The Great Grid Upgrade

Sea Link

Sea Link

Volume 7: Other Documents

Document 7.12.1 Design Principles – Suffolk

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Version History

Date	Issue	Status	Description / Changes
March 2025	A	Final	For DCO submission
February 2026	B	Final	For Deadline 4 submission
April 2026	C	Final	For Deadline 6 submission
April 2026	D	Final	Response to REP6
September 2026	E	Final	Response to Secretary of State RFI

Executive Summary

Ex1.1.1 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 Design Principles (CSDPs) within this document cover the Suffolk converter station and its relationship to the site access and landscape mitigation proposals around it. The Substation Design Principles (SDPs) within this document cover the Friston substation and its relationship to the landscape mitigation proposals around it. The Fromus Bridge Design Principles (FBDPs) within this document cover the bridge crossing the River Fromus and its ~~realtionship~~relationship to the landscape mitigation proposals around it.

Ex1.1.2 **Application Document 7.12.2 Design Principles – Kent** has been prepared which separately addresses the Kent converter station and Minster substation.

Ex1.1.3 The introduction to the document includes a description of the Proposed Project and identifies the policies and guidance that the Design Principles respond to. This includes:

- Responding to planning policy; National Policy Statements EN-1, EN-3 and EN-5, and local policy including the Suffolk Coastal 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), the Planning Inspectorate's Nationally Significant Infrastructure Projects: Advice on Good Design, the Suffolk Coast Area of Outstanding Natural Beauty Guidance on the use and Selection of Colour in Development, and Lighting Design Guide - Dedham Vale National Landscape.
- Notes and Table 1.1~~Table 0.1~~ of Critical Design Constraints (CDCs) which inform the Design Principles.

Ex1.1.4 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~~Table 1.1~~ containing Overarching Design Principles that bridge the CDCs and vision with the PLDPs including the relationship to siting and colocation.
- Table 2.2~~Table 1.2~~ containing the PLDP set out as per the structure in Plate Ex 1.1~~Plate Ex 0.1~~ below which follows the recommendations of the NIC Design Group.

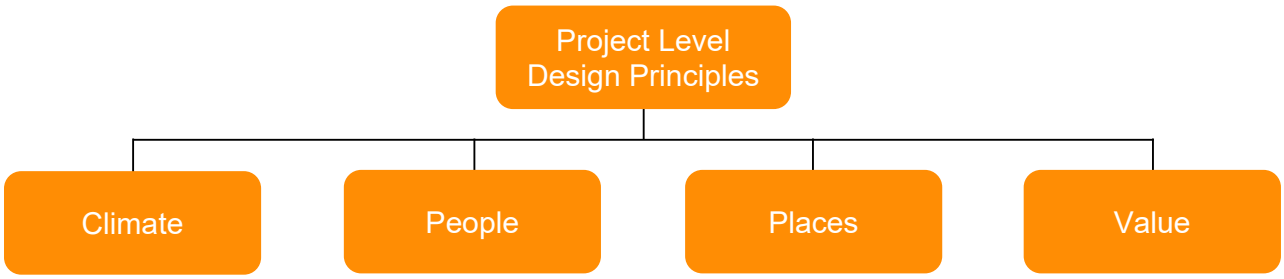

Plate Ex ~~0~~1.1: Structure of PLDPs

Ex1.1.5 Section 3 of the document sets out the guiding narrative and Table 3.1~~Table 2.1~~ of CSDPs for the Suffolk converter station near Saxmundham. The structure of the CSDPs, as shown in Plate Ex 1.2~~Plate Ex 0.2~~ below, follows the relevant characteristic headings from the NDG using the NMDC guidance to help codify the areas of design that will need consideration.

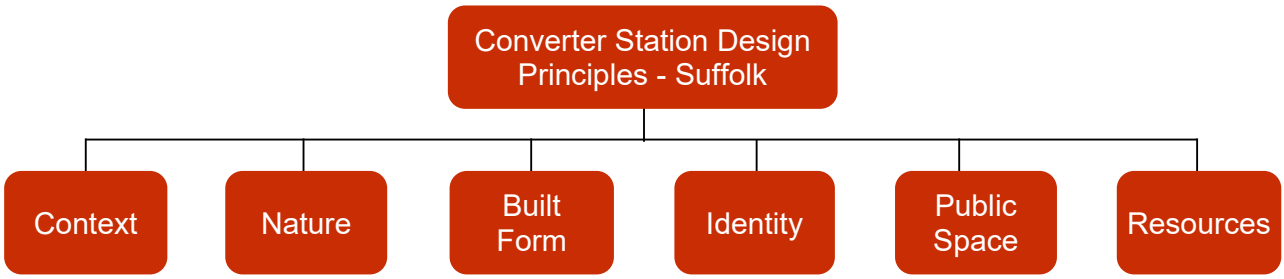

Plate Ex ~~0~~1.2: Structure of CSDPs

Ex1.1.6 Key Design Principles in column 3 of Table 3.1~~Table 2.1~~ are secured, as specified in Requirement 3(1) of the draft Development Consent Order (DCO). The CSDPs in Table 3.1~~Table 2.1~~ only apply to the Suffolk converter station (Work No. 3B). Table 3.1~~Table 2.1~~ also includes column 4 suggesting potential activities associated with each Key Design Principle.

Ex1.1.7 Section 4 of the document sets out Table 4.1~~Table 3.1~~ containing design principles applicable to Work No. 1B – the new Substation at Grove Wood Friston as defined in Schedule 1 of the draft Development Consent Order and shown on **Application Document 2.5.1 Works Plans – Suffolk**. **Application Document 7.5.3.2 CEMP Appendix B Register of Environmental Actions and Commitments (REAC)** secures that the design of this Work will be progressed in general accordance with the Key Design Principles set out in this table. The design principles are derived from those approved in Scottish Power Renewables (SPR) DCOs EN010077 and EN010078, East Anglia ONE North and East Anglia TWO Offshore Windfarms as set out in the Substations Design Principles Statement, Table 5.1 but does not replicate them in full. The design principles in Table 4.1~~Table 3.1~~ would be applied in the event that National Grid were to build the substation at Friston under the Proposed Project rather than being developed under the consents for the two wind farm projects.

Ex1.1.8 Key Design Principles in column 3 of Table 5.1 are secured, as specified in Requirement 3(3) of the draft Development Consent Order (DCO). The Fromus Bridge Design PRinciples only apply to the bridge within Work Number 3A - Access road to the

Suffolk Converter Station. Table 5.1 also includes column 4 suggesting potential activities associated with each Key Design Principle.

Ex1.1.9 Only the Key Design Principles in Table 3.1~~Table 2.1~~, Table 4.1~~Table 3.1~~, and Table 5.1 are formally secured, and the rest of the document is provided for guidance only.

1. Introduction

1.1 Introduction

~~1.0.1~~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.

~~1.0.2~~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.

~~1.0.3~~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.

~~1.0.4~~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:

~~1.0.5~~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*

~~1.0.6~~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'.*

~~1.0.7~~1.1.7 The purpose of this document is to:

- Provide a guiding narrative to the Proposed Project through establishing a set of Overarching Design Principles and Project Level Design Principles (PLDPs) for the Suffolk Onshore Scheme in line with the latest National Infrastructure Commission (NIC) guidance of defining principles that relate to climate, people, places and value.
- Provide Key Design Principles in column 3 of Table 3.1~~Table 2.1~~ Converter Station Design Principles (CSDPs) – Suffolk, for Work No. 3B Suffolk converter station, near Saxmundham, in line with Requirement 3(1) of the draft Development Consent Order (DCO).
- Provide Key Design Principles in Table 4.1~~Table 3.1~~ Substation Design Principles (SDPs) – Friston, for Work No. 1B – the new Substation at Grove Wood, Friston as defined in Schedule 1 of the draft DCO.
- Provide Key Design Principles in Table 5.1 Fromus Bridge Design Principles, for the bridge within Work No. 3A - Access road to the Suffolk Converter Station, in line with Requirement 3(3) of the draft Development Consent Order (DCO).

- **Application Document 7.12.2 Design Principles – Kent** provides an equivalent set of the Overarching Design Principles and PLDPs for the Kent Onshore Scheme. It also contains Key Design Principles for the Kent converter station and Minster substation.

~~1.1~~1.2 The Proposed Project

~~1.1.1~~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 800 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.

~~1.1.2~~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.

~~1.2~~1.3 Structure of the Design Principles

~~1.2.1~~1.3.1 The design principles have been split into two documents:

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

~~1.2.2~~1.3.2 Both documents follow the same 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 1.1~~Table 0.1~~ of Overarching Design Principles, and Table 2.2~~Table 1.2~~ of PLDPs in line with the NIC guidance.
- Section 3 – Converter Station Design Principles (CSDPs): includes guidance and Table 3.1~~Table 2.1~~ containing Key Design Principles for the Suffolk converter station in this document, and the Kent converter station in the other document for the Kent Onshore Scheme.
- Section 4 – Substation Design Principles (SDPs): includes introductory clarification notes and Table 4.1~~Table 3.1~~ containing Key Design Principles for the Friston substation in this document, and the Minster substation in the other document for the Kent Onshore Scheme.
- Section 5 – Fromus Bridge Design Principles (FBDPs): includes Table 5.1 containing Key Design Principles for the Fromus Bridge in this document.

~~1.2.3~~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~~Table 0.1~~ 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~~Table 1.1~~ are strategic to National Grid and sit above the PLDPs in Table 2.2~~Table 1.2~~ which are subdivided into the four areas identified in the NIC guidance and apply across the Proposed Onshore Project.

~~1.2.4~~1.3.4 The CSDP section is 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~~Table 2.1~~ of which column 3 contains the Key Design Principles, (also split into the six headings from the NMDC), which are secured as specified in Requirement 3(1) of the draft DCO. Column 4 includes potential activities that could be associated with each Key Design Principle. The scope of Table 3.1~~Table 2.1~~ has been limited to design principles relating to the layout, scale and external appearance of the Suffolk converter station (Work No. 3B). This is to avoid duplication of what is defined by other (outline) management plans.

~~1.2.5~~1.3.5 The SDP section includes introductory notes and Table 4.1~~Table 3.1~~ containing Key Design Principles applicable to Work No. 1B – the new Substation at Grove Wood Friston as defined in Schedule 1 of the draft DCO. **Application Document 7.5.3.2 CEMP Appendix B Register of Environmental Actions and Commitments (REAC)** secures that the design of this Work will be progressed in general accordance with the Key Design Principles set out in this table. The design principles are derived from those approved in Scottish Power Renewables (SPR) DCOs EN010077 and EN010078, East Anglia ONE North and East Anglia TWO Offshore Windfarms as set out in the Substations Design Principles Statement, Table 5.1 but have not been replicated in full. The SDPs in Table 4.1~~Table 3.1~~ would be applied in the event that National Grid were to build the substation at Friston under the Proposed Project rather than being developed under the consents for the two wind farm projects.

~~1.2.6~~1.3.6 The FBDPs section includes Table 5.1 of which column 3 contains the Key Design Principles which are secured as specified in Requirement 3(3) of the draft DCO. Column 4 includes potential activities that could be associated with each Key Design Principle.

~~1.2.7~~1.3.7 Only the Key Design Principles in Table 3.1~~Table 2.1~~, Table 4.1~~Table 3.1~~ and Table 5.1 are secured and the rest of the document is provided for guidance only.

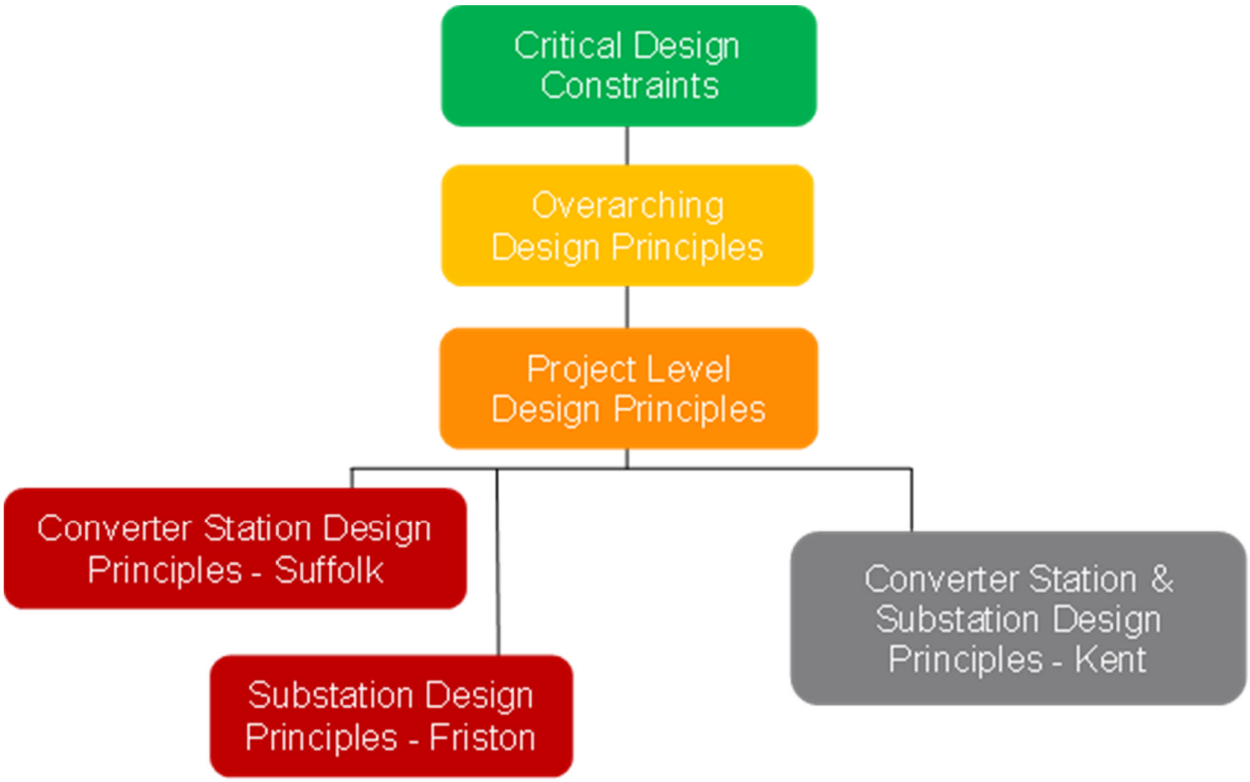

Plate 1.1 Hierarchy of Critical Design Constraints and Design Principles

~~1.3~~1.4 Responding to Planning Policy

~~1.3.1~~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

~~1.3.2~~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)

~~1.3.3~~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)

~~1.3.4~~1.4.4 Overall, this technology specific NPS covers renewable electricity generation, however it relates to the Sea Link 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)

~~1.3.5~~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

East Suffolk Council – Suffolk Coastal Local Plan

~~1.3.6~~1.4.6 The Plan covers the former Suffolk Coastal District area and was adopted on 23 September 2020. Policy SCLP11.1: Design Quality[6] identifies the need for clear design principles, and the use of Design Review Panels, which has been undertaken and addressed in **Application Document 7.11.1 Design Approach Document - Suffolk**. There are other relevant policies including an area specific strategy for Saxmundham. (Policy SCLP12.28)[7], and major energy infrastructure projects (Policy SCLP3.4) [8].

~~1.4~~1.5 Responding to Other Guidance

[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

[6] Suffolk Coastal Local Plan page 193 and 452

[7] Suffolk Coastal Local Plan page 292

[8] Suffolk Coastal Local Plan pages 55 and 433

NIC Design Group – Design Principles for National Infrastructure

~~1.4.1~~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.'*[9]

~~1.4.2~~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~~Table 1.2~~:

- *'**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.'*[10]

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

The National Design Guide and National Model Design Code

~~1.4.3~~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~~Table 2.1~~ of CSDPs, with Lifespan being covered in the Value section of the PLDPs:

- *'Context – enhances the surroundings*
- *Identity – attractive and distinctive*
- *Built Form – a coherent pattern of development*

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

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

- *Nature – enhanced and optimised*
- *Public Spaces – safe, social and inclusive*
- *Resources – efficient and resilient'*[11]

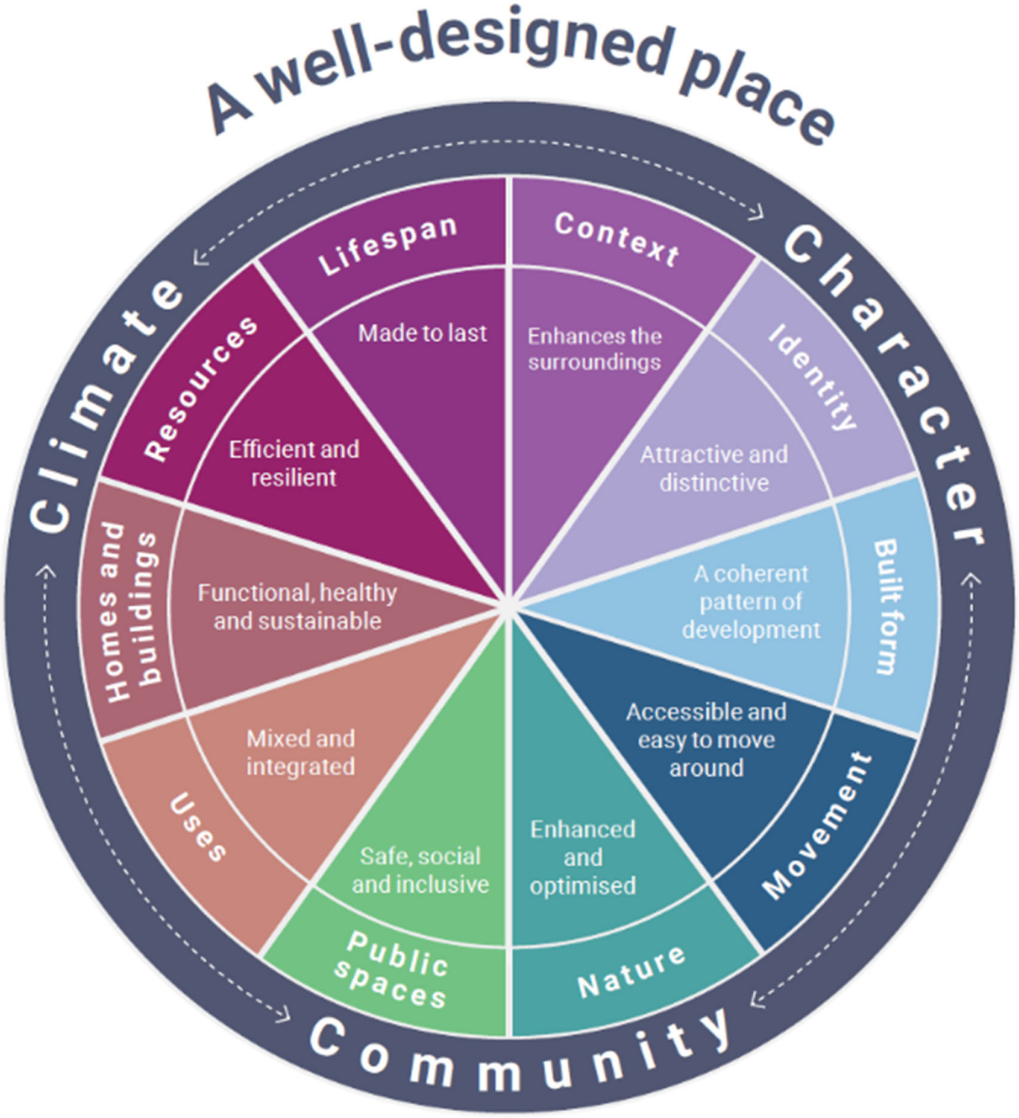

Plate 1.3: The ten characteristics of well-designed places, National Design Guide, page 8

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

~~1.4.4~~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*

[11] National Design Guide, page 8

applicants should follow the recommendations and considerations outlined in the advice.'[12]

~~1.4.5~~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

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

~~1.4.6~~1.5.6 The proposed site falls outside of the designated Area of Outstanding Natural Beauty (AONB), however the guidance is still useful given the close proximity to the identified landscape character types, and as a process for selecting materials where there is flexibility over the colour for elements of the Proposed Development within the setting of the AONB.

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

~~1.4.7~~1.5.7 The proposed site falls outside of 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 taken account of.

~~1.5~~1.6 Addressing Critical Design Constraints

~~1.5.1~~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 principles. The relationship between the constraints and design principles is clarified in the Overarching Design Principles.

~~1.5.2~~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.'*[13] However as stated in NPS EN-1 designs should *'demonstrate good aesthetics as far as possible.'*[14]Therefore the

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

[13] EN-5 2.4.3

[14] EN-1 4.7.2

Overarching Design Principles in Table 2.1~~Table 1.1~~ 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

~~1.5.3~~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 National Grid 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 open, 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 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 draft DCO.
C.7	Security	The design and specification of fences, gates, CCTV, lighting, clearances, and related items will meet National

ID	Constraint	Activity
		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. Design Vision & Project Level Design Principles

~~2.0~~2.1 National Grid Strategic Priorities

~~2.0.1~~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.*[15] *"The world and industry around us is transforming so we need to transform ourselves at the same time."*[16]

~~2.0.2~~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.

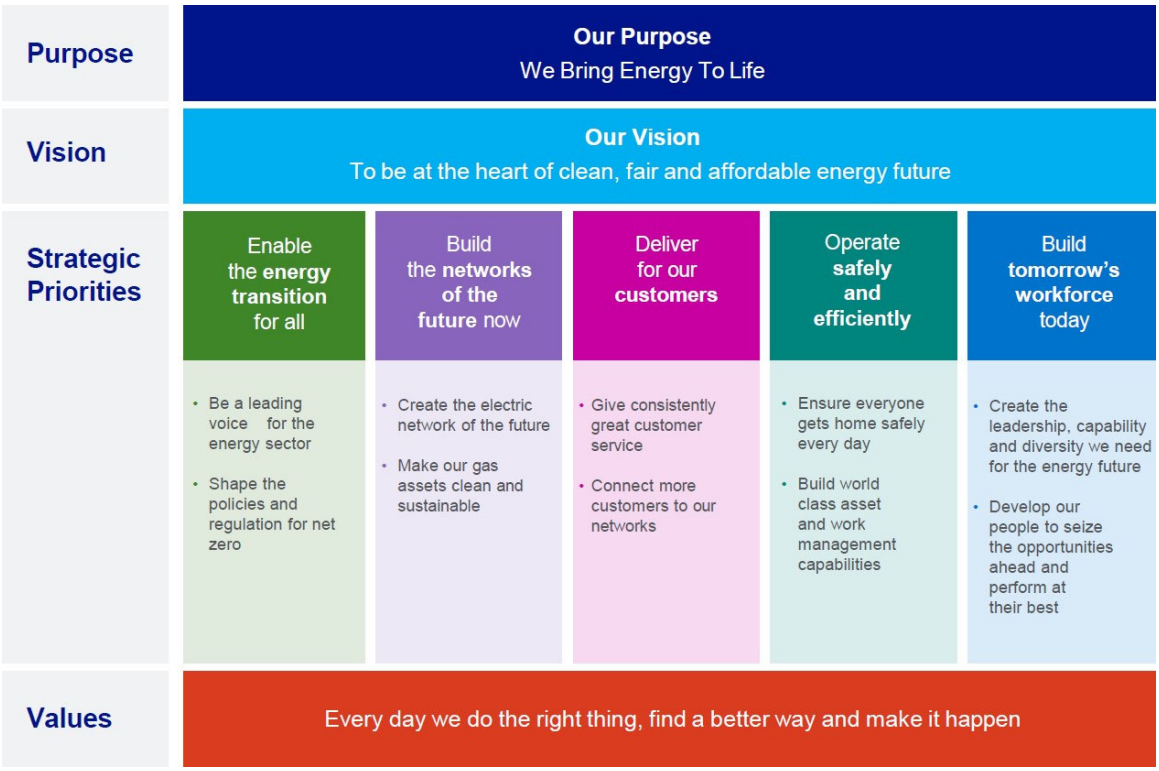

Plate 2.1 National Grid strategic framework[17]

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

[16] John Pettigrew, CEO of National Grid

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

~~2.1~~2.2 The Proposed Project Design Vision

~~2.1.1~~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.

~~2.1.2~~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 CSDPs and SDPs 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

~~2.1.3~~2.2.3 In line with the recommendations of NPS EN-1[18] and guidance from the NIC Design Group on developing project level design principles, a design champion has been assigned to the project to provide oversight of the ongoing design process and delivery of the project.

~~2.1.4~~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.'*[19]

~~2.1.5~~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.

[18] EN-1 4.7.5

[19] 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.

~~2.1.6~~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.

~~2.1.7~~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.

~~2.1.8~~2.2.8 The design champion will track performance of the 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.[20]
- National Grid's ten commitments to carrying out work in the UK from Our stakeholder, community and amenity policy.[21]

~~2.2~~2.3 Overarching Design Principles

~~2.2.1~~2.3.1 The Overarching Design Principles in Table 2.1~~Table 1.1~~ are at strategic level and define the relationship between the CDCs and the Proposed Project Design Vision, and how the PLDPs, CSDPs and SDPs should be interpreted and applied.

Siting

~~2.2.2~~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.

~~2.2.3~~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'*[22] Whilst intended for overhead lines these rules can also be applied where applicable to buried High Voltage cables.

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

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

[22] 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.'*[23] 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.

~~2.2.4~~2.3.4 The siting of the substation at Grove Wood Friston was already determined when the substation was consented as part of the East Anglia One and Two offshore windfarms. The design principles presented in Table 4.1~~Table 3.1~~ for this substation have been developed to be consistent with those developed for the substation as consented for those projects, focusing on those necessary and relevant for the elements included also in the Proposed Project.

Colocation

~~2.2.5~~2.3.5 Two further converter station projects are proposed in the Saxmundham area, LionLink and Nautilus. In consultation with the LPAs it was established that the preference was for them to colocate to prevent impacts being spread over a wider area.

- LionLink – This is an interconnector project being developed by National Grid Ventures (NGV) that is proposed to connect the UK to The Netherlands. It has undertaken a non-statutory consultation but has not yet undertaken a statutory consultation.
- Nautilus – This is an interconnector project being developed by NGV that is proposed to connect the UK to Belgium. It is less developed than LionLink and is currently investigating a connection to the Isle of Grain in Kent, however the project still retains a connection agreement (at the time of writing) with the National Electric System Operator (NESO) so is therefore being considered in this exercise.

~~2.2.6~~2.3.6 The process of coordinating Sea Link with the other projects has been covered in **Application Document 7.10 Coordination Document,** with Appendix A NGV Coordination Suffolk Masterplan that explains how Sea Link has been designed to allow two further projects to use the remainder of the site and provide an illustration of what colocation could look like based on the available information for the two further projects.

~~2.2.7~~2.3.7 The design principles for Suffolk have been written to take into account the coordination requirements where applicable, including as an overarching design principle. This principle doesn't need to be applied in the same way to the Kent converter station site, and this is reflected in the difference between the CSDPs for Suffolk and Kent.

~~2.2.8~~2.3.8 The substation at Grove Wood, Friston is colocated with other works consented under the East Anglia One and Two windfarms, with Scottish Power Renewables and National Grid working together for many years to develop proposals for this area.

[23] NPS EN-5 2.9.18

Table 2.1 Overarching Design Principles

ID	Heading	Design Principle
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~~Table 0.1~~ 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.[24]
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.

~~2.3~~2.4 Project Level Design Principles

~~2.3.1~~2.4.1 The PLDPs in Table 2.2~~Table 1.2~~ 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 CSDPs in Table 3.1~~Table 2.1~~ and

[24] 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.

the SDPs in Table 4.1~~Table 3.1~~, each of which contain Key Design Principles related to the defined Works.

~~2.3.2~~2.4.2 Table 2.2~~Table 1.2~~ 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~~Plate 1.2~~ below shows how the PLDPs fit into the hierarchy of constraints and design principles.

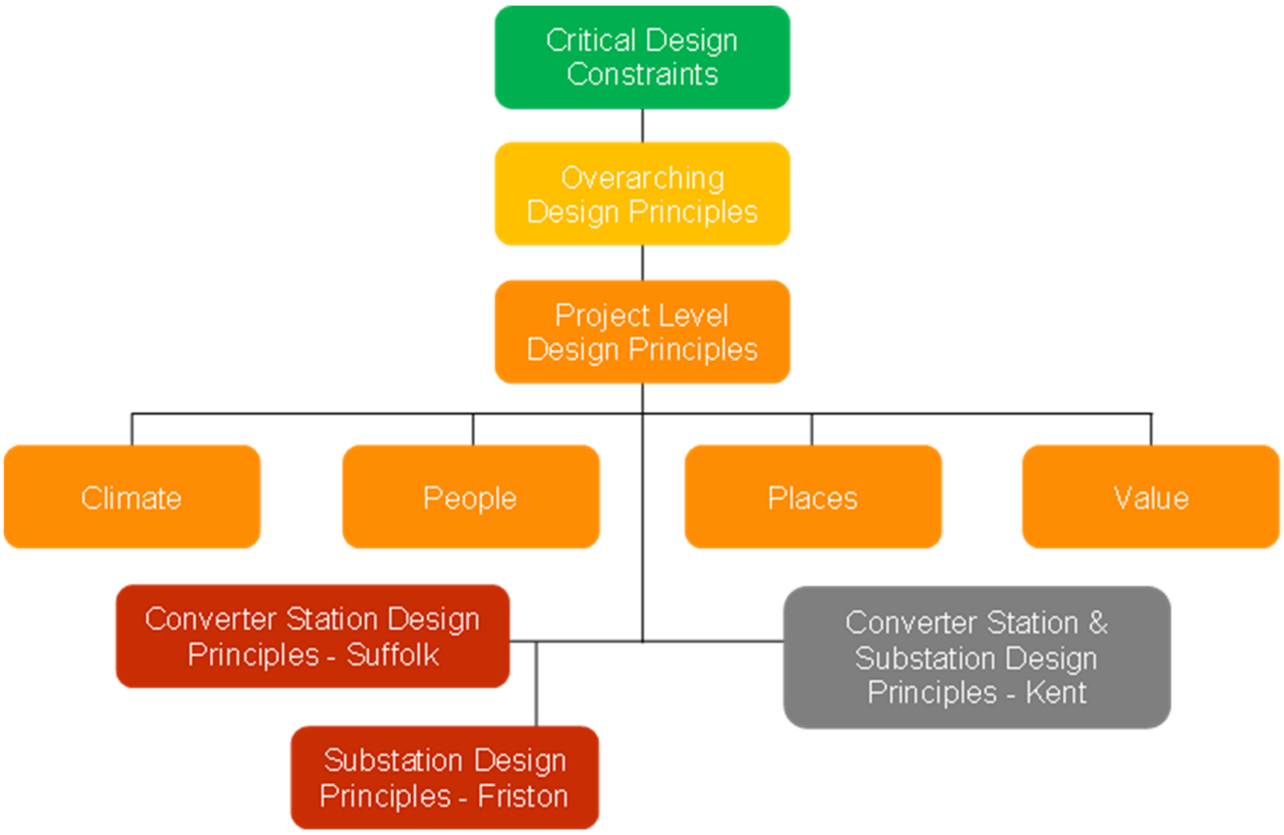

Plate 2.2 Structure of Project Level Design Principles

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

ID	Heading	Design Principle
		projects. National Grid has made this commitment on a voluntary basis in advance of the requirement being mandatory for Nationally Significant Infrastructure Projects. 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. 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~~Table 0.1~~.
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

ID	Heading	Design Principle
		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~~Table 2.1~~ and Table 4.1~~Table 3.1~~ 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 CSDPs, to working with the supply chain to explore the feasibility of using planted 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.

ID	Heading	Design Principle
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 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 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.

ID	Heading	Design Principle
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, 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 the Outline Landscape and Ecological Management

ID	Heading	Design Principle
		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) to provide inspiration for the design and consider what may be achievable in compliance with the CDCs in Table 1.1~~Table 0.1~~ and other considerations.

3. Converter Station Design Principles – Suffolk

~~3.0~~3.1 Introduction

~~3.0.1~~3.1.1 The Suffolk Onshore Scheme has a set of Converter Station Design Principles for the Suffolk converter station at Saxmundham. 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~~Table 2.1~~: Converter Station Principles – Suffolk – of which column 3 contains Key Design Principles which are to be secured, as specified in Requirement 3(1) of the draft DCO, and covers the Suffolk converter station (Work No. 3B), and its relationship to the access road, river crossing, and the associated landscape mitigation proposals around it.

~~3.0.2~~3.1.2 A separate set of Key Design Principles have been developed in parallel for the Kent converter station, in **Application Document 7.12.2 Design Principles – Kent**. These follow the same structure as Table 3.1~~Table 2.1~~ in this document.

~~3.0.3~~3.1.3 The CSDPs in Table 3.1~~Table 2.1~~ for Suffolk 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~~Plate 2.1~~~~Plate 2.1~~ below:

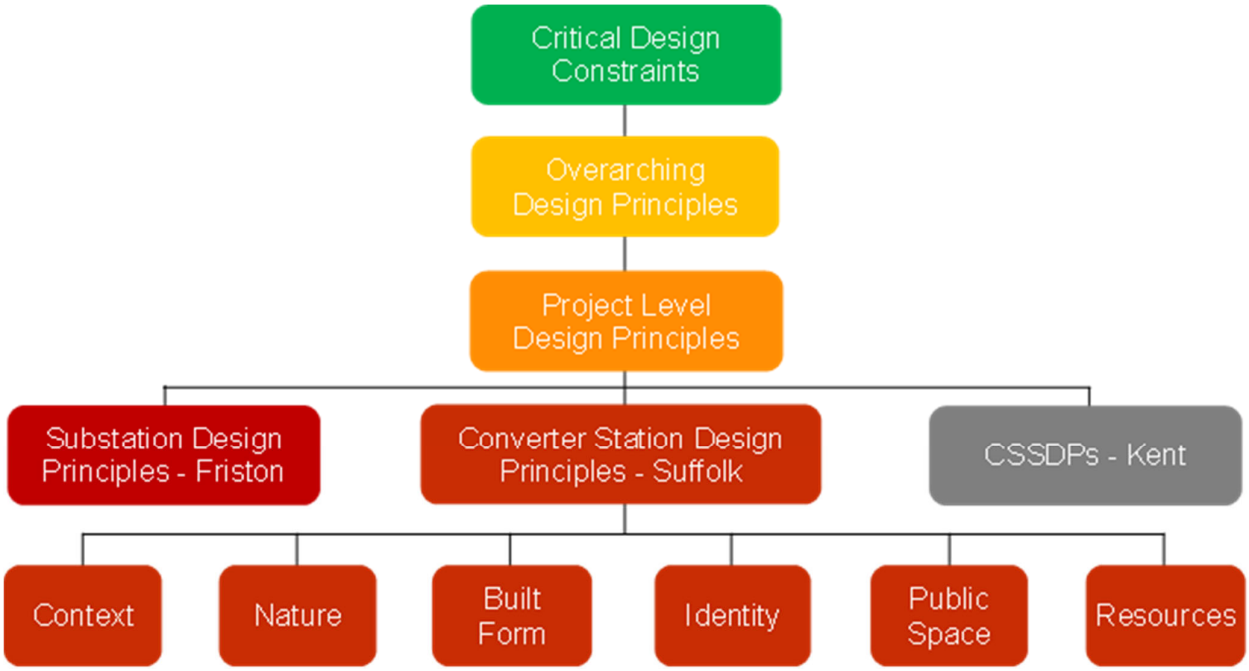

Plate 3.1 Structure of Converter Station Design Principles - Suffolk

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(1) 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.

~~3.0.4~~3.1.4 The number of Key Design Principles for discharge has been rationalized and the table only includes lines that relate to direct compliance activity 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~~Table 2.1~~ 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'*[25]

~~3.0.5~~3.1.5 A further general Key Design Principle has been added to the top of Table 3.1 for the purpose of encoding a relationship between the design principles and the Critical Design Constraints, such that each of the following Key Design Principles in the table need to be applied in accordance with the CDCs. This negates the need to state this within each individual Key Design Principle.

~~3.1~~3.2 Guiding Narrative to the Converter Station Design Principles

Context

~~3.1.1~~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.'*[26]

~~3.1.2~~3.2.2 The Proposed Project converter station has been sited to enable up to two further converter stations, LionLink and Nautilus, to be colocated in the same field at Wood Farm on the eastern edge of Saxmundham. How the proposals for Sea Link relate to the other projects is covered in **Application Document 7.10 Coordination Document** which includes Appendix A NGV Coordination Suffolk Masterplan covering a masterplan for the wider site. The potential for cumulative impacts has been assessed in the relevant ES chapters of the draft DCO where information regarding the other projects is available. Coordination requirements have been added to the relevant Key Design Principles in Table 3.1~~Table 2.1~~.

~~3.1.3~~3.2.3 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 7.5.7.1 Outline Landscape and Ecological Management Plan - Suffolk**. To avoid duplication of design principles in that document Table 3.1~~Table 2.1~~ focuses

[25] NPS EN-1 4.7.5

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

on how the building designs will relate to the landscape proposals for an integrated design approach.

~~3.1.4~~3.2.4 The response to the cultural heritage setting will be related to the consultation responses and approach found in **Application Document 6.2.2.3 Environmental Statement Part 2 Suffolk Chapter 3 Cultural Heritage** and the analysis found in **Application Document 7.11.1 Design Approach Document – Suffolk**. This will be covered through use of the visualisations within **Application Document 6.4.3.1 Landscape and Visual** (See Representative Viewpoint Visualisations) and additional heritage views agreed with the LPAs for CGIs of detailed proposals, as set out in Table 3.1~~Table 2.1~~, to demonstrate how impacts on cultural heritage assets have been addressed.

Nature

~~3.1.5~~3.2.5 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.'*[27]

~~3.1.6~~3.2.6 **Application Document 7.5.7.1 Outline Landscape and Ecological Management Plan - Suffolk** 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~~Table 2.1~~ which instead focuses on how the converter station design 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 western 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.
- Planting along the B1119. The landscape mitigation proposals will introduce native hedgerow and tree planting along sections of the B1119 to partially screen views of the Sea Link converter station, with colocating projects also benefitting.

Built Form

~~3.1.7~~3.2.7 One of the main challenges in defining the converter station 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

[27] National Design Guide, page 26

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.*'[28]

~~3.1.8~~3.2.8 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 2.5.1 Works Plans – Suffolk** 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

- 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 26 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 10 m tall, with the electrical equipment up to 16 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. The overall AC area is proposed to have an approximate footprint of 180 m x 75 m, with most of the equipment less than 12m tall, though lightning protection will exceed this. The illustrative plans show two buildings, Pre-insertion Resistor (associated with circuit breaker) (PIR) Building and Gas-insulated Switchgear (GIS) Building, which together have a combined approximate footprint of 60 m x 48 m and an indicative height of up to 15 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

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

buildings, Spare Parts Building and Service Building, would be up to 13 m high, with the rest less than 10 m high.

Identity

~~3.1.9~~3.2.9 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.'*[29]

~~3.1.10~~3.2.10 Whilst complying with the principle of being visually recessive as far as is possible, the design of buildings within the converter station 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 7.11.1 Design Approach Document – Suffolk**. 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.

~~3.1.11~~3.2.11 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 **Application Document 7.11.1 Design Approach Document – Suffolk** and this allows the colours to address specific key views as well as the broad character of the area.

Public Space

~~3.1.12~~3.2.12 The Public Space characteristic needs to be considered in the context of the rural setting of the site. *'The Suffolk Coastal Settlement Sensitivity Assessment identified that land to the east of the B1121 is sensitive with views of Hurts Hall and the town beyond…Proposals on the site would need to consider their impact on heritage assets and their settings…'*[30]

~~3.1.13~~3.2.13 The new permanent access road and river crossing will be designed such that it can serve the entire masterplan. The road will be designed to accommodate the largest and heaviest Abnormal Indivisible Load (AIL) required for installing and replacing equipment in any of the proposed converter stations. The landscape proposals extend along the length of the access road and around the area of the crossing and associated temporary construction compounds as can be seen in **Application Document 7.5.7.1 Outline Landscape and Ecological Management Plan - Suffolk**.

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

[30] Suffolk Coastal Local Plan 12.292

3.1.143.2.14 The design approach to the River Fromus crossing has been developed and recorded in **Application Document 7.11.1 Design Approach Document – Suffolk**. As it falls outside of Work No. 3B the mitigation commitment to be complied with is located in **Application Document 7.5.3.2 CEMP Appendix B Register of Environmental Actions and Commitments** (REAC).

3.1.153.2.15 References to improving the PRoW network have not been included in Table 3.1Table 2.1 to accord with **Application Document 7.5.9.1 Outline Public Rights of Way Management Plan Suffolk** that sets out why the DCO can only cover maintaining the existing network. However, it may be possible to agree additional permissive access rights, and improvements to the local network as a separate voluntary agreement.

3.1.163.2.16 Consideration will be given to whether it may be possible and appropriate to enable permissive access to mitigation land around the converter station to provide a green amenity space for the local community. However, it is recognised that this may well not be possible for operational reasons. Phasing of any PRoW and permissive access works will be coordinated with following projects as far as possible given the stage of design as illustrated in **Application Document 7.10 Coordination Document Appendix A NGV Coordination Suffolk Masterplan**.

3.1.173.2.17 Enhancements within the public realm are not included in the DCO so have not been included in Table 3.1Table 2.1. 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 and associated with the PRoW network, to communicate the purpose of the Project to the public and what is happening inside the buildings.
- Provision of community facilities within the landscape proposals, with examples such as bins, places to sit, and play spaces, as long as they do not conflict with the mitigation function of the landscape or the operation of the converter station.

Resources

3.1.183.2.18 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.'*[31] The Key Design Principles in the Resources section of Table 3.1Table 2.1 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 2.2Table 1.2 that address:

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

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

- sustainable construction (V.3).

~~3.1.19~~3.2.19 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.'*[32] 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~~Table 2.1~~.

~~3.1.20~~3.2.20 Where feasible the 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.

~~3.1.21~~3.2.21 The detailed design will seek opportunities to share and coordinate use of resources, such as site access, cut and fill material, temporary compounds, drainage, and services connections, with colocating projects subject to meeting the CDCs for this and the other projects.

~~3.2~~3.3 Introduction to Table 3.1 Converter Station Design Principles – Suffolk

~~3.2.1~~3.3.1 These are the design principles referenced in Requirement 3(1) of the Development Consent Order applicable to the Saxmundham Converter Station.

~~3.2.2~~3.3.2 It should be noted that Requirement 3(1) is required to be discharged prior to the commencement of any above ground elements of the Converter Station development 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. For example, the cut and fill balance achieved can depend on the materials underground and whether they are suitable for reuse; and it may not be possible to determine with certainty whether solar panels can be incorporated on the roof prior to commencement of development of this stage of works. 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.

[32] EN-3 2.7.96

Table 3.1 Converter Station Design Principles – Suffolk

ID	Heading	Key Design Principles	Potential Associated Activities
General			
GE.1	Compliance with CDCs	The following Key Design Principles in this table must be implemented in accordance with the CDCs. In particular, the architectural design shall be implemented within the confines of: • The Project programme, • The Project budget • The Project functional requirements, • Operational, security and safety requirements, • Within the parameters and commitments that are otherwise fixed by the Development Consent Order and documents secured by it.	Where changes to design or requests cannot be accommodated due to conflicts with Critical Design Constraints this will be clearly communicated in documents submitted to discharge Requirement 3(1) on the DCO.
GE.2	Consultation on design of Saxmundham Converter Station	Prior to submission of information on the design of buildings associated with Requirement 3(1) the Applicant will: • Organise a design meeting to present initial design ideas and gain feedback on the design for Work No. 3B. Invitees to this meeting would include: the relevant planning authority, the relevant county council and a representative from Saxmundham Town Council and Benhall & Sternfield Parish Council. This may be	As described.

ID	Heading	Key Design Principles	Potential Associated Activities
		face to face or virtual depending on the programme and availability of attendees. • Submit draft design information for an independent and objective review by a nationally recognised impartial body (such as the Design Council or Frame Projects). It may be beneficial to use the same panel as was used during the pre-application stage as described in **Application Document 7.11.1 Design Approach Document.** • Include within the submission to discharge Requirement 3(1) a document that explains the activities undertaken and a summary of any design changes made in response to the engagement above.	
GE.3	Information submitted to discharge Requirement 3(1)	The information submitted to discharge the relevant stages of Requirement 3(1) will include: • An explanation of how the Critical Design Constraints have shaped the development; • Information on how the Applicant has sought to satisfy each Key Design Principle; where there is deviation from a Key Design Principle the rationale for this change will be clearly set out. • Consideration of the form of the converter station complex;	As described

ID	Heading	Key Design Principles	Potential Associated Activities
		• Colour analysis and review of potential façade colours for the external treatment of the converter station buildings; • Review of material options for the primary forms of buildings; and • Conclusions relating to the proposed solution for the external appearance of the converter station complex in terms of form, colour and materials	
Context			
CO.1	Coordination with other projects	In developing the detailed design, opportunities for coordination between Sea Link and the other colocating projects will be explored to identify actions that could reduce overall impacts, make the most efficient use of resources, and deliver a coordinated landscape masterplan.	Coordination workshops could be held at least once per RIBA design work stage 1, 2 and 3, between the National Grid projects to minimise impacts across the masterplan. An overall site plan could be provided showing the latest available design data (identified as for information only), from the colocating projects to demonstrate coordination has taken place and conflicts avoided as appropriate.
CO.2	Height, scale, and massing response to context	The detailed design will aim to locate the smallest feasible compound and the building mass within it, as far south as possible within the defined LoD to reduce visual impact and assist following projects in optimising their locations to mitigate cumulative impacts of the masterplan, where this does not conflict with other principles (e.g. need to retain space for future projects).	A technical statement could be provided showing how the compound layout and position has been developed within the LoD to: • minimise impact on LVIA viewpoints particularly VP02; and • and maximise space available for the colocating projects.
CO.3	Responding to key views	Through analysis of the relevant LVIA key views, where the proposed building massing will be visible,	A technical statement could be provided setting out design development including analysis of the

ID	Heading	Key Design Principles	Potential Associated Activities
		it will be demonstrated how the detailed design strategy, alongside the landscape proposals have sought to minimise the visual impact of the proposals. Where design information of collocating proposals is available this should also be taken into consideration.	affected LVIA and heritage key views, and CGIs of the proposed converter station and landscape designs in those views, including versions for: • summer and winter seasons, • 5-, 10-, and 15-year planting growth.
CO.4	Responding to strategic views	A subset of the LVIA key views, VP01, VP02 and VP04, will be considered strategic for the purposes of assessing the performance of the design of the buildings in different lighting conditions, for the purpose of demonstrating that consideration has been given to how the sheen on cladding materials can affect appearance.	Additional baseline photography and corresponding CGIs of these views covering different lighting conditions could assist: • Morning, midday, and evening • Overcast and bright sunlight
Nature			
N.1	Integration with landscape proposals	The detailed proposals will demonstrate how the designs of the converter station have been integrated with the access road, river crossing, 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. 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 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~~Table 0.1~~ 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. • The second will be to provide native habitat. • The third to increase surface water attenuation reducing run-off from the site. • The fourth is reducing the reliance on chemical weed suppression. 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. • Potential for allowing areas of open ground to be planted. • Potential for climbing plants to be trained up netting or trellis work. • 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	A technical statement could be provided for the external lighting designs, including:

ID	Heading	Key Design Principles	Potential Associated Activities
		for tasks, specifying fittings that avoid light spillage, using 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. • 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 LoD, 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: • Permanent and temporary access strategy and how this relates to the site layout. • Cable corridors into the converter station. • Lines of sight through gaps in screening.
BF.2	Enclosures	If there is a requirement for external equipment to be enclosed for technical reasons, such as acoustic attenuation, then the enclosure should be considered as a building for the purposes of assessing the design of the cladding and colour selection.	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. Including 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 compound, opportunities will be taken to locate buildings to screen external equipment, and to create a clear and cohesive	A technical statement could be provided including annotated compound layouts and massing diagrams, with analysis of how the buildings are

ID	Heading	Key Design Principles	Potential Associated Activities
		pattern of forms, for example using smaller buildings arranged in front of larger ones to reduce the visual impact of tall flat elevations. 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.	arranged for the benefit of the massing strategy whilst also considering how: • access to buildings and equipment is managed, including how the AIL accesses the transformers; and • 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. The details of roof profiles, ridges, eaves, parapets and verges will be used to articulate the final design approach relating to the profiles of buildings as a development of the options provided in the Design Approach Document.	A technical statement including sketch diagrams including 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. Where there is flexibility the preferred strategy is to use the space between the halls 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: • the design measures taken to reduce their apparent scale; • how the design approach relates to their greater significance and potential impact; and • how they relate to the rest of the buildings and equipment, and how they are seen in context.
Identity			

ID	Heading	Key Design Principles	Potential Associated Activities
ID.1	Meeting the ground	The way the building meets 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 East Anglian Black Barns.	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.
ID.2	Meeting the sky	Where the upper parts of buildings rise above the tree line, design concepts will be developed considering how the top edge of the buildings are seen against the sky. 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.4).	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. Studies could include a strategy for managing visual clutter of elements such as, rainwater goods, access safety equipment, louvres, cowls, and other roof-based equipment.
ID.3	Materials, colours, and textures	The designs will use cladding and roofing systems that seek to 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.	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. 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	Heading	Key Design Principles	Potential Associated Activities
ID.4	Integration of building openings, plant, ductwork, access equipment and rainwater goods.	Where appropriate, the design will seek to locate plant, ductwork, access equipment and rainwater goods in less prominent areas, avoiding roofs and the upper parts of the cladding, or behind rainscreen overcladding. Where it is not appropriate to hide these features then the aim will be to integrate them within the design such that they do not detract from the concept. Where appropriate, the design will seek to locate doors, windows, louvres, and cowls where they have less prominence, aiming to avoid 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	Where enhanced building design approaches are proposed with the intention to reduce visual impact and improve visual amenity, they will be compared to an equivalent conventional olive-green trapezoidal cladding scheme, to enable the added benefit of the proposal to be assessed. The viewing distance will be a key consideration in establishing what type of detailing is appropriate, such that: • Finer detailing to be considered in areas where public viewpoints are closer to the compound, • Larger scale and coarser detailing in areas that are intended to be seen from long distances, • Potential for enhancement to be prioritised on outward facing areas, compared to areas that can be	A technical statement could be provided including diagrams showing areas of buildings, enclosures and fences that fit into each category of detailing approach. 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
		demonstrated to be inward facing and less visible.	
Public Space			
PS.1	Interface with the public realm and PRoW network	The security fencing design, in conjunction with the detailed landscape proposals, will take into consideration the proximity to the PRoWs around the perimeter of the converter station compound 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 be provided to include indicative 3D renders from a selection of points along the PRoW surrounding the converter station 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 perimeters 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. Secured by Design principles will be followed where appropriate.	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. Security measures to 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 appropriate, and without significantly increasing visual impact, the potential to incorporate on-site renewables into the design to contribute towards the operational energy requirements of the converter station will be considered. Consideration will be given to how the provision of on-site renewables would interface with other features, such as access provision or other roof-based equipment and features.	Should on-site renewables initially appear feasible, a technical statement could be prepared covering the energy strategy including an assessment of: • how the energy demand for operating the converter station is managed for efficiency and performance, including the design of the building envelopes; • options for on-site renewables including technical suitability and how

ID	Heading	Key Design Principles	Potential Associated Activities
		Opportunities for recycling of waste heat will also be evaluated for viability.	they relate to visual impact (see key views in CO.3); and • opportunities for recycling any waste heat generated by the converter station.
R.2	Balancing cut and fill across the site	Cut and fill will be balanced across the site where appropriate, to reduce the impact of vehicle movements to and from the site, in such a way that the converter station compound level is at the lowest reasonable level and cut material is used around the site for landforming to provide: • additional visual screening elevating planting to reduce visual impact and, • additional acoustic screening to sensitive receptors. Where there is the opportunity to do so and it is appropriate given the different design programmes, National Grid will seek to coordinate cut and fill strategies with colocating projects, including: • movements for temporary compounds and during construction, • establishing permanent landforming at an early stage where required for advanced planting, • where appropriate sharing cut and fill material, to reduce overall/multiple movements across the combined masterplan.	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. Landforming profiles showing: • natural contours to their outward faces in keeping with the landscape setting; and • potential for steeper banks facing the converter stations to maximise acoustic screening. The technical statement could include the most up to date available information from the colocating projects and strategies for avoiding co-dependency issues.

ID	Heading	Key Design Principles	Potential Associated Activities
R.3	Water recycling	Where appropriate 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). If any planting is to be included within the converter station site a strategy for irrigation will be included, to prevent drying out and dying back during dry spells and becoming a potential fire spread hazard.	A technical statement could be provided for the water recycling strategy in support of the overall SuDS proposals showing: • where it is collected, storage and maintenance strategies; • what the recycled water is to be used for including quantities required and mains connection requirements; and • how the recycled water can feed any irrigation systems and how those are topped up by mains supply if required.

4. Substation Design Principles - Friston

4.04.1 Introduction to Table 4.1Table 3.1 Substation Design Principles - Friston

4.0.14.1.1 Table 4.1Table 3.1 contains design principles applicable to Work Number 1B – the new Substation at Grove Wood Friston as defined in Schedule 1 of the draft Development Consent Order and shown on **Application Document 2.5.1 Works Plans – Suffolk**. **Application Document 7.5.3.2 CEMP Appendix B Register of Environmental Actions and Commitments (REAC)** secures that the design of this Work will be progressed in general accordance with the Key Design Principles set out in this table.

4.0.24.1.2 The design principles are derived from those approved in Scottish Power Renewables (SPR) DCOs EN010077 and EN010078, East Anglia ONE North and East Anglia TWO Offshore Windfarms as set out in the Substations Design Principles Statement, Table 5.1. The design principles in Table 4.1Table 3.1 below would be applied in the event that National Grid were to build the substation at Friston under the Proposed Project rather than being developed under the two consented wind farm projects. The Design Principles presented in the SPR consents are not suitable for use in their entirety because the National Grid substation is one element of the wider works and subject to different documents and controls to the SPR projects, but consistency has been retained where possible within those constraints. Where design principles are broad principles and are already included in earlier sections of this document or secured in documents, such as the REAC or the Outline Landscape and Ecological Management Plans, they have not been replicated here.

Table 4.1 Substation Design Principles – Friston

ID	NIC Design Principle	Key Design Principles	Potential Associated Activity
S.1	People and Value	Reduction of visual impact of the substation	The design of the Proposed substation will be compliant with the maximum parameters prescribed in Article 5 of the draft DCO. Where cost effective and efficient to do so, National Grid will seek to further reduce the visual extent of the substation, through appropriate equipment procurement and layout considerations.
S.2	People and Value	Designate a senior business representative as the design champion	Designation of individual as the design champion for the project, in order to maintain the necessary focal point and co-ordination in the progression of good design.
S.3	Places	The visual impacts of the substation buildings will be minimised as far as possible by their sensitive placing, the use of appropriate design, building materials, shape, layout, coloration, and finishes	Appropriate building design and materials will be actively sought as part of the procurement process.
S.4	Climate, People, and Places	Consideration of use of bunds to support visual screening	The overall site design will be coordinated with the collocating projects where reasonable, to maximise the opportunity for site won topsoil and subsoil materials to be reused on site. National Grid is committed to utilising suitable material excavated on site for example, for the creation of bunds or berms. It is noted that until detailed ground investigation information is obtained as part of the detailed design process, the quantity of suitable excavated material for reuse will not be known. It also may be beneficial to use won material from the adjacent works consented under East Anglia One and Two; and the works constructed at Saxmundham, subject to the relevant waste considerations. The potential for these options will be investigated through the development of final management plans, particularly the Construction Environmental Management Plan (and associated appendices) and the Landscape and Ecological Management Plan - Suffolk.

ID	NIC Design Principle	Key Design Principles	Potential Associated Activity
S.5	People, Places and Value	Promotion of an integrated design	In order to ensure a coordinated design is maintained and communicated to stakeholders, as the substation's architectural and landscape framework evolves during the detailed design stage, National Grid will, in coordination with the colocating projects, maintain a masterplan of the substation area for information purposes. Masterplans will be made available for information at RIBA Work Stages 1, 2 and 3 of the design development of buildings in the National Grid substation, insofar as National Grid is able to facilitate this, and will be provided for information to the relevant planning authority and Suffolk County Council when available.

5. Fromus Bridge Design Principles

~~5.0~~5.1 Introduction to Table 5.1 Fromus Bridge Design Principles

~~5.0.1~~5.1.1 Table 5.1 contains design principles applicable to the Fromus Bridge design which is part of Work Number 3A – Access road to the Suffolk Converter Station. These are the design principles referenced in Requirement 3(3) of the Development Consent Order.

~~5.0.2~~5.1.2 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(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.

Table 5.1 Fromus Bridge Design Principles

ID	Heading	Key Design Principles	Potential Associated Activity
FB.1	Compliance with CDCs	The following Key Design Principles in this table must be implemented in accordance with the CDCs. In particular, the architectural design shall be implemented within the confines of: • The Project programme, • The Project budget • The Project functional requirements, • Operational, security and safety requirements, • Within the parameters and commitments that are otherwise fixed by the Development Consent Order and documents secured by it.	Where changes to design or requests cannot be accommodated due to conflicts with Critical Design Constraints this will be clearly communicated in documents submitted to discharge Requirement 3(3) of the DCO.
FB.2	Consultation on design of Fromus Bridge	Prior to submission of information on the design of the bridge crossing of the River Fromus to discharge Requirement 3(3) the Applicant will: • Organise a design meeting to present initial design ideas on the bridge and gain feedback. Invitees to this meeting would include: the relevant planning authority, the relevant county council and the Environment Agency. This meeting is likely to be virtual given the criticality of the bridge to the construction programme. • Submit draft design information for an independent and objective review by a nationally recognised impartial body (such as the Design Council or Frame Projects). It may be beneficial to use the same panel as was used during the	As described

		pre-application stage as described in **Application Document 7.11.1 Design Approach Document**. This stage may be in parallel to the design meeting above. • Include within the submission to discharge Requirement 3(3) a document that explains the activities undertaken and a summary of any design changes made in response to the engagement above.	
FB.3	Bridge Design Approach	The intention of the bridge design is to make it visually recessive as described in Requirement 3(3). The following areas of bridge design have been identified as being key to reducing the visual impacts; • Relationship with the landscape mitigation proposals with aim to blend into the landscape, including palnting of the banks to the ramps, • Selection of material, colour and texture palette following 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, • Articulation of the spanning structure for slenderness and elegance, • Design of the abutment walls to soften their appearance, and • Parapet railings that are designed to reduce the apparent height of the bridge.	A technical statement showing the design response to the key areas of bridge design. Provision of plan, section, and elevation drawings of the bridge. 3D renders of the bridge design in representative viewpoint VP02, and heritage viewpoint CH02

6. References

~~6.0~~6.1 Glossary

~~6.0.1~~6.1.1 For a full list refer to **Application Document 1.6 Glossary and Acronyms**

~~6.1~~6.2 References

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