Preliminary Environmental Information Report Volume 1

Chapter 3 Alternatives and Design Evolution

LLK1-ARU-REP-ENV-000005
Version 0.0
January 2026

Contents

Glossary of Project Terminology

This Glossary has been provided to define terms used across a number of the LionLink Proposed Scheme documents.

Terms and abbreviations specific to this technical chapter are provided at the end of the document in the **Topic Glossary and Abbreviations.**

	Description
Amendment to Kiln Lane Substation Scenario	The scenario where the Proposed Scheme will comprise the amendments to Kiln Lane Substation that would be required if Kiln Lane Substation was built out pursuant to the EA1N/EA2 DCOs.
Applicant, the	National Grid Lion Link Limited (NGLLL)
Bellmouth	A flared vehicular access/egress point connecting permanent route to the public highway.
Converter Station	A converter station changes electricity between High Voltage Alternating Current (HVAC), which power our homes, and High Voltage Direct Current (HVDC) which is more efficient for transporting electricity over long distances and vice versa. The proposed Converter Station is located to the east of Saxmundham.
Converter Station Site	The Converter Station Site as a whole, allowing for the co-location of the Converter Station with the Converter Station being separately consented as part of the Sea Link project.
Co-ordination	The process of people or entities working together.
Co-location	Where different elements of a project, or various projects, are located in one place.
Construction Compound	Temporary compounds installed during the construction phase of the Proposed Scheme. Each compound is likely to contain storage areas such as laydown areas, soils storage, and areas for equipment and fuel, drainage, generators, car parking and offices and welfare areas (portacabins).
Development Consent Order (DCO)	An order made by the Secretary of State pursuant to the Planning Act 2008 (as amended) granting development consent for a Nationally Significant Infrastructure Project. It grants consent to develop the approved project and may include (among other things) powers to compulsorily acquire land and rights where required and deemed marine licences for any offshore works.
Draft Order Limits	The area of land identified as being subject to the DCO application. The Draft Order Limits are made up of the land required both temporarily and permanently to allow for the construction, operation and maintenance, and decommissioning of the Proposed Scheme. All onshore parts of the Proposed Onshore Scheme are located within England and offshore parts of the Proposed Offshore Scheme are located within English territorial waters to 12 Nautical Miles and then up to the United Kingdom (UK) Exclusive Economic Zone (EEZ) boundary at sea.

	Description
Dutch Offshore Components	Is the term used when referring to the offshore elements of the Project within Dutch waters.
Eastern Route Option	As part of the Underground HVDC cable corridor, the Eastern Route Option would facilitate a degree of co-location with the Sizewell Link Road (SLR) scheme.
Environmental Impact Assessment (EIA)	The EIA is a systematic regulatory process that assesses the potential likely significant effects of a proposed project or development on the environment.
EIA Scoping Report	An EIA scoping report defines the proposed scope and methodology of the EIA process for a particular project or development. The EIA Scoping Report for the Proposed Scheme was submitted to the Planning Inspectorate with a request for the Secretary of State to adopt a scoping opinion in relation to the Proposed Scheme on 6 March 2024.
Environmental Statement (ES)	The ES is a document that sets out the likely significant effects of the project on the environment. The ES is the main output from the EIA process. The ES is published as part of the DCO application.
Exclusive Economic Zone (EEZ)	The zone in which the coastal state exercises the rights under Part V of the United Nations Convention on the Law of the Sea. These rights relate principally to the water column and may extend to 200 nautical miles from baselines. This is distinct from territorial waters, which for the UK extend 12 nautical miles from the coast.
Full Build Out of Kiln Lane Substation Scenario	The scenario if the Proposed Scheme was brought forward first, then it would be responsible for developing Kiln Lane Substation for the Proposed Scheme, with sufficient additional capacity for other projects.
Joint Bay	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Kiln Lane Substation	The proposed connection point for the Project to the British National Electricity Transmission System, located to the north of Friston. Formerly known as Friston Substation. The new name has recently been adopted by NGET. The substation is of the same footprint and in the same location. Friston Substation will, hereafter, be referred to as Kiln Lane Substation.
Landfall	The proposed Landfall is where the proposed offshore HVDC Submarine Cables are brought ashore and meets with the onshore proposed Underground HVDC Cables. This includes the Transition Joint Bay (TJB). The proposed Landfall will be located at Walberswick, and there will be no permanent above ground infrastructure at the proposed Landfall.
Landfall Site	The area where the Landfall may be located.
Limit of Deviation	A maximum distance or measurement of variation within which the works must be constructed. These are lateral (i.e. on the ground) and vertical limits (in relation to height).

	Description
Link Box Chamber	Link boxes are used at joint bays to facilitate grounding connections to ensure safety and enable maintenance. Link boxes can either be installed below ground, in a link box chamber, or in an above ground link pillar
Multi-purpose interconnector (MPI)	A project where GB interconnection is combined with transmission of offshore generation within GB (and optionally within a connecting state).
National Grid Electricity Distribution (NGED)	The local distribution network operator for the Midlands, the southwest of England and south Wales.
National Grid Electricity Transmission (NGET)	Operators of the national electricity transmission network across Great Britain and own and maintain the network in England and Wales, providing electricity supplies from generating stations to local distribution companies. National Grid does not distribute electricity to individual premises, but its role in the wholesale market is vital to ensuring a reliable, secure and quality supply to all.
National Grid Lion Link Limited (NGLLL)	The Applicant, a joint venture between National Grid Ventures and TenneT. NGLLL is a business within the wider National Grid Ventures portfolio.
National Grid Strategic Infrastructure (NGSI)	Part of NGET and responsible for delivering major strategic UK electricity transmission projects, focussed on connecting more clean, low-carbon power to England and Wales.
National Grid Ventures (NGV)	Operates and invests in energy projects, technologies and partnerships to accelerate the development of a clean energy future. This includes interconnectors (such as the LionLink Project), allowing trade between energy markets and the efficient use of renewable energy resources.
Nationally Significant Infrastructure Projects (NSIP)	Major infrastructure developments in England and Wales for which development consent is required, as defined within Section 14 of the Planning Act 2008 (as amended). This includes any development which is subject to a direction by the relevant Secretary of State pursuant to Section 35 of the Planning Act 2008.
Non-standard interconnector (NSI)	A project where GB interconnection is combined with transmission of offshore generation outside of GB.
Northern Route Option	A northern cable corridor option that would allow Underground HVAC Cable delivery for Proposed Scheme only.
Offshore Hybrid Asset (OHA)	A project that combines cross-border interconnection with the transmission of offshore generation, this is an overarching term which covers both multi-purpose interconnectors (MPI) and non-standard interconnectors (NSI).
Order Limits	The maximum extent of land within which the Proposed Scheme may take place, as consented.
Outline Offshore Construction	Describes the control measures and standards proposed to be implemented to provide a consistent approach to the environmental management of the construction activities of the Proposed Offshore Scheme.

	Description
Environmental Management Plan (Outline Offshore CEMP)	
Outline Onshore Code of Construction Practice (Outline Onshore CoCP)	Describes the control measures and standards proposed to be implemented to provide a consistent approach to the environmental management of the construction activities of the Proposed Onshore Scheme.
Overhead Lines (OHL)	Conductors (wires) carrying electric current, strung from Tower to Tower.
Planning Act 2008	The Planning Act 2008 being the relevant primary legislation for national infrastructure planning.
Planning Inspectorate (PINS)	The Planning inspectorate review DCO applications and make a recommendation to the Secretary of State, who will then decide whether to approve the DCO.
Preliminary Environmental Information Report (PEIR)	The PEIR is a document, compiled by the Applicant, which presents preliminary environmental information, as part of the statutory consultation process. This is defined by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 as containing information which "is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development (and of any associated development)" (Section 12 2. (b)). This PEIR describes the Proposed Scheme, sets out preliminary findings of the EIA undertaken to date, and the mitigation measures proposed to reduce effects. The PEIR is published at Statutory Consultation stage for information and feedback.
Project (the)	The LionLink Project (hereafter referred to as the 'Project') is a proposal by National Grid Lion Link Limited (NGLLL) and TenneT. The Project is a proposed electricity link between Great Britain (GB) and the Netherlands with a capacity of up to 2.0 gigawatts (GW) of electricity and will connect to Dutch offshore wind via an offshore platform in Dutch waters. The Project is the collective term used to refer to the proposal for all aspects (onshore and offshore) of the proposed interconnector between GB and the Netherlands.
Proposed Offshore Scheme	The term used when referring to the offshore elements of the Proposed Scheme, seaward of the mean high-water springs to the EEZ boundary at sea.
Proposed Onshore Scheme	The term used when referring to the onshore elements of the Proposed Scheme, landward of the mean low water springs. Proposed Onshore Scheme components include: a) Kiln Lane Substation.

	Description
	b) Underground High Voltage Alternating Current (HVAC) Cables; c) Converter Station. d) Underground High Voltage Direct Current (HVDC) Cables; and e) Landfall.
Proposed Scheme	Used when referring to the GB scheme components of the Project, not including Dutch components. This includes both the onshore and offshore scheme components which are within UK territorial waters and up to the UK EEZ boundary at sea.
Rochdale Envelope	The Rochdale Envelope or Design Envelope approach is employed where the nature of a proposed development means that some details of a project are not available in advance of, or at the time of submitting the DCO application. The Rochdale Envelope approach defines a design envelope and parameters within which the final design will sit and ensures a robust and reliable EIA can be undertaken.
Scoping Opinion	A scoping opinion is requested from the Planning Inspectorate on behalf of the Secretary of State, to inform the requirements of EIA process and ultimately the ES which will be submitted as part of the application for development consent. Through the scoping process, the views of the statutory consultees and other relevant organisations on the proposed scope of the EIA are sought. A Scoping Opinion for the Proposed Scheme was issued by the Planning Inspectorate (on behalf of the Secretary of State) on 16 April 2024. The Applicant received a separate EIA Scoping Opinion from the Marine Management Organisation (MMO) (Reference DCO/2024/00005, dated 04 September 2024) as the MMO were unable to provide opinion to the Planning Inspectorate in time for the April 2024 deadline.
Scottish Power Renewables (SPR) East Anglia One North (EA1N) and East Anglia 2 (EA2) Consents (SPR EA1N and EA2 Consents)	The Orders made following the Scottish Power Renewables applications for development consent for the following projects: a) The East Anglia ONE North Offshore Wind Farm Order 2022; and b) East Anglia TWO Offshore Wind Farm Order 2022
Southern Route Option	A southern cable corridor option that would allow: a) Underground HVAC Cable delivery for Proposed Scheme only, or b) Underground HVAC Cable delivery for Proposed Scheme and ducting for Sea Links Underground HVAC and HVDC cables in that section.
Statutory Consultation	Consultation undertaken with the community and stakeholders in advance of the application for development consent being submitted to the Planning Inspectorate, on behalf of the Secretary of state, in accordance with the PA 2008.

	Description
Substation	Substations are used to control the flow of power through the electricity system. They are also used to change (or transform) the voltage from a higher to lower voltage to allow it to be transmitted to local homes and businesses.
TenneT	Operator of the electricity transmission network across the Netherlands.
Tower	A structure used to carry overhead electrical conductors, insulators, and fittings. Often described as a pylon.
Transition Joint Bay (TJB)	An underground structure at the Landfall Site that house the joints between the offshore cables and the onshore cables.
Underground Cable Corridors	Collective term for the corridors within which HVAC and HVDC cables are planned.
Underground High Voltage Alternating Current (HVAC) Cable Corridor	A corridor in which the underground HVAC cables are planned to be installed.
Underground High Voltage Alternating Current (HVAC) Cables	Transmission cables which connect between the Converter Station and Substation. HVAC cables are designed to manage fluctuating flow of current.
Underground High Voltage Direct Current (HVDC) Cable Corridor	A corridor in which the underground HVDC cables are planned to be installed.
Underground High Voltage Direct Current (HVDC) Cables	Transmission cables which connect the Converter Station to the Landfall Site and then offshore. HVDC cables are designed to manage current flowing in one direction.
Visibility Splay	An area of land at a road junction that ensures drivers have an unobstructed view of oncoming traffic allowing them to safely join or cross the road.
Western Route Option	As part of the Underground HVDC cable corridor, the Western Route Option would deliver the Scheme within its own corridor with no co-location with the Sizewell Link Road (SLR) scheme.

3 Alternatives and Design Evolution

3.1 Introduction

3.1.1 This chapter describes the reasonable alternatives that have been considered, and the design evolution undertaken to date on the Proposed Scheme. This chapter provides the following information:

a. Section 3.1 Introduction (this section)
b. Section 3.2 Requirement to consider alternatives;
c. Section 3.3 Overview of approach to siting and routeing;
d. Section 3.4 Strategic options identification and feasibility;
e. Section 3.5 Appraisal of short list;
f. Section 3.6 Design development; and
g. Section 3.7 Next steps.

3.1.2 This chapter is supported by the following Figures:

a. **Figure 3.1 Appraisal of Longlist Options;**
b. **Figure 3.2 Appraisal of Shortlist Options;**
c. **Figure 3.3 Converter Station Location within Site 3;**
d. **Figure 3.4 Proposed Onshore Scheme Emerging Preferences;**
e. **Figure 3.5 Proposed Onshore Scheme Preferred Options;**
f. **Figure 3.6 Offshore Connection Points and Offshore HVDC Cable Corridor Options;**
g. **Figure 3.7 Offshore HVDC Cable Corridor Development KP52 - KP64; and**
h. **Figure 3.8 Offshore HVDC Cable Corridor Development Aggregate Area 2109.**

3.1.3 This chapter should be read in conjunction with the **Options Siting and Routeing Report (OSRR)** that has been published as part of the Statutory Consultation (Ref 1).

3.2 Requirement to consider alternatives

3.2.1 Regulation 14(d) in conjunction with Schedule 4, paragraph 2 of *The Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017* (Ref 2) sets out that an Environmental Statement (ES) should *include "a description of reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."*

3.2.2 The EIA Scoping Report (Ref 3) contained an overview of the options that have been considered for the Proposed Scheme and the siting and routing process, which is set out in detail in the **OSRR** that has been published as part of the Statutory Consultation. Following receipt of the EIA Scoping Opinion (Ref 4) the Planning Inspectorate advised that *"The Inspectorate would expect the ES to*

provide details of the reasonable alternatives studied and the reasoning and selection of the chosen option(s), including a comparison of the environmental effects". Further information will be provided within the ES, with this chapter of the PEIR describing the reasonable alternatives considered, with **Section 3.7** outlining how the feedback from Statutory Consultation will be used to further review and refine the design, where appropriate.

Horlock rules

3.2.3 Consideration of the design and siting of the Kiln Lane Substation has been undertaken in accordance with the Horlock Rules (Ref 5), as referred to in the NPS for Electricity Networks Infrastructure (NPS EN-5) (Ref 6). The Horlock Rules are guidelines established by National Grid in 2003 and updated in 2009 for the early consideration of environmental and amenity factors in the design and siting of new substations to mitigate potential effects.

3.3 Overview of approach to siting and routeing

3.3.1 Following the confirmation of a grid connection point (see **Paragraph 3.4.1**) within the UK, siting and routeing studies were undertaken to determine potential locations for the Converter Stations, Landfalls and Offshore and Onshore Cable Corridors. A staged approach was adopted which primarily focused on environmental and technical considerations, with later stages of the approach additionally considering stakeholder engagement and planning policy. This process and the stages therein are described in full in the **OSRR** that has been published as part of the Statutory Consultation. The aim of the process was to identify feasible options for Converter Station and Landfall locations, and Cable Corridors associated with these potential locations, within which preliminary alignments could later be developed.

3.3.2 This staged approach is detailed below:

a. Stage 1 – Identification of study areas:
   i. This step sought to identify the extent of the study area within which a Converter Station, Landfall location, and Cable Corridors could be developed. The connection point to the Kiln Lane Substation was used as the basis for defining the study area associated with the Converter Station and Landfall locations.
b. Stage 2 – Development and appraisal of a long list of options to identify short list:
   i. A long list of potential options, displayed on **Figure 3.1 Appraisal of Longlist Options**, was developed based on the defined study area. The environmental and technical benefits and disbenefits of each option were considered using desk-based information obtained from publicly available sources. Based on the outcome of the appraisal a list of options was taken forward for further appraisal. The list of options that followed this stage were presented at the 2022 Non-Statutory Consultation (Ref 7).
c. Stage 3 – Appraisal of a short list of options and preferred option(s) identification:

i. The feedback from the **2022 Non-Statutory Consultation** as well as technical and environmental assessments was used in the appraisal of the short list options, This appraisal resulted in the identification of an alternative landfall site at Walberswick and Underground HVDC Cable Corridor at Southwold which were then presented at the and **2023 Supplementary Non-Statutory Consultation (Ref 8)** with this feedback considered as part of a further appraisal, The short list options are presented on **Figure 3.2 Appraisal of Shortlist Options** and include the additional options identified through Non-Statutory Consultation feedback. Additional desk-based information was collated, supported by site visits. Each option was appraised independently, accompanied by a holistic review of the design of the Proposed Scheme to validate the design decisions within each section of the route. Based on the outcome of the appraisal, the preferred option(s) were taken forward for further design development.

3.3.3 This focus of this chapter is to outline the consideration of reasonable alternatives focusing mainly from Stage 3 onwards.

3.4 Network Connection Point and identification of study area

Connection point to the National Grid Electricity Transmission System (NETS)

3.4.1 In 2017 the Applicant applied to National Grid Electricity System Operator[1] (NGESO) for an interconnector connection to the Great Britain (GB) National Electricity Transmission System (NETS) and were made an offer for connection at the proposed Leiston 400kV substation (now known as Kiln Lane Substation).

3.4.2 The connection point assessment undertaken by NGESO appraised a variety of options and identified the preferred onshore connection points. The process considered technical, commercial, regulatory, environmental, planning and deliverability aspects to identify the preferable connection for the consumer. The connection point assessment undertaken by NGESO considered the proposed location of the LionLink Proposed Onshore Scheme alongside the proposed location of the Nautilus project, a proposed interconnector allowing electricity to flow between the UK and Belgium. The assessment recommending that both schemes enter into a connection agreement to coordinate with other developers. After an initial assessment, shortlisted substation sites across the southeast coast of England included:

a. Grain 400kV Substation;
b. Norwich Main 400kV Substation;
c. Rayleigh Main 400kV Substation;
d. Sizewell 400kV Substation; and
e. Kiln Lane 400kV Substation (formerly known as ‘a substation in the Leiston area’).

[1] Note that in 2024 NGESO was made a public body under the Energy Act (2023), referred to as the National Electricity System Operator (NESO).

3.4.3 High level assessments of the shortlisted substation sites shown in **Figure 3.1 Appraisal of Longlist Options** considered developer and transmission capital costs and technical and environmental constraints. The assessment of connection options included input from the Applicant but was determined by NGESO.

3.4.4 Overall, a connection at Sizewell performed better than the remaining options; however, due to spatial constraints, this option was discounted by NGESO as the Proposed Scheme would not be able to connect to these substations within the nuclear security perimeter zone.

3.4.5 The assessment concluded a connection in the Leiston area was considered to offer similar economic benefits to the now discounted Sizewell location, and therefore this location (i.e. the Kiln Lane Substation Site as shown on **Figure 3.1 Appraisal of Longlist Options**) forms the basis of the connection for the Proposed Scheme.

3.4.6 It should be noted that the Kiln Lane Substation has formerly been reported as 'Friston Substation' in the EIA Scoping Report (Ref 3).

3.4.7 Further information on the network connection point process can be found in the **OSRR Section 2** that has been published as part of the Statutory Consultation.

3.4.8 At the time of the assessment, there were several nationally significant electricity generation and transmission developments proposing to connect to the Sizewell and Leiston area, namely:

a. Sizewell C;
a. East Anglia One North;
b. East Anglia Two;
c. Sea Link;
d. Nautilus; and
e. The Proposed Scheme.

3.4.9 The appraisal of options for the Proposed Scheme included consideration of co-location and coordination with Nautilus at the time of the appraisal. However in February 2025 the Nautilus project rescinded its connection agreement in Suffolk which removes the potential for coordination with the Proposed Scheme. This has not changed the outcome of the appraisal of reasonable alternatives.

3.4.10 The Sea Link project has since become a key focus for the Applicant in its attempt to coordinate with other developers. The Sea Link project, which is a 'bootstrap' transmission project between Suffolk and Kent, which seeks to reinforce the GB electricity transmission system. Consideration of co-location with Sea Link has been included within the appraisal of reasonable alternatives and the ongoing review of design development of the Proposed Scheme.

Connection point with TenneT

3.4.11 In parallel to securing a GB onshore connection agreement, the Applicant opened discussions with TenneT (the Dutch Electricity System Operator) to identify a

suitable offshore wind farm to connect to in Dutch waters. Discussions identified the Ijmuiden Ver or Nederwiek Wind Farm Zones, along the UK/Netherlands Exclusive Economic Zone (EEZ) boundary, as suitable locations for offshore connection, given the proposed construction timelines for all projects.

3.5 Appraisal of short list

3.5.1 This section describes the short list options within each design component of the Proposed Scheme namely:

a. Proposed Converter Station;
b. Proposed Underground Cable Corridor;
c. Proposed Landfall Site; and
d. Proposed Offshore HVDC Cable Corridor.

Approach to options identification and selection

3.5.2 The options appraisal process provides a clear and consistent method and evidence base to enable the Applicant to select design option(s) taking account of the following factors:

a. environmental and socio-economic factors;
b. technical considerations;
c. planning policy;
d. land use/classifications;
e. stakeholder engagement;
f. non-statutory consultation feedback;
g. strategic fit; and
h. cost.

3.5.3 The process has been applied where there is more than one potential design option to be appraised. This includes the appraisal of strategic siting and routeing options, as well as consideration of localised alternatives responding to survey data and stakeholder engagement, design development and construction processes. The objective is to identify a preferred option(s) for the Proposed Scheme.

3.5.4 The iterative design of the Proposed Scheme has been the subject of periodic design reviews and validation exercises to ensure the decisions made through the options appraisal process remain valid as the design matures and further information becomes available through surveys and stakeholder feedback.

Converter Station Site options

Initial short-list of Converter Station sites

3.5.5 Four Converter Station site areas were short listed and taken forward to non-statutory consultation, these are presented on **Figure 3.2 Appraisal of Shortlist Options** with a summary of the assessment outcomes provided below:

a. Site 1 identified good potential for co-location with other projects, including Sea Link and Nautilus. Existing infrastructure near to site, including 400kV overhead lines, as well as the proximity to Kiln Lane Substation were identified as benefits to Site 3. Several residential receptors are in proximity to the site, as well as Site 1 located on the border of the Suffolk & Essex Coast & Heaths National Landscape;
b. Site 3 benefited from being in proximity to the Kiln Lane Substation and existing infrastructure factors, as well as an opportunity for colocation alongside Sea Link and Nautilus, an opportunity that was favoured in the 2023 non-statutory consultation feedback to minimise the cumulative impacts of major infrastructure projects in the area. Site 3 would also be viewed as an extension to the existing settlement of Saxmundham due to its location within the landscape;
c. Site 4 was similar to Site 3 in that it is close to the existing 400kV overhead lines and outside the National Landscape boundary, and scored positively for geotechnics and topography; and
d. Site 5 was identified as a site which offered distance from the National Landscape designation and where mature woodland blocks offered potential for screening and backgrounding, however topography and geotechnics are a challenge within this option.

3.5.6 Following a review of the non-statutory consultation feedback in 2022 and 2023, a series of option refinement workshops were undertaken. The workshops considered this feedback alongside previous desk-based assessments by the disciplines within the project team comprising: onshore technical (including cost); onshore environmental, consents/planning; land; stakeholder/engagement; and legal. Further detail on the non-statutory consultation feedback process within the **OSRR (Section 5.5 - 5.7)** that has been published as part of the Statutory Consultation.

3.5.7 Site 1 is further south than the other three Converter Station sites and provided a connection to a Landfall at Aldeburgh (Site E). A Landfall at Aldeburgh (Site E) was discounted due to the constraints associated with the offshore Cable Corridor. As a result, Site 1 was discounted due to increased distance and constraints that would need to be crossed to reach this site from other Landfall options.

3.5.8 The three remaining Converter Station sites were all evaluated similarly during the appraisal process, with key differentiators being landscape impacts, access, and the length of the proposed Underground HVAC Cable Corridor to the Kiln Lane Substation.

3.5.9 To progress further refinement, a landscape assessment, based on a site visit to the remaining three sites was undertaken to provide additional information to support the identification of a preferred site.

3.5.10 A workshop was subsequently held to identify a preferred Converter Station site and Underground HVAC Cable Corridor to the Kiln Lane Substation. The workshop identified Site 3 as the best performing, benefiting from some existing screening from existing woodland and field boundaries.

3.5.11 In considering both the landscape and technical impacts, a preference was also identified for Site 3 due to the fact that this site provided an opportunity for co-location with Sea Link.

3.5.12 Site 5 was viewed as the worst performing due to the setting of the historic village of Knodishall and potential heritage and archaeology impacts, as well as challenges in the topography of the site and groundwater vulnerability.

3.5.13 Site 4 has substantial planting which would provide screening, but the site location results in the greatest impact for views from within and to the Suffolk & Essex Coast & Heaths National Landscape. From a technical perspective, the location of Site 4, north of Kiln Lane Substation, would mean that the HVAC Cable Corridor would be longer in comparison and would have more crossings than the other sites, including the existing mainline railway and public highways. Crossing of other infrastructure by HVAC cables require a larger construction area than HVDC cables due to the increased number of cables and subsequently discounted.

3.5.14 Preferred Converter Station location Following the identification of Converter Station Site 3 as the preferred converter station site, further work has been undertaken to determine the positioning of the Converter Station within the extents of Site 3. As outlined in **Chapter 2 Description of the Proposed Scheme**, the permanent footprint of the Converter Station for the Proposed Scheme will be approximately 8ha.

3.5.15 An options appraisal was undertaken that considered the factors outlined in the options appraisal process, as noted in **Paragraph 3.5.2** of this Chapter.

3.5.16 Due to the size and scale of the permanent above ground structures of the proposed Converter Station (see **Chapter 2 Description of the Proposed Scheme** for further information), the landscape appraisal has been central to the appraisal.

3.5.17 Four options were identified (see **Figure 3.3 Converter Station Location within Site 3)** and have been appraised independently of each other, with and without the opportunity to co-locate with the Sea Link Converter Station, as set out in detail in the **OSRR (Section 6)** that has been published as part of the Statutory Consultation.

3.5.18 Option 1, located within the southern extent of Converter Station Site 3 was originally considered and presented benefits due to its lower elevation, increased distance from existing settlements and its location adjacent to existing woodland screening. Option 1 would also present the greatest opportunity for mitigation in the form of earthworks and planting that could further integrate the Converter Station into the existing landscape. However, in coordination with Sea Link, this option was no longer viable due to the incompatibility of both projects to site a Converter Station in this location. At the time of the appraisal, Sea Link had identified Option 1 as their preferred Converter Station site and on that basis Option 1 was discounted in the interest of a collaborative and coordinated approach. The Applicant was comfortable that the other options within Site 3 remained viable for siting the Converter Station.

3.5.19 With Option 1 identified and progressed as the preferred siting option for the Sea Link Converter Station, Option 2 was selected as the preferred option for the Proposed Scheme. Whilst it would extend the development further into the rural landscape to the east and north in comparison to Options 3 and 4, it would minimise noise and visual effects on residential receptors during both construction and operation and provides effective coordination with Sea Link from a technical and masterplanning perspective.

3.5.20 Option 3 presented the greatest landscape impact and most difficult to mitigate due to the elevation and the proximity to the B1119. Option 3 presents the most technically challenging location during construction and cabling due to the physical constraints of the site with the extent of the proposed Converter Station area tight against field boundaries. It is for these reasons that Option 3 was discounted.

3.5.21 Option 4 was identified as likely to have noise impacts on residential receptors during construction and operation in an area with a baseline of low background noise levels. Option 4 had the potential for visual screening through the presence of mature trees on the western boundary and would benefit from the lower topography from a landscape perspective. However, this location would have significant residual visual effects on views from residential properties due to the proximity of this option. On balance, due to technical and environmental constraints, Option 4 was discounted.

3.5.22 The outcome of the appraisal was that Option 2 is the preferred location for the Converter Station.

Proposed Underground Cable Corridor

Appraisal of HVDC and HVAC Onshore Cable Corridors

3.5.23 Further siting and routeing work was undertaken on the Underground HVAC Cable Corridors as part of the short list appraisal considering the identification of Kiln Lane Substation as the grid connection point determined by NGESO (**see Paragraph 3.4.3**) and Converter Station Site 3 as the preferred Converter Station site.

3.5.24 Further siting and routeing work as part of the short list appraisal was also undertaken on the proposed Underground HVDC Cable Corridor considering the emerging preferences of the Landfall Sites at Southwold (Landfall F) and Walberswick (Landfall G2). The outcomes of the HVDC appraisal for the sections of cable to Southwold and Walberswick were used to feed into the landfall preferred options identification appraisal (see **Paragraph 3.5.41**).

3.5.25 The consideration of the proposed Underground Cable Corridor included the development of a 'heat map' of constraints and avoidance criteria within the EIA Scoping boundary (Ref 3). This included:

a. Known technical and environmental constraints;

b. The identified constraints were overlaid to produce a combined picture of known constraints – effectively a "heat map" showing areas of minimum to maximum constraint effects;
c. Environmental and technical avoidance criteria were compiled and represented spatially; and
d. Initial Cable Corridor options were defined based on the "heat map" and avoidance criteria. These options were taken forward for consideration through the options appraisal process.

3.5.26 The EIA Scoping boundary was divided into sections and sub-sections to enable the appraisal of HVDC and HVAC Cable Corridors. Following the consideration of constraints, 400m wide Cable Corridors were identified within each section of the route. These 400m wide corridors were then appraised independently of other options against the factors set out in the appraisal process (see **Paragraph 3.5.2** for further information).

3.5.27 The appraisal considered multiple Cable Corridors within the HVAC Cable Corridor (Section A) and in each sub-section of the HVDC Cable Corridor (Sections B to F) (see **Figure 3.4 Proposed Onshore Scheme Emerging Preferences**). The completion of these appraisals enabled the selection of the preferred 400m corridor option(s) within each sub-section of the route to both Landfall options, at Southwold (Landfall F) and Walberswick (Landfall G2). Where necessary, more than one route option was taken forward for further consideration and design refinement. **Table 3.1** below outlines the outcomes and key drivers for the preferred HVDC and HVAC onshore cable corridor appraisal (see the **OSRR Section 5** that has been published as part of the Statutory Consultation for further detail).

Table 3.1 Appraisal outcome of Proposed HVDC and HVAC onshore Cable Corridors

Section of Onshore Cable Corridor	Preferred 400m corridor	Key decision making
Proposed Underground HVAC Cable Corridor		
Section A1	Option 1 and Option 2	Options 1 and 2 taken forward for further review. Option 2 presented the shortest cable length, would avoid veteran trees and mature hedgerows through trenchless construction technique and would have the shortest construction programme. Option 2 would also enable coordination with Sea Link. Option 1 would avoid the presence of Grade II listed buildings that are within the 400m corridor for both Option 2 and 3. Option 1 would also

Section of Onshore Cable Corridor	Preferred 400m corridor	Key decision making
		provide an alternative siting option, in addition to Option 2, for the Proposed Scheme to be constructed as a standalone project.
Proposed Underground HVDC Cable Corridor		
Section B1	Option 1	A single option (Option 1) was identified for review within Section B1 following consideration of key technical and environmental constraints. The review validated the 400m corridor proposed from all factors and identified that no further alternative was identified. Key constraints identified for further review in design development included a major road crossing (B1119) and mature hedgerows and areas of woodland.
Section B2	Option 2	Option 2 was identified as the preferred option due to reduced impact on vegetation, hedgerows, and mature trees in comparison to Option 1. Option 2 was also identified as the preferred technical option and cost due to the shorter cable length in comparison to Option 1. Option 1 would have fewer trenchless crossings, would avoid possible sources of contamination that have been highlighted within Option 2 due to the presence of a former World War 2 airfield site. On balance, Option 2 was preferred from environment, technical and cost factors.
Section B3	Option 1	A single option (Option 1) was identified for review within Section B3 following consideration of key technical and environmental constraints. The review validated the 400m corridor proposed

Section of Onshore Cable Corridor	Preferred 400m corridor	Key decision making
		from all factors and identified that no further alternative was identified. Key constraints identified for further review in design development included two road crossings, four watercourses, a parcel of special category land and within vicinity of a former World War 2 airfield site.
Section B4	Option 1	Option 1 was identified as the preferred option as it offers the greatest distance from residential properties, listed buildings, and known archaeology. This option extended beyond the EIA Scoping Boundary to minimise impacts on known constraints. Option 1 also presented a lesser impact on floodplain habitats in comparison to Option 2 and 3, as well as a reduced number of crossings of roads, watercourses and field boundaries in comparison to Options 2 and 3. On balance, Option 1 was preferred from environment and technical factors.
Section C1	Option 1	A single option (Option 1) was identified for review within Section C1 following consideration of key technical and environmental constraints. The review validated the 400m corridor proposed from all factors and identified that no further alternative was identified. Key constraints identified for further review in design development included the crossing of the Minsmere River, a single road crossing, impact on field boundaries and important riverine habitats, including Minsmere Valley CWS and Darsham Marshes CWS and a

Section of Onshore Cable Corridor	Preferred 400m corridor	Key decision making
		range of associated floodplain priority habitats.
Section C2	Option 3	Following a review of two initial options (Options 1 & 2), the appraisal highlighted the opportunity to take forward a third alternative as the preferred option. This option (Option 3) followed the same alignment as Option 1 with the exception of a slight variant at the northern extent of Section C2. As per Option 1, Option 3 was taken forward as the preferred option due to its distance from the National Landscape designations, contains larger scale field boundary patters, has a reduced risk from contaminated land avoiding historic landfalls and avoids the Minsmere SSSI groundwater dependent terrestrial ecosystem. Although comparable to Option 1, Option 3 would reduce the proximity to sections of ancient woodland, would require shorter sections of trenchless crossings and would require fewer crossings of field boundaries. Option 2 would require increased number of road crossings and construction in close proximity to the Minsmere-Walberswick internationally and nationally important statutory designations. On balance, Option 3 was preferred from environment and technical factors.
Section C3	Option 1 and Option 2	This section included two options, both followed a similar alignment before splitting off in two directions to the two landfalls, Southwold and Walberswick. The review validated the 400m corridor proposed from all factors and identified

Section of Onshore Cable Corridor	Preferred 400m corridor	Key decision making
		that no further alternative was identified. Key constraints identified for further review in design development included sensitive field boundary patters associated with the National Landscape designation, the presence of historic landfill sites, known archaeology and the presence of a veteran tree. Both options were taken forward and were dependent on the selection of the preferred landfall.
Section D1	Option 1	A single option (Option 1) was identified for review within Section D1 following consideration of key technical and environmental constraints. The review validated the 400m corridor proposed from all factors and identified that no further alternative was identified. Key constraints identified for further review in design development included the location within the National Landscape designation, the crossing of the Minsmere-Walberswick internationally and nationally important statutory designations, the presence of residential properties at the eastern extent and the presence of archaeology.
Section E1	Option 1	Option 1 was identified as the preferred option as it minimises impacts on Blythburgh and the historic landscape of Henham Hall. Option 1 also has a reduced impact from ecological receptors with Option 2 having an increased likelihood of disturbance on County Wildlife Sites of supporting value to Minsmere-Walberswick SPA. Option 2 however is shorter in length

Section of Onshore Cable Corridor	Preferred 400m corridor	Key decision making
		and would require fewer trenchless crossings and would intersect with Wenhaston's neighbourhood plan area. On balance the environmental benefits of Option 1, namely the ecological and landscape impacts, were the key drivers for the preferred option.
Section E2	Option 3	Option 3 was identified as the preferred option as it provided the shortest, most direct route, most technically feasible, a more accessible route during construction, preferred topography and was the most cost-effective option. Option 1 was preferred from environment and planning due to a reduced presence within the Suffolk & Essex Coast & Heaths National Landscape and the reduced risk of archaeology and distance from designated heritage assets, however due to the increased construction complexity associated with the topography, lengthy and complex trenchless crossings and access issues, Option 3 was taken forward as the preferred option.
Section F1	Option 1	Option 1 was identified as the preferred option. From an environmental perspective due to the reduced scale of setting impact on heritage assets during construction. Option 1 is also preferred from a landscape and visual perspective as this is slightly less visible from the settlement of Wangford and is more peripheral to the National Landscape with woodland to the north which could assist in screening and integrating the Scheme. Option 1 is also preferred from

Section of Onshore Cable Corridor	Preferred 400m corridor	Key decision making
		technical due to the shorter route, shorter programme and reduced length of trenchless crossings in comparison to Option 2.
Section F2		A single option (Option 1) was identified for review within Section F2 following consideration of key technical and environmental constraints. The review validated the 400m corridor proposed from all factors and identified that no further alternative was identified. Key constraints identified for further review in design development included medium/high flood risks in the area, with steeper gradients as the route approaches landfall. The cable corridor also presents likely environmental impacts due to the presence of internationally and nationally important statutory designations, proximity to listed buildings, risk of archaeology and location within Suffolk & Essex Coast & Heaths National Landscape and partly within the Suffolk Heritage Coast.

HVDC corridor preferred options identification

3.5.28 The Underground HVDC Cable Corridors and Offshore HVDC Cable Corridors were considered in conjunction with the Kiln Lane Substation, Converter Station and Landfall Sites given the link between the Proposed Scheme components. As a result, the Underground HVDC Cable Corridor was integral to the appraisal of the short-listed Landfall Sites and the preferred options identification. The appraisal of the preferred Underground HVDC Cable Corridor to a single Landfall is covered from **Paragraph 3.5.41** below.

3.5.29 Taking into account the findings of the appraisal of the short listed Underground HVDC Cable Corridors and the emerging preferences for the proposed Landfall Sites, the proposed Underground HVDC Cable Corridor to Landfall at Walberswick (Site G2) was selected as the preferred option. This shorter Onshore Underground HVDC Cable Corridor would require fewer trenchless crossings, presents no discernible flood risk and would not require main river crossings than the Southwold

option. The topography associated with the Walberswick Underground HVDC Cable Corridor is generally flat with no gradients presenting a reduced risk to the construction programme. This option would have a reduction in the loss of habitats in comparison to Southwold due to its shorter length and the fact it is located largely in agricultural land. The Walberswick Underground HVDC Cable Corridor would need to cross the Minsmere-Walberswick designated site via a trenchless crossing and would (in the same way as Southwold) require construction within the Suffolk & Essex Coast & Heaths National Landscape and Suffolk Heritage Coast. The Minsmere-Walberswick designated site referred to collectively within this chapter comprise Minsmere to Walberswick Heaths & Marshes Special Area of Conservation (SAC), Minsmere-Walberswick Special Protection Area (SPA), Minsmere-Walberswick Ramsar site and Minsmere to Walberswick Heaths and Marshes Site of Special Scientific Interest (SSSI). The Walberswick option would have a reduced impact on sensitive landcover patterns as the Underground HVDC Cable Corridor is shorter and overall there would be less impacts on the National Landscape (on the basis that it crosses a small section within this area), and less impact on visual receptors. Further appraisal details of the Underground HVDC Cable Corridors to the Landfall Walberswick (Site G2) and the Landfall at Southwold (Site F) are covered within the preferred options identification for the landfall (see **Paragraph 3.5.41)**.

Landfall Site

Appraisal of short list to emerging preferences

3.5.30 Following the environmental and technical considerations, alongside consideration of coordination with other major infrastructure projects, a short list of four Landfall Sites was taken forward for further appraisal. These are presented on **Figure 3.2 Appraisal of Shortlist Options** and include: Southwold (Site F), Walberswick (Site G), Dunwich (Site H), and Aldeburgh (Site E)[2].

3.5.31 The four Landfall Sites taken forward to Stage 3 were subject to consultation during the Non-Statutory Consultation undertaken at the end of 2022.

3.5.32 Landfall Sites were considered in conjunction with onshore Cable Corridors and offshore Cable Corridors, given the link between the Proposed Scheme components.

3.5.33 The Landfall at Dunwich (Site H) was identified as the least preferred Landfall and subsequently discounted. This was due to the likely adverse impacts on offshore heritage (submerged medieval settlement) and technical constraints associated with construction via HDD due to the high offset of the cliff. Non-statutory stakeholder feedback identified that a nearshore/coastal Cable Corridor option

[2] Please refer to **OSRR Section 5.6, Table 5-1** (published as part of the Statutory Consultation) which documents the changes to naming conventions for the Landfall options

could not be designed that would avoid the heritage asset and it would be challenging to identify suitable mitigation to reduce significant impacts on the heritage asset.

3.5.34 The Landfall at Aldeburgh (Site E) was the only Landfall which could offer the potential for co-location with the Sea Link project, as well as Nautilus. Following an evaluation of the Landfall at Aldeburgh (Site E), this was subsequently discounted as both the offshore technical and environmental disciplines identified significant risks associated with the nearshore approach given the cables routing from the north/northeast, as well as identified as the longest offshore route assessed. Due to the direction of the Offshore HVDC Cable Corridor approaching the Landfall at Aldeburgh (Site E) from the north/northeast, a substantially increased number of offshore infrastructure crossings would be required in comparison to the other Landfall site options, all of which would have been within designated European sites (Outer Thames Estuary Special Protection Area (SPA) and Southern North Sea Special Area of Conservation (SAC)). To approach the Landfall at Aldeburgh (Site E) from the Dutch offshore wind farms the Offshore HVDC Cable Corridor option would need to route either:

a. between the East Anglia ONE North and East Anglia TWO offshore wind farm export Cable Corridor and the western flank of the Aldeburgh Napes sandbank (protected Annex I sandbank); or
b. to the east and around the southern tail of the Aldeburgh Napes sandbank.

3.5.35 A review on the feasibility of the Landfall at Aldeburgh (Site E) was undertaken, alongside feedback from Natural England, considered that routeing across the sandbank should be avoided. To avoid the sandbank, both options would require infrastructure crossings, resulting in permanent habitat loss, within the above-noted SAC and SPA. Concerns were also raised by several non-statutory consultation responses regarding the potential impacts on the Coralline Crag formation, and on fisheries bottom drift netting grounds. As it could be demonstrated that there were feasible alternatives with lower environmental impacts on designated European sites the Aldeburgh Landfall and associated nearshore/coastal Cable Corridor option was discounted.

3.5.36 It should be noted that as Sea Link is proposing to route to the Landfall at Aldeburgh (Site E) from the southeast it does not face the same technical and environmental constraints.

3.5.37 The Landfall at Walberswick (Site G) provided a shorter onshore Underground HVDC Cable Corridor, however the Underground HVDC Cable Corridor crosses the Minsmere-Walberswick designated site. The Minsmere-Walberswick designated sites referred to collectively within this chapter comprise Minsmere to Walberswick Heaths & Marshes Special Area of Conservation (SAC), Minsmere-Walberswick Special Protection Area (SPA), Minsmere-Walberswick Ramsar site and Minsmere to Walberswick Heaths and Marshes Site of Special Scientific Interest (SSSI). Mitigation identified comprised a trenchless crossing through the designation, which in the first instance would need to be subject to technical feasibility and further

consideration the associated impacts that would result on the European designations during construction. Walberswick (Site G) also included a number of technical challenges regarding access to the proposed Landfall site. The key considerations included the likely temporary loss of the beach car park and the use of beach huts during construction, the impact of construction traffic on Walberswick, access across the bridge crossing the Dunwich River, and the potential impacts on designated sites. Following a review of this short list option, an alternative Landfall Site, Walberswick G2, was identified at this stage to reduce access constraints and traffic impact when compared to the original option. The alternative site also reduced the number/extent of interactions with the ecological designated sites, however, would be located closer to residential properties (see the **OSRR Section 5** that has been published as part of the Statutory Consultation for further detail).

3.5.38 The Landfall at Southwold (Site F) would require the longest Underground HVDC Cable Corridor of the all the options considered, but the shortest Offshore HVDC Cable Corridor. As with Walberswick, the Underground HVDC Cable Corridor also crosses through the designated Minsmere-Walberswick SAC, SPA, Ramsar, SSSI, consequently an alternative cable corridor avoiding these designations, routeing to the north of Southwold was identified and taken forward for further assessment. The Offshore HVDC Cable Corridor had the same constraints and opportunities as with Walberswick.

3.5.39 Following the further assessment of the short listed options within the selected options phase, a second 'supplementary' non-statutory consultation was held at the end of 2023, which allowed stakeholders to feedback on the 'additional' options of the Walberswick (G2) Landfall Site and the alternative northern Underground HVDC Cable Corridor from Southwold.

3.5.40 Taking into account the findings of the technical and environmental assessments of the short-listed Landfalls and feedback reviewed from the 'supplementary' non-statutory consultation, Southwold (Site F) and Walberswick (Site G2) were identified as emerging preferences for the Landfall site.

Landfall preferred options identification

3.5.41 Both Landfalls, Southwold (Site F) and Walberswick (Site G2), were subject to further technical and environmental work, including ecological and archaeological geophysical surveys, engagement with key stakeholders such as Natural England and consideration of construction methodologies and impacts to inform the final selection of the Landfall.

3.5.42 An options appraisal of the two Landfall emerging preferred options, Southwold (Site F) and Walberswick (Site G2), has been undertaken to identify a preferred option for the Landfall Site alongside the associated Offshore HVDC Cable Corridor and the Underground HVDC Cable Corridor. The following components of the Proposed Scheme were considered in the appraisal:

a. Landfall Site and associated Offshore HVDC Cable Corridor; and
b. Underground HVDC Cable Corridor associated with each Landfall Site.

3.5.43 The appraisal excluded the sections of Onshore and Offshore HVDC Cable Corridors that were common to both options. The appraisal summary below reports Section D for the Walberswick Underground HVDC Cable Corridor and Sections E & F for the Southwold Underground HVDC Cable Corridor (see **Figure 3.4 Proposed Onshore Scheme Emerging Preferences)**. The parameters of the Landfall appraisal considered the outcome of the appraisal undertaken on HVDC route corridors where there had been optionality in the routeing (see **Table 3.1 Appraisal outcome of Proposed HVDC and HVAC onshore Cable** Corridors).

3.5.44 The appraisal was undertaken in accordance with the options appraisal process and considered the factors outlined in **Paragraph 3.5.2** (see the **OSRR Section 5** that has been published as part of the Statutory Consultation for further detail).

Onshore Technical

3.5.45 From an onshore technical perspective, the Landfall at Walberswick (Site G2) and the Walberswick Underground HVDC Cable Corridor was identified as the preferred option.

3.5.46 The Landfall at this location is sited outside the Environment Agency mapped flood zones and has a raised elevation from coastal erosion reducing the technical complexity during construction. The Walberswick Underground HVDC Cable Corridor was shorter, of a generally flat topography, would require fewer trenchless crossings, presents no discernible flood risk or watercourse crossings than the Southwold Underground HVDC Cable Corridor resulting in reduced risk to the construction programme and phasing of construction works.

3.5.47 In addition, the Landfall at Southwold (Site F) would require additional earthworks due to low lying topography, and more challenging ground conditions due to shallow groundwater levels and is located at the end of the seawall where erosion rates are high. Further technical complexities also weighed against Southwold .including the need for a raised platform to mitigate flood risk, and associated health and safety risks of this during construction. The Landfall at Southwold (Site F) has an increased risk of encountering Unexploded Ordnances (UXOs) as it includes an area that was historically used as a rifle range during WWI and WWII.

3.5.48 The Southwold Underground HVDC Cable Corridor would require an increased number of trenchless crossings, including a number of longer and more challenging crossings (e.g. river crossings and associated flood zones). The Southwold Underground HVDC Cable Corridor also has challenging topography with steep gradients. The Walberswick Underground HVDC Cable Corridor as a result has a reduced level of technical complexity, reduced programme risk and would require fewer launch and reception pits compared to the Southwold Underground HVDC Cable Corridor.

Offshore Technical

3.5.49 From an offshore technical perspective, the Offshore HVDC Cable Corridor to Southwold was identified as the preferred option. The Offshore HVDC Cable Corridor to Landfall at Walberswick (Site G2) is approximately 3km longer in length than the Southwold Landfall Site and would require a longer section of HDD offshore with a marginal increase in programme risk.

Onshore Environment

3.5.50 From an onshore environmental perspective, the Landfall at Walberswick (Site G2) and the Walberswick Underground HVDC Cable Corridor was identified as the preferred option.

3.5.51 Land use within the Landfall at Walberswick is predominantly intensive arable farmland, not designated as Best and Most Versatile agricultural land, which can be reinstated following construction. The Landfall at Walberswick (Site G2) is located further from any geologically designated sites and there is a lower potential for land contamination based on historical site use information. The vicinity of the Landfall at Walberswick (Site G2) has substantial archaeological features indicative of historic settlement and agricultural land use, with the centre of activity understood to be to the south of the Landfall Site. Historic England and Suffolk County Council have indicated that the site could be nationally significant.

3.5.52 The Walberswick Underground HVDC Onshore Cable Corridor, as well as the Landfall to Offshore section, would need to cross the designated Minsmere-Walberswick SAC, SPA, Ramsar, SSSI via a trenchless crossing. Likely construction parameters and potential mitigation measures were considered to further appraise the potential to cause habitat loss or damage, or disturbance of bird features, that would result in adverse effects upon the integrity of the designated Minsmere-Walberswick SAC, SPA, Ramsar, SSSI.

3.5.53 This concluded that adverse effects on the integrity of the designated Minsmere-Walberswick SAC, SPA, Ramsar, SSSI would be avoided through measures implemented into the design (e.g. trenchless crossings) and specific control measures (monitoring of equipment and spill kits). All works within the designated Minsmere-Walberswick SAC, SPA, Ramsar, SSSI would be entirely below ground, as the cable installation within this area would be undertaken using trenchless installation techniques. There is some potential that the habitat may be impacted in the unlikely event of a frac-out (drilling fluid making its way to the surface of the site through natural fissures), however the scale of any impact would be temporary and negligible. Overall, the Walberswick Underground HVDC Onshore Cable Corridor is shorter than the Southwold Underground HVDC Cable Corridor and therefore the loss of habitat would be reduced. The Walberswick Underground HVDC Cable Corridor avoids the need for works within the flood zone and would not require main river crossings, however the corridor would cross a groundwater dependent SSSI.

3.5.54 Both the Walberswick and Southwold Underground HVDC Cable Corridor options are located within very high valued landscapes, with any changes to those

landscapes likely to result in significant impacts within the Suffolk & Essex Coast & Heaths National Landscape and Suffolk Heritage Coast. Temporary construction impacts for both options relate to the National Landscape as a result of the change of land cover from predominantly agricultural land to an active construction site. The Walberswick option is shorter, does not require any main river crossings, avoids works within the flood zone and would have a reduced impact in terms of habitat loss, impacts on sensitive landcover patterns and overall, there would be less impacts on the National Landscape and would impact fewer visual receptors. Walberswick option would however cross a groundwater dependent SSSI.

3.5.55 The Landfall at Southwold (Site F) includes part of a County Wildlife Site, which are more valuable and include priority habitats . These habitats support a range of protected/notable species. The loss of the priority habitats would increase biodiversity net gain (BNG) requirements. The Landfall at Southwold (Site F) and borders a geologically designated Site of Special Scientific Interest (SSSI) and includes an area that was used as a rifle range during WWI and WWII. There is therefore the potential to encounter small arms UXO, together with associated contamination of the soil. The Landfall at Southwold (Site F) has also been subject to geophysical survey and contains high likelihood of archaeological remains of potential national importance, such as the remains of Medieval ships, however similar to Walberswick, this is likely to be to the south of the site.

3.5.56 Construction of both Landfall at Walberswick (Site G2) and Southwold (Site F) would likely impact the amenity of residential properties. Construction of the Landfall at Southwold (Site F) would potentially cause disturbance to Southwold Pier car park, Southwold pier, and tourism receptors including restaurants/cafes/shops along Northern Parade.

3.5.57 The Southwold Underground HVDC Cable Corridor is longer in length, encapsulates several blocks of high distinctiveness woodland priority habitats and six potential veteran trees, as well as crosses up to five river corridors resulting in disturbance impacts during construction.

Offshore Environment

3.5.58 From an offshore environment perspective, the Proposed Offshore HVDC Cable Corridor to Southwold was identified as the preferred option. The Proposed Offshore HVDC Cable Corridor associated with both the Landfall at Walberswick (Site G2) and Southwold (Site F) has the potential for a likely significant effect on the red-throated diver feature of the Outer Thames Estuary SPA due to disturbance from vessels during the sensitive feature (winter). This would also be the case with the discounted Landfall at Aldeburgh (Landfall E) and the discounted Landfall at Dunwich (Landfall H). The greater the length of the Proposed Offshore HVDC Cable Corridor within the Outer Thames Estuary SPA the greater the potential for physical disturbance to the red-throated diver feature during construction. As the Walberswick Offshore HVDC Cable Corridor is longer in length than the Southwold Offshore HVDC Cable Corridor there is a marginally greater potential for physical

disturbance to the SPA during construction associated with the Walberswick Landfall relative to the Landfall at Southwold (Site F). Mitigation such as defining transit routes through the SPA and seasonal restrictions on high-risk construction activities could be implemented to ensure that the Proposed Offshore Scheme would not have an adverse effect on the SPA. Therefore, whilst the distinction is important to note between the Landfalls, on the balance with other constraints it was not a deciding factor. The Proposed Offshore HVDC Cable Corridor common to both options passes through the Southern North Sea Special Area of Conservation (SAC) designated for Harbour porpoise.

Lands

3.5.59 From a land perspective, the Landfall at Walberswick (Site G2) and the Walberswick Underground HVDC Cable Corridor was identified as the preferred option. The Landfall at Walberswick (Site G2) has a smaller number of landowners and titles in comparison to Southwold landfall site; however, it is closer to residential properties and an area of open space, which may be impacted. The Walberswick Underground HVDC Cable Corridor does not interact with Crown land, is shorter in length and would impact fewer landowners and land titles.

Planning Policy

3.5.60 From a planning perspective, the Landfall at Walberswick (Site G2) and the Walberswick Underground HVDC Cable Corridor was identified as the preferred option. It is considered that the Walberswick option is better as it is shorter in length with reduced environmental impact and the Landfall Site is not within an area at risk of flooding, not within a mineral consultation area and not within an area covered by a Shoreline management Plan, as is the case at Southwold.

Stakeholder Engagement

3.5.61 From a stakeholder engagement perspective, early engagement with Natural England identified concerns on breeding and wintering birds associated with the Minsmere-Walberswick internationally and nationally important statutory designations, risk of significant effects on the Outer Thames Estuary SPA and the crossing of a groundwater dependent SSSI. Further studies and engagement concluded:

a. There is no risk of permanent habitat loss within the designated Minsmere-Walberswick SAC, SPA, Ramsar, SSSI;
b. Very low risk of HDD frac-out through design mitigation. In the unlikely event of a frac-out occurring this could result in habitat damage/degradation that would not represent an adverse effect upon the integrity of the designated Minsmere-Walberswick SAC, SPA, Ramsar, SSSI. This is due to the small spatial scale and temporary nature of the potential impacts that would arise from the spill of inert clay-based drilling fluid and its immediate clean up. Further work is ongoing to quantify the area of habitat that would be impacted by a frac out occurrence, alongside engagement with Natural England; and

c. Negligible risk of noise or visual disturbance impacts from construction upon qualifying bird species that could result in a significant adverse effect upon the designated Minsmere-Walberswick SAC, SPA, Ramsar, SSSI.

Strategic Fit

3.5.62 From a strategic fit perspective, the Landfall at Walberswick (Site G2) and associated cable corridors was identified as the preferred option. Both the Walberswick option and the Southwold option comply with all core objectives. The Walberswick Underground HVDC Cable Corridor aligns overall better with Secondary Objective 10 'Deliver the most efficient offshore and onshore cable routes'. Both the Walberswick option and Southwold option have a partial compliance with Secondary Objective 12 'To avoid where possible, or otherwise minimise the distance through which the route crosses protected sites'. The Walberswick Underground HVDC Cable Corridor provides the shortest route, but has greater constraints crossing a European Designated site.

Cost

3.5.63 From a cost perspective, the Landfall at Walberswick (Site G2) and associated cable corridors was identified as the preferred option. The Landfall at Walberswick (Site G2), Proposed Offshore HVDC Cable Corridor and Underground HVDC Cable Corridor is estimated to cost substantially less than the Southwold option. This is due to the Walberswick Underground HVDC Cable Corridor being shorter and requiring less trenchless crossings in comparison.

Conclusion

3.5.64 When considered broadly against the objectives for the Proposed Scheme, the Walberswick option was preferred as it has the shortest Underground HVDC Cable Corridor, overall reduced environmental, technical and economic constraints and minimises third-party asset crossings.

3.5.65 The outcome of the appraisal undertaken concluded the Landfall at Walberswick (Site G2) and associated Proposed Offshore HVDC Cable Corridor, and the Walberswick Proposed Underground HVDC Cable Corridor which connects into the Proposed Underground Cable Corridor, are the preferred options to be taken forward to Statutory Consultation, as shown on **Figure 3.4 Proposed Onshore Scheme Emerging Preferences.**

Proposed Offshore HVDC Cable Corridor options

Appraisal of a short list of options to preferred option(s) identification

3.5.66 Offshore HVDC Cable Corridors were developed from the short-listed Landfalls to the UK/NL Connection Points seeking to route through areas identified by the constraints mapping exercise as having the lowest constraints.

3.5.67 Four cross border connection points (A, B, C and D) (**Figure 3.6 Offshore Connection Points and Offshore HVDC Cable Corridor Options**) were initially

identified along the UK/NL EEZ border (based on the position of NL planned offshore wind farm (OFW) sites), where Proposed Offshore HVDC Cable Corridors from the UK would connect and enter NL jurisdiction onwards to the selected OFW. It was agreed by the Applicant and TenneT to discount Connection Point D during an optioneering workshop in October 2022 as the length of the corridor and number of third-party infrastructure crossings in NL waters made this connection point unfavourable. An additional connection point X, was included which would allow connection to the Nederwiek 1 platform (as illustrated in **Figure 3.6 Offshore Connection Points and Offshore HVDC Cable Corridor Options** of this PEIR).

3.5.68 When designing offshore cable corridor options to the UK/NL border crossing point(s) the following over-arching guiding principles were considered.

a. Create the shortest, technically feasible, Offshore HVDC Cable Corridor possible, which would minimise the length of cable needed, reduce the manufacturing and installation costs, and minimise the environmental footprint of the Proposed Scheme;
b. Avoid environmentally sensitive areas, where possible;
c. Avoid areas which would represent restrictions to vessel movement e.g., anchorages, restricted navigation channels;
d. Avoid areas of archaeological importance and wrecks;
e. Avoid existing offshore infrastructure;
f. Minimise the crossing of in-service cables and pipelines. Where it is not possible to avoid a crossing altogether, then to seek to optimise the crossing angle and to ensure that navigational safety or water depth is not adversely affected;
g. Avoid hazardous seabed e.g., mobile sediments or bedrock outcrops and sub crops; and
h. Minimise any impact on third party considerations such as seasonal fishing activities or local tourism.

3.5.69 Four nearshore/coastal routes were developed from the four short-listed Landfalls to a common point offshore just before a crossing of the Ulysses telecommunications cable, an existing submarine communications cable network that crosses the North Sea. From this common point, three Proposed Offshore HVDC Cable Corridor options were developed; A, B and C, with an option within Route C to route either side of the NeuConnect interconnector, a HVDC submarine power cable between the Isle of Grain, England and Wilhelmshaven Germany. These four nearshore/coastal routes and three Proposed Offshore HVDC Cable Corridor options are illustrated in **Figure 3.6 Offshore Connection Points and Offshore HVDC Cable Corridor Options**. The appraisal of the four nearshore/coastal routes to the common point offshore was assessed within the appraisal of the landfall and associated cable corridors within the Landfall preferred options identification within this chapter and within the **OSRR** that has been published as part of the Statutory Consultation.

3.5.70 The key constraints for each option were:

a. Option A – Longest route option evaluated (141km), 20 infrastructure crossings, interaction with two SACs and one SPA (combined total 95km), crossing of a dredge spoil ground, routeing through a deepwater shipping channel;
b. Option B – Second longest option evaluated (122km), 18 infrastructure crossings, interaction with one SAC and one SPA (combined total 114km), crossing of a dredge spoil ground, routeing through a deepwater shipping channel; and
c. Option C – Shortest route option (97km), nine infrastructure crossings, interaction with one SAC and one SPA (combined total 113km), crossing of a dredge spoil ground, routeing through a deepwater shipping channel.

3.5.71 Appraisal of the Proposed Offshore HVDC Cable Corridor options concluded that Offshore HVDC Cable Corridor A was the least preferred of the three options given the additional interaction with a European site, that Offshore HVDC Cable Corridors B and C could avoid, the significantly increased length of the corridor and the significantly high number of third-party crossings, many of which would be within a European site. Offshore HVDC Cable Corridors B and C will result in lower environmental impact on European sites than Offshore HVDC Cable Corridor A, and therefore Offshore HVDC Cable Corridor A was discounted.

3.5.72 Further refinement of the remaining Offshore HVDC Cable Corridor B and C was undertaken. This included the following:

a. Removal of optionality within Offshore HVDC Cable Corridor C. Discussions with East Anglia THREE OWF have allowed a decision to be made regarding the position of Offshore HVDC Cable Corridor C in relation to the OWF boundary and the NeuConnect interconnector, removing the optionality within Offshore HVDC Cable Corridor C; and
b. Include additional ‘spurs’ on both Offshore HVDC Cable Corridor B and Offshore HVDC Cable Corridor C to re-introduce optionality at the UK/NL EEZ boundary. This decision followed a request from TenneT that the UK/NL Connection Point remain flexible (within the bounds of the area identified along the UK/NL EEZ boundary) to support route development in Dutch waters. This led to the introduction of spurs to Offshore HVDC Cable Corridor B and Offshore HVDC Cable Corridor C to allow either route to be used to access the different UK/NL Connection Points.

3.5.73 From an environmental and technical perspective, Offshore HVDC Cable Corridor C to UK/NL connection point C was selected as the initial emerging preference in the UK, subject to TenneT confirming the Dutch platform location for the Proposed Scheme to connect to.

3.5.74 TenneT’s decision to select Nederwiek Gamma for the OWF connection in late 2023 allowed for consideration of an end-to-end solution for the Offshore HVDC Cable Corridor.

3.5.75 Nederwiek Gamma lies to the east of UK/NL connection point A. The shortest route to connection point A is Offshore HVDC Cable Corridor option B, however it crosses a moderate amount of oil and gas infrastructure, which is why it was ranked less preferential in the UK in comparison to Offshore HVDC Cable Corridor C.

3.5.76 Consultation with TenneT identified that an Offshore HVDC Cable Corridor through Dutch waters from connection point C to Nederwiek Gamma OWF is highly constrained. On the Dutch side of the connection point several existing cables would need to be crossed in proximity to a shipping lane. Feedback from the Rijkswaterstaat (NL regulatory authority), who were consulted on the Dutch Cable Corridors only, confirmed that a 1km buffer from the shipping lane should be maintained, making these infrastructure crossings technically challenging. In addition, the offshore HVDC Cable Corridor to Nederwiek Gamma would run parallel to the eastern boundaries of several planned OWFs. The planned OWF export cables, existing pipelines and shipping lane reduces the space available for the Project. It was also considered that the presence of the Project would constrain future wind energy grid connections.

3.5.77 From an end-to-end perspective the options appraisal concluded that Proposed Offshore HVDC Cable Corridor Option B to connection point A was the emerging preference. For a connection to Nederwiek Gamma it offers the shortest total route length (197km in comparison to 215km for Offshore HVDC Cable Corridor Option C) and has two less infrastructure crossings (18 compared to 20 overall).

3.6 Design development

3.6.1 The options set out in **Table 3.2** were taken forward as the preferred options by the Proposed Scheme, this is outlined in **Figure 3.5 Proposed Onshore Scheme Preferred Options**.

Table 3.2 Preferred options taken forward to design development.

Component of the Proposed Scheme	Option taken forward to design development
Kiln Lane Substation	Kiln Lane Substation as determined by NGESO.
Proposed Underground HVAC Cable Corridor	HVAC Cable Corridor to connect the proposed Kiln Lane Substation with the proposed Converter Station at Site 3.
Proposed Converter Station	Converter Station at Site 3 (which is also the preferred option for the Sea Link project and now provides for the colocation of Converter Stations).
Proposed Underground HVDC Cable Corridor	HVDC Cable Corridor to connect the Converter Station at Site 3 to the Landfall at Walberswick (Site G2).

Component of the Proposed Scheme	Option taken forward to design development
Proposed Landfall	Landfall at Walberswick (Site G2).
Proposed Offshore HVDC Cable Corridor	Offshore HVDC Cable Corridor Route B to connection point A.

3.6.2 The following sections describe the design development of the Proposed Scheme and the ongoing consideration of stakeholder engagement, engineering and environmental studies. This has included developing design principles on the Proposed Scheme.

3.6.3 The **Design Principles** (Ref 9) published as part of the Statutory Consultation set out the design vision and principles for the Proposed Scheme, informed by best practice guidance, planning policy and a collaborative approach to design including engagement. The design principles serve a number of functions:

a. They help to inform the assessment of the likely environmental effects of the Proposed Scheme in the EIA;
b. They help to demonstrate how sustainability objectives are implemented within the design;
c. They set the parameters for the detailed plans to be prepared by Contractors or others to satisfy the Requirements that will be attached to the application for development consent;
d. They help to illustrate how the Applicant has responded to public consultation feedback in relation to design; and
e. They help to illustrate how the Applicant has taken account of the criteria for good design set out in NPS EN-1 (Ref 10) and the Planning Inspectorate's Advice on Good Design for Nationally Significant Infrastructure Projects (Ref 11).

Kiln Lane Substation

Consideration of multiple consenting scenarios

3.6.4 The Proposed Scheme has considered multiple scenarios for the construction of the Kiln Lane Substation. The Kiln Lane Substation has already been consented as part of other third-party DCOs, specifically the SPR EA1N and EA2 windfarms. It is anticipated that Kiln Lane Substation will be delivered pursuant to the existing SPR EA1N and EA2 consents by 2028.

3.6.5 The Kiln Lane Substation as consented by SPR within the EA1N and EA2 consents does not include sufficient connection capacity for the Proposed Scheme and additional extension works would therefore be required at the Kiln Lane Substation, should it be built out pursuant to those consents. However, in order to account for the unlikely scenario that the Kiln Lane Substation is not delivered by the SPR consent(s), and to avoid the Proposed Scheme being reliant on third party works,

the design envelope for the Proposed Scheme also includes a scenario for the construction of Kiln Lane Substation in its entirety as an alternate consenting scenario.

Converter Station

Converter Station orientation

3.6.6 An alternative orientation of the proposed Converter Station was considered due to changes in other third-party DCOs. The Nautilus project had originally considered a Converter Station located within the same site as both Sea Link and the Proposed Scheme. Following a decision by Nautilus to locate the Converter Station elsewhere, the Proposed Scheme was able to consider an alternative layout. The alternatives are:

a. Option 1 – the proposed Converter Station arrangement oriented in a north to south direction that was originally proposed to sit alongside the Nautilus project; and
b. Option 2 – the proposed Converter Station arrangement oriented in an east to west arrangement of infrastructure that would sit perpendicular to the Sea Link Converter Station in the south of the site.

3.6.7 Option 2 enabled better coordination with Sea Link through minimising the need for complex cable alignments, provided beneficial outcomes for a coordinated approach to landscape masterplanning and will maintain the ability to co-locate whilst retaining the option for individually constructed schemes. The landscape impacts of both options were deemed to be comparable, although Option 1 would protrude further into the landscape to the north, increasing the sense of scale and mass in the open landscape beyond the B1119. On balance, due to the open nature of the site, Option 2 was preferred due to its positioning to the west and south within the site. This would allow more space around the proposed Converter Station to reprofile the land and for planting. Option 1 was deemed slightly preferable from a noise and vibration perspective due to the distance away from residential properties compared to Option 2, however this was not deemed significant.

3.6.8 Further optimisation of the Converter Station orientation is possible within the Limits of Deviation (LoD) set by the Proposed Scheme and will be considered throughout the design development.

Proposed Converter Station access

3.6.9 Alternative access routes to the proposed Converter Station location were assessed to consider coordination with Sea Link and address feedback from Suffolk County Council on the Sea Link submission. The following alternatives were considered:

a. Option 1 - an access road that utilises the proposed Sizewell Link Road, forming part of another third-party DCO in the area. This option was suggested by Suffolk County Council in the review of the Sea Link project; and

b. Option 2 - access to the proposed Converter Station Site via the Fromus Bridge crossing that Sea Link have also identified as their preferred access.

3.6.10 Although Option 1 was preferred from an Environmental and Planning perspective due to the reduced permanent impacts on the landscape setting, listed parkland and mature woodland, Option 2 was the preferred access route on technical grounds. Option 2 would avoid the need for significant highway improvement works that would be needed for Option 1 to cross the B1119. Option 2 remains the most direct route to the proposed Converter Station Site, avoids interference with overhead lines (OHL) and would not be dependent on third party consents. Option 2 would also allow for a coordinated approach with Sea Link utilising the same access, reducing the extent of construction activities through the avoidance of two separate access routes, and would reduce footprint of the two projects.

Onshore Underground Cable Corridor

Proposed Underground HVDC Cable Corridor and proposed Underground HVAC Cable Corridor design refinement

3.6.11 Further design development was undertaken to review the preferred onshore Underground HVDC and Underground HVAC Cable Corridors (400m in width). Holistic design reviews including technical, environmental, lands and landowners, planning and stakeholder engagement to refine the alignment and to reduce the width of the cable corridors. This included the avoidance of habitats known to support protected species, avoidance of known mature and veteran trees, avoidance of land associated residential properties, minimising the construction required withing Flood Zones 2 and 3, avoidance of identified committed developments, the use of trenchless construction techniques for crossing points, minimising the land parcels required within the construction working area, construction access requirements and consideration of the design principles.

Onshore Underground Cable Corridor construction methodologies

3.6.12 The design has included provision to undertake trenchless techniques as an avoidance measure at certain locations of the Underground HVAC Cable Corridor and Underground HVDC Cable Corridor routes, including, where relevant, beneath constraints and environmental designations. Trenchless installation is a method by which ducts and cables are installed below ground level and are specifically designed to avoid conflict with surface features. There are various trenchless techniques which can be utilised, depending on the site conditions and design parameters, including depth and length requirements.

3.6.13 Environmental surveys and technical studies have driven the need for the crossing of sensitive features through trenchless installation along the Underground HVDC Cable Corridor and Underground HVAC Cable Corridors, to minimise impact on environmental and reduce disturbance on human receptors. The Proposed Scheme has made commitments through the **Design Principles** published as part of Statutory Consultation to avoid woodland, avoid the removal of veteran trees, avoid

direct impacts to major watercourses, minimise the closure of main roads, avoid railway lines, and to minimise the impacts on known environmental constraints and designated sites. This has been achieved through the approach to siting and routeing on the Proposed Scheme, as well as careful consideration and implementation of trenchless crossings.

3.6.14 Technical studies have been undertaken on the consideration of the different trenchless techniques available in the UK and assess the suitability of these with the Proposed Onshore Scheme. Trenchless cable installation techniques cover a range of different methods of installing underground cables without excavating a trench on the surface of the ground. The methods considered within the design review include:

a. HDD;
b. Pipe Jacking/Microtunnelling;
c. Impact Moling;
d. Auger Boring; and
e. Direct Pipe.

3.6.15 The design review considered the temporary works, permanent works, noise and vibration, timescales and risks involved. This has provided increased certainty around the construction methodology of the Proposed Scheme and has enabled the inclusion of trenchless crossings within the design of the Proposed Scheme as a key avoidance measure.

Underground HVDC Cable Corridor crossing of the Minsmere-Walberswick internationally and nationally important statutory designations

3.6.16 A number of design principles have been established as part of the Proposed Scheme, which include measures designed to safeguard the qualifying features of internationally and nationally important statutory designations. Most notable are the onshore crossing points of the designated Minsmere-Walberswick SAC, SPA, Ramsar site and SSSI at both the Underground HVDC Cable Corridor and the Landfall to Offshore HVDC Cable Corridor section at Walberswick.

3.6.17 The development of the Landfall at Walberswick (Site G2) and associated Underground HVDC Cable Corridor has recognised the high ecological value of the designated Minsmere-Walberswick SAC, SPA, Ramsar, SSSI from the outset. Measures embedded within the design for this option include the use of the trenchless cable installation method at both crossings of the designated Minsmere-Walberswick SAC, SPA, Ramsar, SSSI to avoid the loss or damage of habitats (see **Figure 2.3 Proposed Onshore Scheme Crossing Points**). This embedded mitigation at both crossings avoids the default alternative of a trenched solution which would give rise to significant direct loss of habitat damage and degradation of the internationally and nationally important statutory designations.

3.6.18 Through the appraisal of the proposed Landfall and proposed Underground Cable Corridor emerging preferences (see **Paragraph 3.5.9** onwards), it was identified

that installing the Underground HVDC Cable Corridor via trenchless methods under the designated Minsmere-Walberswick SAC, SPA, Ramsar, SSSI has the potential to result in direct impacts upon the qualifying habitats and the habitats upon which the qualifying species rely as result of frac-out (drilling fluid making its way to the surface of the site through natural fissures). The potential for temporary habitat damage and degradation within the designations is therefore identified.

3.6.19 The Applicant appointed specialists to undertake an appraisal of drill depths and ground conditions to determine the likely risk of frac-out, which comprised a technical and environmental assessment. The multiple scenarios outlined suitable mitigation measures during the design stage. The primary embedded measure would be to undertake extensive ground investigation surveys and to design the depth of the trenchless section dependent on ground conditions to mitigate the risk of frac-out. To further minimise the impact of any frac-out that may occur, commitments would be made for frac-out control measures and clean up protocols.

Underground HVDC Cable Corridor – coordination with Sizewell C

3.6.20 Further consideration has been given to the Underground HVDC Cable Corridors in the vicinity of the Sizewell Link Road (SLR) consented under the Sizewell C third-party project.

3.6.21 The Sizewell C project benefits from development consent granted in 2022. One of the components of the Sizewell C proposals is a new road (referred to as the Sizewell Link Road (SLR)) connecting the A12 near Yoxford with the B1122 approximately 5.5 kilometres (km) to the east, bypassing the villages of Yoxford, Middleton Moor, and Theberton. A coordination opportunity has been identified for the Underground HVDC Cable Corridor in the vicinity of Theberton and Annesons Corner where the Proposed Scheme could align its Underground HVDC Cable Corridor with the proposed SLR route. Alternative co-ordination options included:

a. Option 1 - Proposed Scheme located to the west of the SLR and crossing via a trenchless construction technique to the north of Title Lane;
b. Option 2 – Proposed Scheme located to the west of the SLR, similar to Option 1 crossing Wash Lane further west;
c. Option 3 – Proposed Scheme located within the road/verge of SLR;
d. Option 4 – Proposed Scheme located to the west of the SLR, crossing via a trenchless construction technique to the south of Title Lane; and
e. Option 5 – Proposed Scheme located to the east and in parallel to SLR.

3.6.22 Following consideration of the five alternatives, the Proposed Scheme has taken forward both Option 1 and Option 3. Further information on the assessment of options is provided in Section 6.5 of the **OSRR** that has been published as part of the Statutory Consultation. Option 1, the Western route option described in **Chapter 2 Description of the Proposed Scheme**, would be delivered within its own corridor and would impact on fewer ecological and human receptors in comparison to the alternatives. Option 3, the Eastern Route option described in **Chapter 2 Description of the Proposed Scheme**, would enable an opportunity for co-location

with the SLR and would avoid the need for two different route corridors between the Proposed Scheme and Sizewell C. This option would present challenges during construction including traffic disruption on the basis that the Proposed Scheme is constructed following completion of the SLR however both options have been taken forward for consultation and design consideration. Option 4 and Option 5 were discounted on technical and environmental constraints due to the increased length of the cable route in comparison to alternatives, the proximity of residential receptors and the impact on mature tree-lined field boundaries.

Underground HVAC Cable Corridor coordination

3.6.23 Following the appraisal of Underground HVAC Cable Corridors within **Paragraph 3.5.23**, ongoing coordination with the Sea Link project has enabled further consideration to the Underground HVAC Cable Corridor route between Kiln Lane Substation and the proposed Converter Station Site. Three differing scenarios were identified by the project for further consideration of the HVAC Cable Corridor, these included:

a. Scenario A- Proposed Scheme (HVAC) as a standalone project;
b. Scenario B - Proposed Scheme (HVAC) with Sea Link (HVAC and HVDC); and
c. Scenario C - Proposed Scheme (HVAC) with Sea Link (HVAC and HVDC) and Nautilus (HVAC and HVDC) - to assume a shared corridor to Sea Link and Nautilus

3.6.24 Consideration of both technical studies and environmental surveys, as well as ongoing engagement with key stakeholder and landowners were taken into account when identifying the options for appraisal across the three scenarios. A total of seven HVAC Cable Corridors were identified for appraisal, five of which considered Scenario A, followed by two options that considered Scenario B and C.

3.6.25 Continued engagement with NGET has further highlighted the opportunity to coordinate the delivery of the Proposed Scheme's proposed Underground HVAC Cable Corridor within the Sea Link proposed cable corridor. This aligns with the feedback received at Non-Statutory Consultation in 2022 in the consideration of cumulative impacts of proposed projects in the locality are to be fully assessed in design and development. Following this engagement with NGET, a decision has been made on the Nautilus project to locate the Converter Station elsewhere and will not be positioned in Site 3. Therefore, coordination with Nautilus is no longer possible.

3.6.26 Following consideration of the seven alternatives, two consenting scenarios are being progressed as part of the Proposed Onshore Scheme for the proposed Underground HVAC Cable Corridor. This retains the opportunity to coordinate with Sea Link as well as maintaining an option that is preferable if the Proposed Scheme is constructed in isolation. These preferred options are:

a. Proposed Scheme only (Option 6) - The Proposed Onshore Scheme would consent and install Underground HVAC Cables for this Proposed Scheme only.

b. Proposed Scheme in coordination with Sea Link (Option 7) - The Proposed Onshore Scheme would install the ducting and cabling for the Proposed Onshore Scheme and ducting for Sea Link's HVAC and HVDC cabling. This would allow for coordination and colocation of the Proposed Onshore Scheme with Sea Link project.

Landfall

Landfall optimisation review

3.6.27 Further design reviews were undertaken on the siting of the proposed Landfall following the preferred options identification. Consideration has been given to the siting, access, haul road and construction areas associated with the proposed Landfall site and associated Underground HVDC Cable Corridor.

3.6.28 Micro-siting of the construction activities, primarily in relation to the transition joint bay compound, within the proposed Landfall Site considered technical factors of topography, earthworks and construction feasibility of the offshore trenchless section of the Underground HVDC Cable Corridor. Considerations of environmental factors included the proposed Landfall Site being located within the Suffolk & Essex Coast & Heaths National Landscape and the Suffolk Heritage Coast, as well as proximity to residential properties, the Minsmere-Walberswick internationally and nationally important statutory designations and the presence of archaeology. Following a review of the relevant factors, a location to the west of the proposed Landfall study area was considered preferrable. This would minimise views from neighbouring houses, utilises existing hedgerows and trees as screening in views from the south, considers the presence of archaeology and enables a suitable distance from the Minsmere-Walberswick internationally and nationally important statutory designations. This location is considered feasible from a construction perspective to ensure a suitable alignment for the Offshore HVDC Cable Corridor installed via HDD that avoids passing underneath residential properties and provides a location with suitable topography and access capabilities.

Access to proposed Landfall Site

3.6.29 Access requirements to the proposed Landfall during construction were considered during design development. There is no existing vehicular access to the proposed Landfall and the nearest access would be via the B1387, Lodge Road and Stocks Lane. Access routes off the B1387 were considered in terms of environmental, technical and social factors. It was considered that Stocks Lane (designated as a PRoW) is not suitable for construction vehicle access, and the B1387/Lodge Road junction would not facilitate HGV movements. A review of access routes to the site was undertaken to avoid the need to enter the village of Walberswick.

3.6.30 It was considered that access off the B1387 to the west of the village of Walberswick would avoid the need for highway improvement works within the village, would minimise disturbance and access issues by residents and would also provide access to the Underground HVDC Cable Corridor in this section.

3.6.31 Further consideration of routeing and mitigation will be undertaken.

Proposed Offshore HVDC Cable Corridor

Proposed Offshore HVDC Cable Corridor Development KP52 – KP60

3.6.32 In 2024 a geophysical survey was undertaken along Offshore HVDC Cable Corridor Route B to inform engineering and environmental assessments. The scope, objectives and approach to the survey is described in detail in **Chapter 18 Marine Physical Environment** of this PEIR. The survey identified large sandwaves (up to 10m high) along with seabed ridge (clay expulsion) features that could have associated *Sabellaria spinulosa* reef (a protected habitat under the Natural Environment and Rural Communities Act 2006) in survey blocks 9 and 10 between approximately kilometre point (KP) 52 and KP60.

3.6.33 Due to engineering and environmental concerns, the Applicant instructed the survey vessel to acquire additional geophysical data outside of the original corridor defined for Offshore HVDC Cable Corridor Route B (as illustrated in **Figure 3.7 Offshore HVDC Cable Corridor Development KP52 - KP64** of this PEIR). Approximately 8.5km of additional data was acquired across an alternative 200m wide survey corridor, across a potentially more favourable area of seabed (as defined from high resolution UK Hydrographic Office multi-beam echosounder data). Fewer large sandwaves and no seabed ridge features were present along the alternative route.

3.6.34 A detailed evaluation of the two route options was undertaken based on general engineering, seabed features, mobile sediments, benthic features and geotechnical data. Each of the categories were sub-divided and ranked against each other. Whilst the alternative route was slightly longer (8.37km compared to 8.13km) evaluation determined that it was more favourable with significantly lower numbers of boulders, clay outcrops and benthic features. No *Sabellaria* reef was identified on the alternative route. Whilst there was a higher number of sandwaves on the alternative route due to the lower overall size, the total estimated volume that would need to be cleared to enable trenching to take place was less than for the original route.

3.6.35 Overall, the emerging preference was to select the alternative route developed between KP52 and KP60, and it is this route that now forms the Draft Order Limits for the Proposed Offshore Scheme.

Proposed Offshore HVDC Cable Corridor development aggregate area 2109

3.6.36 At the time of preparing the PEIR, a design change was being evaluated near to KP154 to KP167. In late 2024 Deme Building Materials Ltd were awarded a marine aggregate exploration and option licence for Area 2109 (Indefatigable East). Within the extent of the 2024 Proposed Offshore Scheme marine characterisation survey, the proposed HVDC Offshore Cable Corridor intersects the western boundary of the licensed area (**Figure 3.8 Offshore HVDC Cable Corridor Development Aggregate Area 2109** of this PEIR). An alternative proposed Offshore HVDC Cable

Corridor has therefore been designed which avoids the boundary of Area 2109 by routeing 500m to the west. This is an industry standard exclusion zone that is used for most constraints when undertaking marine spatial planning. Whilst bilateral discussions are underway to determine if there is the opportunity for colocation, both design options have been assessed in the EIA and presented in the PEIR. A final decision regarding the option selected will be communicated within the ES.

3.7 Next steps

3.7.1 The consultation responses received during statutory consultation on the information provided within this PEIR will be used to review and refine the design of the Proposed Scheme, where appropriate, and will form the basis of design for the application for development consent. The current design of the Proposed Scheme that is being consulted on is described in **Chapter 2 Description of the Proposed Scheme**.

3.7.2 Further engagement with third party DCOs will also be undertaken as part of the design evolution process to identify further opportunities for colocation and coordination, including consideration of programme and phasing of construction activities.

Glossary and Abbreviations

Term	Definition
ALC	Agricultural Land Classification
AONB	Area of Natural Beauty
BNG	Biodiversity Net Gain
CION	Connection and Infrastructure Options Note
DCO	Development Consent Order
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ES	Environmental Statement
GB	Great Britain
GW	Gigawatt
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
KP	Kilometre Point
LN	Leiston North
LS	Leiston South
NETS	National Electricity Transmission System
NGESO	National Grid Electricity System Operator
NGET	National Grid Electricity Transmission
NL	Netherlands
NPS	National Policy Statement
NTS	National Transmission System
OHL	Overhead Line(s)
OSRR	Options, Siting and Routing Report
PEIR	Preliminary Environmental Information Report
PRoW	Public Right of Way
SAC	Special Area of Conservation
SLR	Sizewell Link Road
SPA	Special Protection Area
SPR	Scottish Power Renewables
SSSI	Site of Special Scientific Interest
UK	United Kingdom
UXO	Unexploded Ordnance

Term	Definition
WWI	World War One
WWII	World War Two

References

Ref 1 National Grid Ventures (2025), LionLink – Initial Options Selection Report/Siting and Route Corridor Study

Ref 2 Regulation 14, The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, Available at: https://www.legislation.gov.uk/uksi/2017/572/regulation/14#:~:text=associated%20Explanatory%20Memorandum-,14.,accompanied%20by%20an%20environmental%20statement.

Ref 3 National Grid Ventures (2024), LionLink Environmental Impact Assessment EIA Scoping Report Volume 1 Main Text [online] available at: https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020033-000046-LION%20-%20Scoping%20Report%20-%20Main%20Text.pdf [last accessed 06 August 2025].

Ref 4 The Planning Inspectorate (2024), Proposed LionLink Multi-purpose Interconnector – Scoping Opinion [online] available at: https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN020033-000103-LION%20-%20Scoping%20Opinion.pdf [last accessed 06 August 2025].

Ref 5 The National Grid Company Public Limited Company (2009), NGC Substations and The Environment: Guidelines on Siting and Design [online] available at: https://www.nationalgrid.com/sites/default/files/documents/13796-The%20Horlock%20Rules.pdf [last accessed 06 August 2025].

Ref 6 Department for Energy Security and Net Zero (2023), National Policy Statement for Electricity Networks (EN-5) [online] available at: https://assets.publishing.service.gov.uk/media/65a78a5496a5ec000d731abb/nps-electricity-networks-infrastructure-en5.pdf [last accessed 06 August 2025].

Ref 7 LionLink Multi-Purpose Interconnector (2023) Interim Non-Statutory Consultation Feedback Summary Report [online] available at: https://www.nationalgrid.com/national-grid-ventures/lionlink/library#230548828-3684997351 [last accessed 06 August 2025]

Ref 8 LionLink (2024) Supplementary Non-Statutory Consultation Summary Report [online] available at: https://www.nationalgrid.com/national-grid-ventures/lionlink/library#230548828-3684997351 [last accessed 06 August 2025]

Ref 9 National Grid Ventures (2025), Design Principles – LionLink

Ref 10 Department for Energy Security and Net Zero 2024. Overarching National Policy Statement for Energy (EN-1). Available at:

https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1 [last accessed 15 August 2025]

Ref 11 The Planning Inspectorate (2024) Nationally Significant Infrastructure Projects: Advice on Good Design [online] available at: https://www.gov.uk/guidance/nationally-significant-infrastructure-projects-advice-on-good-design [last accessed 10 September 2025]

National Grid Lion Link Limited

Company number 14722364

1-3 Strand

London

WG2N-5EH

United Kingdom

nationalgrid.com/lionlink