approach taken to BNG on the Proposed Project is explored in **Application Document 6.12 Biodiversity Net Gain Feasibility Report** submitted with the application. National Grid will explore how this can be delivered through a combination of on-site measures, off-site measures and credits will be determined when the detailed design of design is complete and the final effects and potential for delivering BNG on site is clear. |
| CL.3 | Ecology and habitat connectivity | Areas of high ecological value will be avoided where feasible to retain established habitats. Where this is not possible the design will aim to minimise the impact by restoring and enhancing habitat features. The resilience of habitat networks will be enhanced through the landscape mitigation design to prevent the isolation of species populations. |
| CL.4 | Protection and reinstatement of soils | Where possible and where it does not conflict with other design principles, siting and routing will minimise the loss of the best and most versatile agricultural land, applying best practice to handling, storage and reinstatement of topsoil and subsoil. Where agricultural land is to be reinstated care will be taken to repair and reconnect affected land drainage systems. |
| CL.5 | Sustainable drainage system (SuDS) design | The surface water system design will be developed following the mitigation hierarchy with SuDS integrated with the landscape proposals, whilst providing the run-off attenuation required to not increase the flood risk of neighbouring and downstream properties. |

| ID | Heading | Design Principle |
|---|---|---|
| | | Opportunities to provide SuDS within the permanent compounds will be explored in the detailed design, subject to demonstrating compliance with the CDCs in Table 1.1. |
| CL.6 | Climate change, extreme weather, and flood resilience | The detailed design of the buildings, equipment, and landscaped areas, including selection of drought resistant tree species, will demonstrate how the proposals address the extremes of rain intensity, drought, hot, cold and wind that may be encountered over the design life of the facility due to climate change. The development platform levels, and flood protection measures within the landscape will be designed to allow the site to remain operational during a 1 in 1000-year surface water flooding event whilst ensuring no vulnerable receptors are in the immediate path of flow exceedance routes. |
| CL.7 | Energy efficiency in use | A fabric first design approach utilising airtightness, insulation, management of solar gains through thermal mass and shading will be used for the buildings, such that the specification of the envelope reduces the energy demands of the facility in operation. Systems and products will be selected for low energy use to reduce the demand on the local power grid where possible. Natural ventilation will be considered where it can be demonstrated to be consistent with the function the spaces. |
| **People** | | |
| PE.1 | Stakeholder engagement | A follow up DRP for the converter station and substation sites in both Suffolk and Kent will be arranged through the same organisation (Frame Projects) for continuity. This is to be done once sufficient supplier information is available to inform a preferred layout and design approach. Further thematic meetings are to be scheduled with LPAs in the lead up to submitting information demonstrating compliance with the Key Design Principles in Table 3.1 (and **Error! Reference source not found.** for Suffolk only) in each of the Design Principles documents for Suffolk and Kent. |
| PE.2 | Responding to design feedback | Public and LPA feedback on the six design approaches presented during the Statutory Consultation favoured a solution with curved green/blue roofs where the primary function of rooftop planting was to enhance visual amenity. In acknowledgement of this National Grid will commit, through the CSSDPs, to working with the supply chain to explore the feasibility of using planted |

| ID | Heading | Design Principle |
|---|---|---|
| | | systems within the converter station compounds, taking into account the varying CDCs of the different buildings. |
| PE.3 | Local amenity | The proposals will seek to avoid the loss of local community amenity and, where appropriate to the setting, use the landscape mitigation proposals to increase the green infrastructure opportunities, improving recreational links. |
| PE.4 | Construction impacts | The design will take a balanced approach to design enhancement and impacts during construction. The design would be developed to avoid resulting in new or different significant adverse environmental effects compared to that assessed in the Environmental Statement. |
| PE.5 | Noise and vibration impacts | In developing the detailed design, potential noise and vibration sources will be located as far from sensitive receptors as is feasible given consideration of other principles and CDCs, and the noise levels at sensitive receptors minimised through measures set out in the Register of Environmental Actions and Commitments (REAC). Where assessments demonstrate the need, acoustic attenuation should be incorporated following the As Low As Reasonably Possible (ALARP) principle. The design of any acoustic enclosures will be considered by the same criteria as other structures to reduce visual impact. |
| PE.6 | Local education and training opportunities | National Grid will actively engage with local education providers regarding opportunities for training and skills in relation the energy sector, awareness of Net Zero and the Proposed Project. |
| **Places** | | |
| PL.1 | Minimising and rationalising land take | The design will minimise land take, make efficient use of land in consideration of potential seasonal disruption, and avoid where reasonably practical dividing land to be returned into farming use into inaccessible and unsuitable parcels. However, this principle should be considered in the context of awareness of the need to consider and facilitate delivery of future projects to the extent that they are known about and likely to proceed. |
| PL.2 | Landscape character | Where feasible designated landscapes will be avoided through siting and routing decisions. The landscape proposals will respond to the wider landscape character and immediate landscape pattern of the site. The existing landscape framework of the site will be |

| ID | Heading | Design Principle |
|---|---|---|
| | | strengthened by extending and enhancing woodlands with native woodland planting to provide structural screening to structures and equipment. |
| PL.3 | Visual amenity | The arrangement and design of the buildings and equipment will be sympathetic to their surroundings and integrated into the landscape setting of the site insofar as is possible given the nature of the development. Buildings will be clad in appropriate materials and colours designed to appear recessive within the landscape to mitigate the impact on visual amenity. |
| PL.4 | Archaeology | The Proposed Project will seek through siting, routing, and design, informed by geophysical surveys, to avoid archaeological features where possible, minimising impacts and, where ground disturbance cannot be avoided applying suitable evaluation and mitigation. |
| PL.5 | Built Heritage Assets | Informed by the Cultural Heritage Assessment and through consultation with conservation officers, the Proposed Project will avoid cultural heritage assets where possible through the siting and routing strategy, minimising impacts by locating as far from sensitive receptors as feasible, mitigating the scale and impact of development through landscape screening of external equipment, and design quality of buildings visible over the screening. |
| PL.6 | Maintenance, servicing, emergency access and parking | The converter station and substation compounds will contain circulation around each building/yard to provide clear access for servicing, maintenance, and fire tender access. Car parking for regular operations, visiting personnel, and laydown space will be provided within the secure fence line and accessible without travelling through the AC Yard. |
| **Value** | | |
| V.1 | Integrated multifunctional landscape design | The landscape mitigation proposals will be coordinated across multiple disciplines such that features can be multifunctional, providing a combination of benefits such as visual screening, amenity, acoustic attenuation, drainage, and ecological value with a wide range of habitats, to maximise the benefits and get the most value of out a design which is both functional and aesthetic. |
| V.2 | Design life | The proposals will provide for a minimum design life of 40 years with fit for purpose and tested products, |

| ID | Heading | Design Principle |
|---|---|---|
| | | materials, and assemblies that require minimal maintenance or replacement over that period. |
| V.3 | Sustainable construction and the circular economy | National Grid will work with the supply chain to develop detailed designs which follow sustainable construction principles, including appraising options to reduce embodied carbon, make efficient use of responsibly sourced materials with high recycled content, and specify systems with the ability to recycle at end of life with a preference for the capability to disassemble and re-use, diverting construction waste from landfill. |
| V.4 | Advanced landforming and planting | Where feasible, the landforming proposed around the converter stations will be completed at the earliest opportunity in the construction stage to allow advanced planting to establish areas of mitigation planting prior to construction commencing for maximum screening effect once the Proposed Project is completed. |
| V.5 | Land maintenance and management | Land maintenance and management will be governed by an Outline Landscape and Ecological Management Plans, for both Suffolk and for Kent, the purpose of which will be to establish good practice in maintaining the land for optimum operational life, safe use and access, condition and appearance in line with the CDCs. It will include monitoring and maintenance of new planting and seeding to ensure successful establishment. |
| V.6 | Learning lessons from case studies that can be applied to the Proposed Project | National Grid will consider other converter stations from the UK and across Europe, relevant projects in the local area, and other projects in related sectors (such as data centres) that provide inspiration for the design and consider what may be achievable in compliance with the CDCs in Table 1.1 and other considerations. |

# 3. Converter Station and Substation Design Principles - Kent

## 3.1 Introduction

3.1.1 The Kent Onshore Scheme has a set of Converter Station and Substation Design Principles for the Kent converter station and substation at Minster. This section has been divided into two parts:

- Guidance Narrative – notes have been provided giving background information under each of the headings from the NMDC within the table of Key Design Principles.
- Table 3.1: Converter Station and Substation Design Principles – Kent – of which column 3 contains Key Design Principles which are to be secured, as specified in Requirement 3 of the draft DCO, and covers the Kent converter station (Work No. 9B) and the Kent substation (Work No. 11), and their relationship to the access road and the associated landscape mitigation proposals around them.

3.1.2 A separate set of Key Design Principles have been developed in parallel for the Suffolk converter station, in **Application Document 7.12.1 Design Principles – Suffolk**. These follow the same structure as Table 3.1 in this document.

3.1.3 The CSSDP's in Table 3.1 for Kent have been subdivided under six headings from the NMDC as a means of structuring and covering the requirements across the relevant characteristics as can be seen in **Plate** 3.1 below:

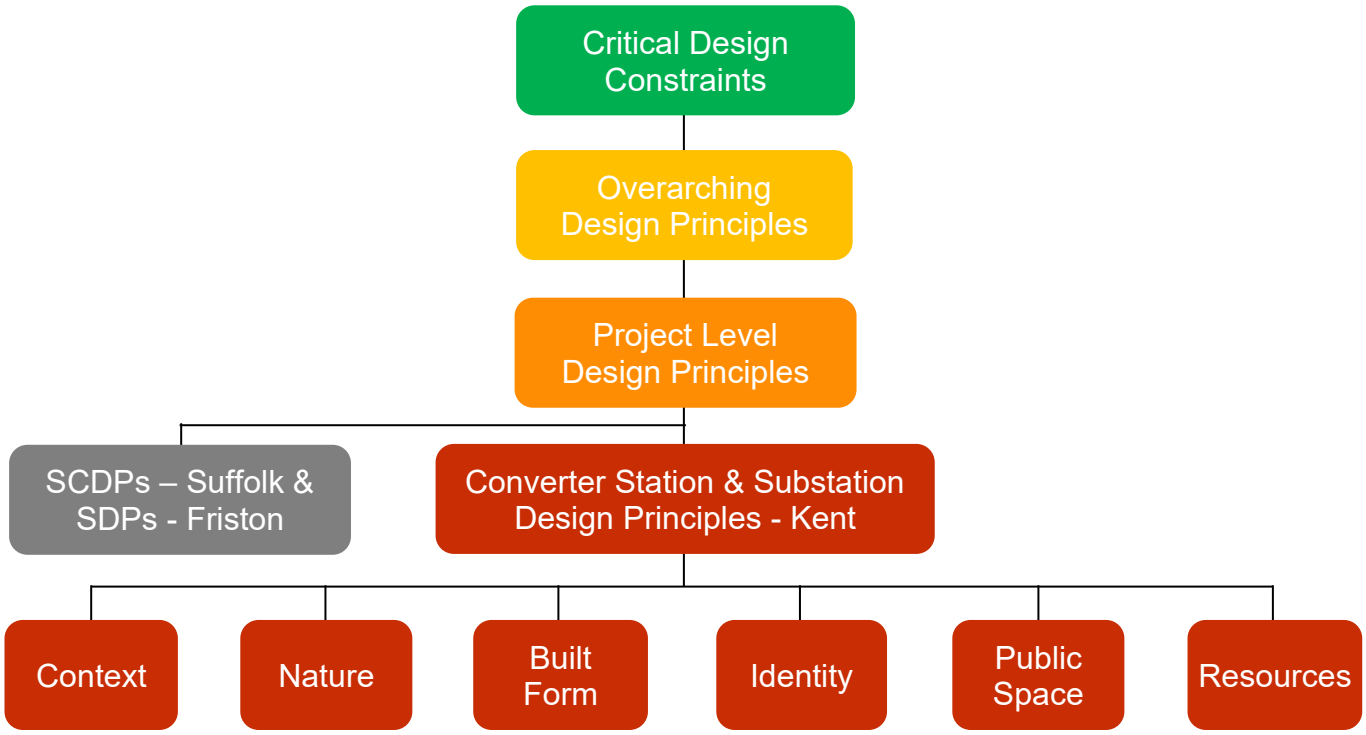

**Plate 3.1 Structure of Converter Station Design Principles - Kent**

3.1.4 The table has been laid out in four columns to make the design principles easy to use and set out a clear route to compliance:

- (Column 1) ID – for quick reference.
- (Column 2) Heading – for quick reference.
- (Column 3) Key Design Principles – setting out the objective to be complied with (or to be adhered to) as specified in Requirement 3 of the draft DCO.
- (Column 4) Potential Associated Activities – setting out guidance to clarify the information that could be associated with each Key Design Principle.

3.1.5 The number of Key Design Principles for discharge has been rationalized to make discharge of the requirements easier to manage for both National Grid and the LPA. For this reason, some of the design principles included in Table 3.1 in previous drafts have been moved to the guidance notes below under each characteristic. This aligns with NPS EN-1 which states, *'Applicants should consider how their design principles can be applied post-consent'*[23]

## 3.2 Guiding Narrative to the Converter Station and Substation Design Principles - Kent

### Context

3.2.1 *'The NDG states that an understanding of the context, history and character of an area must influence the siting and design of new development. This context includes the immediate surroundings of the site, the neighbourhood in which it sits and the wider setting.'*[24]

3.2.2 The response to the landscape setting, making use of existing tree belts for screening, reinforcing existing landscape features and habitats is covered in **Application Document 7.5.7.2 Outline Landscape and Ecological Management Plan - Kent**. To avoid duplication of design principles in that document Table 3.1 focuses on how the building designs will relate to the landscape proposals for an integrated design approach.

3.2.3 The response to the cultural heritage setting will be related to the consultation responses and approach found in **Application Document 6.2.3.3 Environmental Statement Part 3 Kent Chapter 3 Cultural Heritage**, and the analysis found in **Application Document 7.11.2 Design Approach Document – Kent**. This will be covered through use of the visualisations within **Application Document 6.4.3.1.8 Representative Viewpoint Visualisations** and additional heritage views agreed with the LPAs for CGIs of detailed proposals, as set out in Table 3.1, to demonstrate how impacts on cultural heritage assets have been addressed.

### Nature

[23] NPS EN-1 4.7.5

[24] National Model Design Code – Part 2 Guidance Notes, page 2

3.2.4 The NDG states that *'well-designed places:*

- *Integrate existing, and incorporate new natural features into a multi-functional network that supports quality of place, biodiversity and water management, and addresses climate change mitigation and resilience;*
- *Prioritise nature so that diverse ecosystems can flourish to ensure a healthy natural environment that supports and enhances biodiversity;*
- *Provide attractive open spaces in locations that are easy to access, with activities for all to enjoy, such as play, food production, recreation and sport, so as to encourage physical activity and promote health, well-being and social inclusion.'*[25]

3.2.5 **Application Document 7.5.7.2 Outline Landscape and Ecological Management Plan - Kent** covers the design principles that relate to Landscape and Ecology therefore Key Design Principles that could duplicate or conflict with that document have been excluded from Table 3.1 which instead focuses on how the converter station and substation designs relates to the landscape context and proposals. This includes the following:

- Retaining existing landscape features, such as woodland, meadows and ponds and avoiding Veteran Trees.
- Extending and enhancing the woodland planting along the eastern and southern boundaries with native woodland planting to provide structural screening to the converter station and improved habitat connectivity and strong wildlife corridors.
- The proposed increase in woodland, hedgerows, grassland and wetland around the attenuation ponds, will significantly improve the ecological resource of the locality.

## Built Form

3.2.6 One of the main challenges in defining the converter station and substation design at this stage is that flexibility is required in the layout and design of the buildings and equipment to address the specific technical requirements, and resultant differences in arrangements and massing, of the supplier that has not yet been selected. The design principles are designed to address this in line with NPS EN-3, '*where details are still to be finalised applicants should explain in the application which elements of the proposal have yet to be finalised, and the reason why that is the case.'*[26]

3.2.7 The scope for flexibility is defined by the Limits of Deviation as set out in Article 5 of the DCO, which in turn refers **Application Document 2.5.2 Works Plans – Kent** to show the areas where works must take place and includes a Table of Parameters to set the maximum building heights. There are different buildings/areas within the converter station compound with varying characteristics that the Key Design Principles are intended to address as solutions cannot be applied uniformly due to varying CDCs. Heights and areas are provided below for illustrative purposes and will be confirmed in the final designs.

### Defining area types within the converter station and substation

[25] National Design Guide, page 26

[26] EN-3 2.6.1, also 2.6.2 and 2.6.3

- DC Halls – The DC equipment requires a controlled environment hence the need to locate inside buildings. Two sets of identical halls are required, one for each pole. A HVDC cable enters into each DC Hall, adjacent to which is a Valve Hall, and adjacent to that is a Reactor Hall from which three-phase HVAC current goes out/in (as the process is reversible) and connects to the transformers. In the illustrative plans each set of halls has a footprint of approximately 100 m x 60 m and are up to 28 m tall.
- Transformers – The HVAC current from the Reactor Hall is stepped down to the voltage required to feed into the substation. A transformer is required for each AC cable, two sets of three-phase making six, plus a spare. The transformers have particular needs, in terms of blast protection and noise, that sets them apart from the rest of the AC equipment. The blast walls tend to be approximately 12 m tall, with the electrical equipment up to 18 m tall in places. In the illustrative plans, the row of transformers takes up a space of approximately 18 m deep and of similar width to the DC Halls.
- AC Equipment and Buildings – Most of the AC equipment can be located outside with a limited number of buildings required. This equipment is mostly for cleaning up the current from the transformers and making sure it is ready to be put back into the wider grid. As most of the equipment is external there is limited architectural scope for this area. In the illustrative plans the overall AC area is proposed to have an approximate footprint of 160 m x 70 m, with most of the equipment less than 14 m tall, though lightning protection will exceed this. The illustrative plans show a Pre-insertion Resistor (associated with circuit breaker) (PIR) building with an approximate footprint of 34 m x 21 m and an indicative height of up to 17 m.
- Ancillary Buildings and Equipment – There is a functional sequence to the other three area types that determines how they need to be arranged. However, subject to meeting the CDCs, there is more flexibility of where the ancillary buildings such as the Spare Parts, Control, Service, and Security Office can go to suit the design intent for the site. There is also fire safety equipment such as water tanks and emergency generators which can be located to suit. The illustrative plans show the two larger buildings, Spare Parts Building and Service Building, would be up to 13 m high, with the rest less than 12 m high.
- Substation – Most of the equipment in the substation is outdoor. The main building in the substation contains a Gas Insulated Switchgear (GIS) Hall and a 400kV Annex Building. The building is likely to have a footprint of approximately 83 m in length, 30 m in width, and circa 15 m tall from existing ground level. It also includes two terminal towers (pylons) which are circa 46 m tall.

## Identity

3.2.8 As set out in the NMDC Guidance, *'The identity of a place comes not just from the form and appearance of the buildings and spaces but also from the way that it is planned, its natural environment and the use of its buildings. This includes the way that it responds to the character of the local area and the design of its buildings and public spaces. Identity may come out of respecting and enhancing the existing character of the area and also from adapting and shaping to develop new character. The architectural approach needs to be influenced by its surrounding architectural character.'*[27]

[27] National Model Design Code: Part 2 – Guidance Notes, Page 41

3.2.9 Whilst complying with the principle of being visually recessive as far as is possible, the design of buildings within the converter station and substation will have a coherent design language that is commensurate with the scale and prominence of massing, particularly where beyond the height of existing and proposed tree screening. The DRP report and responses can be found in **Application Document 7.11.2 Design Approach Document – Kent**. The DRP suggested that there would be a benefit in having the external envelope of the buildings relate to and communicate the internal function of the equipment. For example, inspiration could be taken from the processes happening within the converter station, (principally the inversion of alternating to direct current and vice versa) and use this to inform the articulation of the cladding design.

3.2.10 The Suffolk Coast and Heaths AONB – Guidance on the selection and use of colour in development, offers useful advice in terms of how colours can appear differently externally compared to internally, at long distances, on matt or reflective surfaces, against different backgrounds, lighting conditions and weather at different rates. A similar process of understanding the colours particular to the site have been undertaken as part of **Application Document 7.11.2 Design Approach Document – Kent** and this allows the colours to address specific key views as well as the broad character of the area.

## Public Space

3.2.11 The Public Space characteristic needs to be considered in the context of the rural setting of the site.

3.2.12 The new permanent access road will be designed to accommodate the largest and heaviest Abnormal Indivisible Load (AIL) required for installing and replacing equipment in the proposed converter station and substation. The landscape proposals extend along the length of the access road and associated temporary construction compounds as can be seen in **Application Document 7.5.7.2 Outline Landscape and Ecological Management Plan - Kent**.

3.2.13 **Application Document 7.5.9.2 Outline Public Rights of Way Management Plan Kent** sets out why the DCO can only cover maintaining the existing network. Enhancements within the public realm are not included in the DCO so they have not been included in Table 3.1. However, National Grid is exploring other ways in which this can be achieved and can then be agreed with LPAs and community groups outside the DCO where appropriate. Examples that have been considered in discussions to date include:

- Provision of educational information boards or other more interactive and innovative installations within the landscape mitigation proposals where public access is permitted, and associated with the PRoW network, to communicate the purpose of the Proposed Project to the public and what is happening inside the buildings.
- Provision of community facilities within the landscape proposals, with examples such as off-street public use car parking for walkers and cyclists using the PRoW network that crosses the access road.

## Resources

3.2.14 As set out in the NMDC Guidance, *'Well-designed places and buildings conserve natural resources including buildings, land, water, energy and materials. Their design responds to the impacts of climate change by being energy efficient and minimising*

*carbon emissions to meet net zero targets by 2050. It identifies measures to achieve: mitigation, primarily by reducing greenhouse gas emissions and minimising embodied energy; and adaptation to anticipated events, such as rising temperatures and the increasing risk of flooding.'*[28] The Key Design Principles in the Resources section of **Error! Reference source not found.** are focused on the conservation of resources in relation to the converter station, with conservation of resources for the wider scheme addressed in other relevant management plans. There are also PLDPs in Table 2.2 that address:

- climate change, extreme weather and flood resilience (CL.6);
- energy efficiency in use (CL.7); and
- sustainable construction (V.3).

3.2.15 NPS EN-3 sets out that *'Earth bunds and mounds, tree planting or both may be used for softening the visual intrusion and may also help to attenuate noise from site activities. However, these features should be sympathetic to local landscape character and follow best practice.'*[29] This requirement has also been highlighted in consultation with the LPAs regarding local policy and has been captured in Key Design Principle R.2 of Table 3.1 noting that the scope for this is limited due to the marshland setting.

3.2.16 Where feasible the Proposed Project will seek to engage with local businesses, promote local employment and training opportunities, and source materials, supplies and equipment from as close as possible to contribute to the local economy and reduce transportation emissions.

[28] National Model Design Code – Part 2 Guidance Notes, page 77

[29] EN-3 2.7.96

## 3.3 Introduction to Table 3.1 Converter Station and Substation Design Principles – Kent

3.3.1 These are the design principles referenced in Requirement 3 of the Development Consent Order applicable to the Minster Converter Station and Minster Substation. The Minster Substation is colocated with the Kent converter station, and their compounds are directly adjacent to each other. The wording of the KDPs identifies where it relates to the converter station or both.

3.3.2 It should be noted that Requirement 3 is required to be discharged prior to the commencement of any above ground elements of the Converter Station and Substation and compliance with the key design principles should be assessed with the stage of design in mind. It may therefore be that some of the 'potential associated activities' are not completed at this stage, and these are included for ideas only. Compliance with principles should therefore be considered with cognisance of the stage of design and awareness that it may not be possible to incorporate innovative approaches from the outset due to programme and the need for necessary checks to ensure there are no adverse safety or operational concerns. Where this is the case, the team will consider whether actions can be taken to facilitate later introduction of innovative approaches without significant adverse cost or programme implications.

### Table 3.1 Converter Station and Substation Design Principles – Kent

| ID | Heading | Key Design Principles | Potential Associated Activities |
|---|---|---|---|
| **Context** | | | |
| CO.1 | Height, scale, and massing response to context | Provided that it does not conflict with the CDCs, the detailed design will aim to locate the smallest feasible converter station and substation compounds, and the building mass within, as close to each other as possible within the defined LoDs to reduce visual impact from equipment linking the converter station to the substation and maximise the space for landscape mitigation within the existing field margins defined by the drainage channels. | A technical statement could be provided showing how the converter station and substation compound layouts and positions have been developed within the LoDs to:<br>• minimise impact on LVIA viewpoints particularly VP10; and<br>• and maximise space available for landscape mitigation around both the converter station and substation compounds. |

| ID | Heading | Key Design Principles | Potential Associated Activities |
|---|---|---|---|
| CO.2 | Responding to key views | Through analysis of the relevant LVIA and Heritage key views, where the proposed massing will be visible, the detailed design of the converter station and substation will demonstrate how the impact of the proposals has been minimised in their development alongside the detailed landscape proposals. | A technical statement could be provided setting out design development including analysis of the affected LVIA and heritage key views, and CGIs of the proposed converter station, substation, and landscape designs in those views, including versions for:<br>• summer and winter seasons,<br>• 5-, 10- and 15-year planting growth. |
| CO.3 | Responding to strategic views | A subset of the LVIA key views, VP04, VP08 and VP11, will be considered strategic for the purposes of assessing the performance of the designs of the converter station and substation in different lighting conditions, with a particular focus on how the sheen on cladding materials can affect appearance. | Additional baseline photography and corresponding CGIs of these views covering different lighting conditions could assist:<br>• Morning, midday, and evening<br>• Overcast and bright sunlight |
| **Nature** | | | |
| N.1 | Integration with landscape proposals | The detailed proposals will demonstrate how the designs of the converter station and substation have been integrated with the access road and the detailed landscape proposals, enabling as many existing landscape features to be retained as possible, for the purposes of maximising the effectiveness of the mitigation and reducing the impact on existing habitats. | Detailed drawings of the landscape proposals, such as sections and plans, showing the equivalent level of detail of adjacent features such as fences, buildings and equipment could be provided.<br>Correspondingly, drawings of the proposed buildings and equipment also showing the equivalent level of detail of the landscape proposals demonstrating how they relate to the landscape context could also be provided. |
| N.2 | Potential for planting within the converter station compound | The potential for greening the converter station by introducing planting within the compound and on building roofs will be explored in the detailed designs. The order of priority for assessing benefits will be: | A technical statement, produced whilst developing the detailed designs, demonstrating how options have been appraised in line with the CDCs in Table 1.1 citing reasons why they are to be included or excluded from the proposals could be provided. A study could include: |

| ID | Heading | Key Design Principles | Potential Associated Activities |
|---|---|---|---|
| | | • The first priority of greening will be to provide visual amenity by integrating with the landscape.<br>• The second will be to provide native habitat.<br>• The third to increase surface water attenuation reducing run-off from the site.<br>• The fourth is reducing the reliance on chemical weed suppression.<br><br>The nature of the development limits the potential for planting due to operational, security and safety issues and allowing vegetation growth within the compound is an innovation that is untested in UK converter stations. Therefore, whilst the potential should be explored, it is recognised that these options may not be possible to implement. | • Different types of green roofs on the different building types within the compound.<br>• Potential for allowing areas of open ground to be planted.<br>• Potential for climbing plants to be trained up netting or trellis work.<br>• Maintenance regimes, irrigation requirements and weed management. |
| N.3 | Potential for blue roofs as part of a SuDS strategy | The inclusion of blue roofs to provide additional on-site attenuation as part of the wider SuDS strategy will be explored in the detailed designs. Blue roofs will be avoided where they would conflict with other design principles, such as the ability of green roofs to provide visual amenity (because they need to be flat to retain water). (Note that not all blue roofs are green roofs). As above, it is recognised that whilst this will be considered, it is possible that it may not be possible or appropriate to implement given the nature of development proposed. | A technical statement, produced whilst developing the detailed designs, demonstrating how options have been appraised in line with the CDCs, citing reasons why they are to be included or excluded from the proposals for each different type of building in the converter station, as some may be more suitable than others could be prepared. |
| N.4 | Lighting | Light spillage will be managed by minimising the provision of lighting; keeping to where it is required for tasks, specifying fittings that avoid light spillage, using | A technical statement could be provided for the external lighting designs, including: |

| ID | Heading | Key Design Principles | Potential Associated Activities |
|---|---|---|---|
| | | controls such that it only comes on when required. This will follow the dark skies strategy; to cut light pollution, its impacts on wildlife, prevent wasting electricity, and mitigating visual impact at night. Windows will be fitted with blinds to control light spill if the facility is occupied after dark. | • A strategy for the site and how the lighting provision has been reduced to the minimum operational requirements.<br>• Details of fittings and lighting profiles, controls, energy efficiency ratings. |
| **Built Form** | | | |
| BF.1 | Orientation of the converter station | In developing detailed proposals from the indicative plans and within the LoDs, the orientation of the converter station will be considered in conjunction with the preferred building and equipment arrangements (as set out in BF.3), the access route, and the alignment of the cable corridor, to retain as much of the existing landscape features as possible, and to reduce gaps in screening in the key views. | Annotated site plans and associated key views with analysis of the following could be provided:<br>• Permanent and temporary access strategy and how this relates to the site layout.<br>• Cable corridors into the converter station.<br>• Lines of sight through gaps in screening. |
| BF.2 | Enclosures | Where there is a choice between:<br>• external equipment with no or very limited options over appearance or,<br>• an enclosure that can be designed to control the appearance but adds bulk to the massing,<br>the implications on comparative visual impact will be assessed with the least impactful option selected unless other considerations indicate otherwise. | A technical statement could be provided explaining the requirements for the selected equipment to be enclosed, such as protecting the equipment or acoustic attenuation, and identifying the types of equipment that could be external. It could include studies of key views showing options for external equipment and enclosures in conjunction with the landscape screening design, and the design approach for the buildings. |
| BF.3 | Building arrangement | Where there is flexibility in the arrangement within the converter station and substation compounds, in compliance with the CDCs, opportunities will be taken to locate buildings to screen external equipment, and to | A technical statement could be provided including annotated compound layouts and massing diagrams, with analysis of how the buildings are arranged for the |

| ID | Heading | Key Design Principles | Potential Associated Activities |
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| | | create a clear and cohesive pattern of forms, for example using smaller buildings arranged in front of larger ones to reduce the visual impact of tall flat elevations.<br>Where feasible the preference is for the transformers to be offset from the DC Halls to allow greater design flexibility of the elevation facing the transformers. | benefit of the massing strategy whilst also considering how:<br>• access to buildings and equipment is managed, including how the AIL accesses the transformers; and<br>• operations staff park near to and access the control building. |
| BF.4 | Building and roof forms | Building shapes will be considered as part of the detailed design approach, and refined to suit the internal arrangements, seeking opportunities to reduce height and massing whilst forming a strong narrative and hierarchy of form. Where flat or low pitch roofs are used the preference will be to hide the roof behind a parapet. Where sloping roofs are used, the eaves will be extended to emphasise the roof and push the cladding into the background.<br>The building and roof forms will be coordinated across the converter station and substation for a consistent design approach. | A technical statement including sketch diagrams of sections, elevation studies, and 3D views that show how the external forms respond to the internal space requirements could be provided. |
| BF.5 | DC Halls | These are the largest buildings within the converter station with one for each pole (positive and negative). The halls for each pole have identical requirements tending towards symmetry, with inward sides between them, and outward facing sides. The design will seek to ensure the two buildings read as distinct forms and avoid blurring into a single mass. The space between the halls will be used for keeping air-conditioning plant and other equipment out of view (see BF.3). | A technical statement could be provided including studies of the DC Hall designs showing:<br>• the design measures taken to reduce their apparent scale;<br>• how the design approach relates to their greater significance and potential impact; and |

| ID | Heading | Key Design Principles | Potential Associated Activities |
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| | | | • how they relate to the rest of the buildings and equipment, and how they are seen in context. |
| **Identity** | | | |
| ID.1 | Meeting the ground | The way the converter station and substation buildings meet the ground will be considered in terms of the combined layering of features such as land-forming, screen planting, fencing, compound external works, equipment, and lower sections of the building cladding, with a focus on blending these features together and softening the visual impact. This could be incorporated into the cladding composition by providing a dark plinth level to the buildings, taking inspiration from local barn buildings. | A technical statement could be provided including detailed studies, in section and elevation, showing how the design and appearance of layers up to an including the building façade are integrated into an overall composition, including landscape design, details and colours of the fencing, equipment and lower section of cladding design.<br>Studies could include indicative 3D renders from where the cycle route crosses the access road, and where the river walk looks into the site, showing how this will be seen at the closest public viewpoints. |
| ID.2 | Meeting the sky | Where the upper parts of the converter station and substation buildings rise above the tree line, design concepts will be developed considering how the top edge of the buildings are seen against the sky whilst taking into consideration how the horizon level varies significantly in different key views. The concepts will make use of profiles, edges, planes, and textures to soften the visual impact and include strategies for managing visual clutter to avoid this detracting from the design intent. The way the appearance of the sky as a backdrop varies with weather and lighting conditions will be considered when developing and communicating the designs (in line with CO.3). | A technical statement could be provided including detailed studies, in section and elevation, showing how the design of the tops of buildings works in relation to appearance in key views.<br>Studies could include details of strategy for managing visual clutter of elements such as, rainwater goods, access safety equipment, louvres, cowls, and other roof-based equipment. |

| ID | Heading | Key Design Principles | Potential Associated Activities |
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| ID.3 | Materials, colours, and textures | Where in line with the CDCs, the converter station and substation building designs will aim to use cladding and roofing systems that exploit the way light emphasises articulation, layering and texture, to create depth and variation in surfaces so the buildings skin is responsive to the setting and varying climatic conditions. A limited colour palette will also be selected, following the strategy as established in the Suffolk Coast & Heaths AONB Guidance on the selection and use of colour in development, to help create a strong connection to the landscape design. The above will be considered in the context of the CDCs. | A technical statement could be provided explaining the selection of cladding and roofing systems, including facing materials and coating options, showing how they are used on the scheme through labelling of the detailed elevation drawings.<br>Large scale samples of materials, including the selected colours and mock-ups of any layering effects, photographed in situ as well as being made available for the LPA to view in person could also be provided. |
| ID.4 | Integration of building openings, plant, ductwork, access equipment and rainwater goods. | Where reasonable, plant, ductwork, access equipment and rainwater goods will be kept from view by locating in less prominent areas, avoiding roofs and the upper parts of the cladding, or locating behind rainscreen overcladding. Where it is not possible to hide these features then they will be integrated within the design such that they do not detract from the concept.<br>Where feasible doors, windows, louvres, and cowls will be located where they have least prominence, avoiding the upper parts of the elevations where they could be difficult to manage visually and acoustically. | Detailed plans, sections, and elevations of the proposals could be provided including equivalent level of development for architectural, structural, civil, mechanical, electrical, public health, safety, and maintenance access designs to demonstrate an integrated approach. |
| ID.5 | Quality of detailing | Enhanced building design approaches, intended to reduce visual impact and improve visual amenity, will be compared to an equivalent conventional olive-green trapezoidal cladding scheme, to enable the added benefit of the proposal to be assessed.<br>Aesthetic detailing will be designed to suit the prominence and intended viewing distance such that: | A technical statement could be provided including diagrams showing areas of buildings, enclosures and fences that fit into each category of detailing approach.<br>Including drawings of typical details of key cladding and roofing material interfaces demonstrating how they address the defined requirements. |

| ID | Heading | Key Design Principles | Potential Associated Activities |
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| | | • Larger scale and coarser detailing in areas that are intended to be seen from long distances,<br>• Focus of enhancement to outward facing areas, compared to areas that can be demonstrated to be inward facing. | |
| **Public Space** | | | |
| PS.1 | Interface with the public realm and PRoW network | The security fencing design will take into consideration the proximity of the cycle route on Ebbsfleet Lane North, the Stour Valley Walk route, and the visual amenity of these routes (in line with ID.1). | In conjunction with the technical statement provided for ID.1, the studies could include indicative 3D renders from where the cycle route crosses the access road, and where the river walk looks into the site, showing how this will be seen at the closest public viewpoints. |
| PS.2 | Incorporating security measures into the design | The design of security features including fencing, gates, CCTV and clear margins around the compound perimeter will be considered as part of the overall composition of landscape features and buildings (in line with ID.1), mitigating the impact on the public realm and landscape character whilst meeting the CDCs for these features and Secured by Design principles.<br>CCTV will be positioned to avoid overlooking PRoWs. | A technical statement could be provided showing how security requirements and measures have been determined in line with National Grid policies. Secured by Design principles will be followed in the statement, but an award will not be applied for.<br>Security measures could be included in the detailed studies and indicative 3D renders provided for ID.1 and PS.1. |
| **Resources** | | | |
| R.1 | On-site renewable energy generation | Where feasible, and without significantly increasing visual impact, the potential to incorporate on-site renewables into the converter station and substation designs, to contribute towards the operational energy requirements, will be considered. | Should on-site renewables initially appear feasible, a technical statement could be prepared covering the energy strategy including an assessment of:<br>• how the energy demand for operating the converter station is managed for efficiency |

| ID | Heading | Key Design Principles | Potential Associated Activities |
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| | | Consideration will be given to whether renewables can be incorporated into the final designs. It should be noted that there may be a decision on whether a roof is designed to accommodate solar panels or green/ blue roofs, a combination or whether neither is feasible.<br>Opportunities for recycling of waste heat will also be tested for feasibility. | and performance, including the design of the building envelopes;<br>• options for on-site renewables including technical suitability and how they relate to visual impact (see key views in CO.3); and<br>• opportunities for recycling any waste heat generated by the converter station. |
| R.2 | Managing impacts of importing fill material | The development platform of the converter station and substation will be set at the lowest reasonable level, which meets the CDCs, to reduce the need for importing material.<br>Where feasible, material will be acquired by partnering with suitable local projects that are net exporters, to reduce the $CO_2$ and traffic impacts. | A technical statement could be provided coordinated with the related management plans, and cut and fill drawings, showing how the requirements of the design principle have been met. |
| R.3 | Water recycling | Where feasible rainwater harvesting will be included to reduce water usage and surface water run-off as part of the SuDS strategy. The scope will depend on the requirement for non-potable water such as toilet flushing, vehicle washdown, and if any planting is included on site (in line with N.2 and N.3).<br>Any planting within the converter station and substation compounds will include a strategy for irrigation, to prevent drying out and dying back during dry spells and becoming a potential fire spread hazard as far as possible. | A technical statement could be provided covering the water recycling strategy in support of the overall SuDS proposals showing:<br>• where it is collected, storage and maintenance strategies;<br>• what the recycled water is to be used for including quantities required and mains connection requirements; and<br>• how the recycled water can feed any irrigation systems and how those are topped up by mains supply if required. |

# 4. References

## 4.1 Glossary

4.1.1 For a full list refer to **Application Document 1.6 Glossary and Acronyms**

## 4.2 References


(2024). *Delivering our vision.* National Grid.

*https://assets.publishing.service.gov.uk/media/602cef1d8fa8f5038595091b/National_design_guide.pdf.* (2021, January).

*https://assets.publishing.service.gov.uk/media/611152f98fa8f506ca458925/NMDC_Part_1_The_Coding_Process.pdf.* (2021, June).

*https://assets.publishing.service.gov.uk/media/6111531fd3bf7f043c4badd1/NMDC_Part_2_Guidance_Notes.pdf.* (2021, June).

*https://assets.publishing.service.gov.uk/media/65a7889996a5ec000d731aba/nps-renewable-energy-infrastructure-en3.pdf.* (2023, November).

*https://assets.publishing.service.gov.uk/media/65a78a5496a5ec000d731abb/nps-electricity-networks-infrastructure-en5.pdf.* (2023, November).

*https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf.* (2023, November).

*https://coastandheaths-nl.org.uk/wp-content/uploads/2021/01/SCH-Use-of-Colour-Guidance-v7.pdf.* (2018, July).

*https://dedhamvale-nl.org.uk/wp-content/uploads/2023/08/Lighting-Guidance-in-National-Landscapes.pdf.* (2023, July).

*https://nic.org.uk/app/uploads/NIC-Design-Principles-Handbook-Digital-PDF.pdf.* (2024, May).

*https://www.doverdistrictlocalplan.co.uk/.* (2024, October).

*https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-good-design*. (2024, October).

*https://www.ice.org.uk/areas-of-interest/infrastructure-delivery/defining-and-developing-the-design-champion-role.* (2022, August).

*https://www.kent.gov.uk/about-the-council/strategies-and-policies/service-specific-policies/economic-regeneration-and-planning-policies/regeneration-policies/kent-design-guide.* (2008, November).

*https://www.nationalgrid.com/electricity-transmission/document/81026/download.* (2016, December).

*https://www.nationalgrid.com/electricity-transmission/who-we-are/our-environmental-plan-and-performance*. (2024).

*https://www.nationalgrid.com/sites/default/files/documents/13795-The%20Holford%20Rules.pdf.* (1959).

*https://www.nationalgrid.com/sites/default/files/documents/13796-The%20Horlock%20Rules.pdf.* (2006).

*https://www.thanet.gov.uk/info-pages/local-plan-updates/.* (2020, July).

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