



The Great Grid Upgrade

Sea Link

Preliminary Environmental Information Report

Volume: 1

Part 4 Offshore Scheme

Chapter 1 Evolution of the Offshore Scheme

Version A

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4.1 Evolution of the Offshore Scheme

4.1.1 Introduction

4.1.1.1 The current stage of Sea Link (the Proposed Project) design (**Volume 1, Part 1, Chapter 4, Description of the Proposed Project**) is the result of an iterative process that commenced at project inception when the initial need to reinforce the network in the South East of England was identified in 2019, as explained in detail in **Volume 1, Part 1, Chapter 3, Main Alternatives Considered**.

4.1.1.2 **Volume 1, Part 1, Chapter 3, Main Alternatives Considered** describes National Grid's approach to options appraisal and summarises both the strategic options that have been considered for the Proposed Project as well as the routeing and siting process. This chapter provides a more detailed summary of the routeing and siting appraisal relevant to the evolution of the Offshore Scheme from the point at which a preferred strategic option was selected to definition of the Offshore Scheme Boundary as illustrated on **Figure 1.1.4 Offshore Scheme Boundary**.

4.1.1.3 This chapter should be read in conjunction with:

- **Volume 1, Part 1, Chapter 3, Main Alternatives Considered;**
- **Volume 1, Part 1, Chapter 4, Description of the Proposed Project;**
- **Volume 1, Part 2, Chapter 1, Evolution of the Suffolk Onshore Scheme;** and
- **Volume 1, Part 3, Chapter 1, Evolution of the Kent Onshore Scheme.**

4.1.1.4 This chapter is supported by the following figure:

- **Volume 3, Figure 4.1.1 Evolution of the Offshore Scheme.**

4.1.2 Network Connection Points

4.1.2.1 The preferred strategic option identified the Sizewell Area as the preferred connection point in Suffolk and Richborough substation as the network connection point in Kent (**Volume 1, Part 1, Chapter 3, Main Alternatives Considered**). This was used as the basis for defining the routeing and siting study area (**Volume 1, Part 1, Chapter 4, Description of the Proposed Project**).

4.1.3 Study Area

4.1.3.1 The routeing and siting study area for the Offshore Scheme extended from Mean High-Water Spring (MHWS) on the Suffolk Coast (from Hellesley in the south to Dunwich in the north) to MHWS on the Kent coast (from Herne Bay on the north Kent coast to Kingsdown on the east Kent Coast). The routeing and siting study area is illustrated on **Figure 1.3.1 Routeing and Siting Study Area**.

4.1.4 Landfall Areas of Search

4.1.4.1 **Volume 1, Part 2, Chapter 1, Evolution of the Suffolk Onshore Scheme** and **Volume 1, Part 3, Chapter 1, Evolution of the Kent Onshore Scheme** presents a detailed rationale as to why the following landfall areas of search were identified. These are summarised below.

Areas of Search - Suffolk

4.1.4.2 Five landfall areas of search were initially identified in Suffolk. These are illustrated on **Figure 1.3.2 Suffolk Landfall Areas of Search**. The southernmost area of search (S1) was identified to the south of Aldeburgh, north of the Alde and Ore River. A second area of search was identified between Aldeburgh and Thorpeness (S2). A third area of search was identified between Thorpeness and Sizewell (S3). This area was further split down into two sub areas, south (S3) and north (S3N). A fourth area (S4) at Sizewell and the northern most area of search was identified to the north of Sizewell, south of Minsmere (S5).

Areas of Search - Kent

4.1.4.3 Six landfall areas of search were identified in Kent, which were split geographically across Pegwell Bay, Broadstairs, and the north Kent coast. These are illustrated on **Figure 1.3.3 Kent Landfall Areas of Search**. One area of search (K1) was identified within Pegwell Bay, which stretched from the settlement of Ramsgate to the settlement of Deal. One area (K1a) was identified at North Foreland between the settlements of Margate and Broadstairs. Four areas of search (K2, K3, K4 and K5) were identified along the north Kent coast between the settlements of Herne Bay and Birchington.

4.1.5 Indicative Marine Alignments (Corridor and Preliminary Routeing and Siting Study)

4.1.5.1 Due to the extensive geographical study area in the marine environment and large-scale nature of many of the constraint features, in order to perform a meaningful routeing appraisal in the marine environment it was necessary to identify indicative marine alignments (500m wide, representing a typical offshore working corridor to allow for flexibility in micro-routing) connecting the identified landfall areas of search in Suffolk to those in Kent. These were developed based on the following criteria in line with the DNV recommended practice guidelines (Ref 1.1):

- shortest route possible to minimise the cable length, which in turn reduces the manufacturing and installation cost as well as the environmental and security footprint;
- avoidance of environmentally sensitive areas where possible;
- avoidance of areas that have restricted movement i.e., anchorages where possible;
- avoidance of known wrecks and areas of archaeological importance where possible;
- avoidance of offshore installations (renewable, oil/gas, wells/platforms, etc.) where possible;

- limiting the need to cross in-service cables and pipelines and, where crossings would be necessary, corridors and alignments were routed to ensure the crossing angle would be optimal and water depth would be sufficient for navigational safety;
- routed to consider shipping density, i.e., anchorage areas, high density shipping lanes;
- avoidance of hazardous seabed terrain (e.g., bedrock outcrop and mobile sediments) where possible, ensuring the cable would be protected by achieving an acceptable depth of burial; and
- limiting the impact on third-party considerations including local tourist trade, and military practice zones.

Summary of Appraisal Outcomes

- 4.1.5.2 The Offshore Scheme and associated indicative marine alignments were divided into three main sections, the approach to landfalls in Suffolk (landfalls and alignments with prefix S), the central section (alignments with prefix C) and the approach to the Kent landfalls (landfalls and alignments with prefix K) (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 1 of 5**).

Marine alignments and landfalls (up to MHWS) – Suffolk

- 4.1.5.3 The section of the Suffolk coast within the routeing and siting study area had a number of nature conservation designations, with all potential marine alignment options interacting with these designations to varying degrees on the approach to the landfall.
- 4.1.5.4 All marine alignments approaching the Suffolk coast intersected with the Outer Thames Estuary Special Protection Area (SPA) and the Southern North Sea Special Area of Conservation (SAC) (Ref 1.2).
- 4.1.5.5 Marine alignments S1 and S2 were not constrained in the offshore environment.
- 4.1.5.6 Marine alignment option S2 intersected with the Leiston-Aldeburgh Site of Special Scientific Interest (SSSI) and The Haven, Aldeburgh Local Nature Reserve (LNR) both of which extend onto the foreshore, however, it was considered that the use of a trenchless technique, if feasible, at the landfall could mitigate impacts.
- 4.1.5.7 Marine alignment option S3 was considered significantly constrained in the immediate offshore environment due to the rocky reefs comprised of cemented limestone-rich shells in the immediate offshore environment known as the Coralline Crag, which is an important feature for coastal processes. This alignment also intersected with the Leiston-Aldeburgh SSSI at landfall; however, it was considered that the use of a trenchless technique, if feasible, at the landfall could mitigate impacts.
- 4.1.5.8 Marine alignment option S3 was also potentially constrained in the immediate offshore by the proposed export cable route of the East Anglia 1N and East Anglia 2 developments (**Figure 4.10.3 Offshore Infrastructure in the Study Area**).
- 4.1.5.9 Landfall area of search S3 and associated marine alignment S3N was less constrained by the Coralline Crag in the immediate offshore environment, however this location was constrained by the presence of existing infrastructure, namely the Concerto North submarine telecommunications cable and the export cables of Greater Gabbard and Galloper offshore windfarms as well as the existing Sizewell B Nuclear Power Station

infrastructure and the proposed (and consented) Sizewell C Nuclear Power Station development.

- 4.1.5.10 Landfall area of search S4 and associated marine alignment S4 was constrained by the existing Sizewell B and C Nuclear Power Station site including the intake/outtake pipes located in the immediate offshore area in front of Sizewell B.
- 4.1.5.11 Landfall area of search S5 intersected with the Minsmere-Walberswick Heaths and Marshes SSSI/SAC and the Minsmere-Walberswick SPA/Ramsar at the landfall including in the intertidal area, however, it was considered that the use of a trenchless technique, if feasible, at the landfall could mitigate impacts.
- 4.1.5.12 Landfall areas of search S4 and S5 and associated marine alignment options S4 and S5 were considered to be more constrained than the other options due to the additional number of offshore crossings that would be required and also the proposed Sizewell C development.

Summary of relevant terrestrial constraints – Suffolk

- 4.1.5.13 All landfall areas of search in Suffolk were within the Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB).
- 4.1.5.14 Whilst the marine alignment to landfall area S1 was relatively unconstrained, the terrestrial green corridor was constrained technically by two large river crossings of the Alde and Ore River, which would also require a crossing of the Alde, Ore and Butley Estuaries SAC in two places and the Alde-Ore Estuary SPA and SSSI in three places. A large proportion of this corridor was within the flood zone and this corridor would require the longest route within the Suffolk Coasts and Heaths AONB. Access to this corridor was also considered to be very limited, in particular in the area between the two large river crossings.
- 4.1.5.15 The marine approach to the landfall area S2 had few constraints, however the Leiston-Aldeburgh SSSI and North Warren Royal Society for the Protection of Birds (RSPB) reserve could not be avoided without the use of trenchless construction techniques at this landfall. The red terrestrial route corridor from this landfall area of search also included the pinch-point along Leiston Road. The majority of the landfall area of search was within flood zone 2 and 3, depending on the installation technique, intrusive above ground construction works within these zones are potentially avoidable.
- 4.1.5.16 Onward terrestrial routeing from landfall S3 within the blue corridor would likely require a crossing of the Sandlings SPA and Leiston-Aldeburgh SSSI although the potential for significant effects would likely be avoidable through the use of trenchless construction techniques.
- 4.1.5.17 The purple terrestrial route corridor connecting to S3 landfall area of search and marine alignment S3N could avoid the designated sites for ecological conservation but could not avoid either of the two following pinch points. The first being a pinch-point to the south of Aldringham at the crossing of the Hundred River. This area was constrained by the Hundred River itself, the crossing of the B1353 and the B1122, and an area of woodland and properties. In addition, the proposed cables for the East Anglia (EA) One North and EA Two Offshore Windfarms are proposed to be routed through this same pinch-point. The second being a pinch-point to the northwest of Leiston associated with the offsite works for the proposed Sizewell C Nuclear Power Station including an area which has recently been established for ecological mitigation measures related to the project.

- 4.1.5.18 Landfall area of search S4 was identified as being significantly constrained from a terrestrial perspective as no onward terrestrial route corridor was identified from this landfall area of search, as it is significantly constrained by the existing Sizewell B Nuclear Power Station.
- 4.1.5.19 Landfall area of search S5 was located to the north of the existing Sizewell Nuclear Power Station and south of Minsmere New Cut drainage channel. The whole of the intertidal area and immediate terrestrial area is designated as Minsmere-Walberswick Ramsar and SPA, Minsmere to Walberswick Heaths & Marshes SAC and SSSI and Minsmere RSPB Reserve. These designated sites were unavoidable within this area of search; however, it was considered that the use of trenchless construction techniques could be used to avoid potential significant effects. A second crossing of the Minsmere to Walberswick Heaths & Marshes SSSI and Minsmere RSPB Reserve would also be required for any onward terrestrial routing. The majority of this landfall area of search was within flood zones 2 and 3 and construction within the flood zone could not be avoided. Access to this landfall area of search was also very limited and likely to require a long temporary access road.
- 4.1.5.20 The onward terrestrial corridor for landfall area of search S5 also crossed a large area of the proposed Sizewell C Nuclear Power Station development area which could significantly constrain the ability to route through this area and also have programme implications associated with construction sequencing of the two developments.

Overall summary – Suffolk

- 4.1.5.21 When considering marine constraints alone there was a preference for Landfalls S1, S2 and S3 with associated marine alignments S1, S2 and S3N respectively (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 1 of 5**).
- 4.1.5.22 When considering the constraints from both a terrestrial and marine perspective, on balance, landfall area of search S2 was preferred with associated marine alignment S2 connecting to the red corridor. An alternative marine alignment of S3N connecting to the northern part of landfall area of search S3 connecting to the terrestrial purple corridor was also proposed at this stage, this alternative was included, as further ground investigations are required inform final decision making in late 2023 (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 2 of 5**).

Marine alignments and landfalls (up to MHWS) - Kent

- 4.1.5.23 The section of the Kent coast within the routing and siting study area has a number of national and international nature conservation designations, with all potential marine alignment options interacting with several of these designations, to varying degrees, on approach to the landfall areas of search.
- 4.1.5.24 Detailed consideration was therefore given to the potential activities associated with cable installation and operation on the type of features for which the sites are designated, the distribution of the features within the sites and the sensitivity and recoverability of the features. The extent of interaction and potential for mitigation were also considered.
- 4.1.5.25 Marine alignment sections K2, K3, K4a, and K4b were determined to be the least preferred options from a nature conservation perspective due to the length of interaction with the Margate and Long Sands SAC and the interaction with the Thanet Coast SSSI/ Marine Conservation Zone (MCZ) and the Thanet Coast & Sandwich Bay SPA/Ramsar. Sections K2 and K3 also intersect with the Thanet Coast SAC.

- 4.1.5.26 Several significant constraints were also identified around the marine alignment sections K2, K3 and K4b approaching landfalls on the North Kent coast from a physical environment perspective. It is unlikely that mobile sandbanks could be avoided, some of which may be exposed at low tide, which presents a considerable exposure and engineering risk. It was also likely that there would be some interaction with key anchorage areas offshore of Margate.
- 4.1.5.27 All routes making landfall at K1 in Pegwell Bay intersected with the Sandwich Bay to Hacklinge Marshes SSSI, Sandwich and Pegwell Bay NNR, Sandwich Bay SAC, Thanet Coast & Sandwich Bay SPA/Ramsar and the Goodwin Sands MCZ.
- 4.1.5.28 K1a at Broadstairs also intersected with areas designated for their nature conservation value - Thanet Coast SAC/SSSI/MCZ and Thanet Coast & Sandwich Bay SPA/Ramsar.
- 4.1.5.29 Although the K1a marine alignment to landfall area of search K1a and K1(b-g) marine alignments to landfall area of search K1 were all constrained from a biological environment perspective, there was a slight preference for K1a at Broadstairs. This was because the extent of interaction is smaller, and it would also be possible to avoid the Goodwin Sands MCZ in the offshore environment. There was a preference for marine alignments K1d/K1e/K1f and K1g in Pegwell bay as the extent of interaction with the designations is reduced towards the south of landfall area.
- 4.1.5.30 Based on the available desktop information it was initially considered that the Goodwin Sands MCZ could not be avoided by the identified marine alignments connecting to landfalls in Pegwell Bay. Although marine alignment K1b would require a shorter interaction with this designation than all others. This interaction is due to the routeing in this area being constrained, to the east, by the Goodwin Sandbank - routeing over the Goodwin Sandbank could increase the risk of cable exposure during the lifetime of the cable. This could subsequently result in the requirement for additional rock protection associated with any remedial works, potentially resulting in permanent habitat loss. To the west routeing was constrained by the Ramsgate dredged channel and an area of sandwave fields.
- 4.1.5.31 Additionally, when routeing east out from Pegwell Bay, in order to head north, the route must cross the Nemo Link cable and the Thanet Offshore Wind Farm export cables, requiring the placement of rock protection on the seabed at these locations, potentially resulting in permanent habitat loss, including within the Goodwin Sands MCZ. The water depths in this area are very shallow, slowly gaining depth moving to the east. In order to ensure alignment with guidance regarding reductions in water depths that could pose a hazard to marine vessels (reduction of no more than 5% of water depth – advice from Maritime Coastal Agency), it was that proposed crossings locations should be located in areas with a suitable water depth.
- 4.1.5.32 Considering the factors described above (dredged areas, acceptable navigational depths and seabed features) routeing within the northwest corner of the Goodwin Sands MCZ was considered likely to be unavoidable.
- 4.1.5.33 Marine routeing into Broadstairs (landfall area of search K1a) would require fewer marine cable crossings than the routes connecting into Pegwell Bay (landfall area of search K1) as there would be no requirement to cross with Thanet Offshore Windfarm export cables and the Nemo Link interconnector. However, landfall areas of search K1a is located at a popular recreational beach location, meaning there could be a greater temporary recreational impact during construction at this landfall location.

- 4.1.5.34 Although landfalls in Pegwell Bay (landfall area of search K1) would interact with designated sites, it was considered that these could be largely mitigated by using trenchless techniques, such as Horizontal Directional Drilling (HDD). This would avoid the need to trench across areas of saltmarsh and sensitive intertidal habitat, which could potentially result in greater habitat loss and water quality effects.
- 4.1.5.35 At the time of writing the Corridor and Preliminary Routeing and Siting Study, for marine alignment sections K1b and K1c it was assumed that access to the seaward end of the potential HDD in the intertidal area will be from the sea by a marine vessel or limited terrestrially to the site of the disused hoverport, to avoid impacts to the sensitive saltmarsh habitat in the northern part of the bay.

Summary of relevant terrestrial constraints – Kent

- 4.1.5.36 Of the three corridors that connect with the Pegwell Bay K1 landfall area of search, the red and blue corridors were significantly constrained from a traffic and access perspective, with key issues including access to the east of the River Stour and weight restrictions on local roads around the Sandwich Bay Estate and Royal St George and Royal Cinque Ports golf courses.
- 4.1.5.37 All three corridors that connected with the Pegwell Bay landfall area of search K1 interacted with sites designated for their nature conservation value; whilst the blue corridor minimised that interaction, it was the longest corridor of the three and would require a crossing of the River Stour at a point where is it designated as a Ramsar, SAC, SPA and SSSI. Access to the red corridor was limited and this corridor would also require a crossing of the River Stour. Both the red and green corridors would require a crossing of a golf course. Whilst the green corridor interacted with a larger area of the designated sites for nature conservation this would be temporary and short term and this corridor represented the most direct connection to either of the converter site option areas and has fewer river and road crossings.
- 4.1.5.38 Both the red and the blue corridors extended across a large area of flood zone and would require several watercourses associated with the River Stour to be crossed. The blue corridor would require crossing the River Stour at a point where is it designated as a Ramsar, SAC, SPA and SSSI; although, it was considered, if feasible, the river could be crossed using trenchless techniques.
- 4.1.5.39 Both the green and red corridors intersected with golf courses; however, it was proposed that a trenchless technique, if feasible, would be used at these locations to minimise disturbance.
- 4.1.5.40 The green corridor which connected to the landfall area of search K1a at Broadstairs crossed a linear belt of development between the settlements of Margate and Ramsgate. This would require routeing the cable along either Star Lane or Farley Road, both of which are heavily constrained by several connected planning allocations for housing as well as a proposed extension to the cemetery. These constraints spanned the entire corridor west of the Westwood Industrial Estate and these factors significantly constrained this corridor.
- 4.1.5.41 The three corridors connecting the landfall areas of search located on the north Kent coast (K2, K3 and K4) were all significantly constrained from a traffic and access perspective, due to weight restricted bridge, sensitive receptors, and carriageway widths that are inadequate to allow two-way Heavy Goods Vehicle (HGV) movements. It was likely that extensive mitigation would be required, even during temporary construction work to facilitate safe access and to minimise other environmental effects

(congestion, delays) that could arise because of additional HGV construction traffic on poorly suited roads. Careful routing of the cables could avoid access issues around the Minster Marshes.

Overall summary – Kent

- 4.1.5.42 When considering marine constraints alone there was a preference for landfall area of search K1a with associated marine alignment K1a (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 1 of 5**).
- 4.1.5.43 When considering the constraints from both a terrestrial and marine perspective, on balance, landfall area of search K1 was preferred with associated marine alignment K1c connecting to the green corridor (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 2 of 5**).

Marine alignments – central section

- 4.1.5.44 The central section of the offshore route was common to both the Suffolk and Kent alignment options. All central indicative marine alignments intersect with the Outer Thames Estuary SPA and Southern North Sea SAC.
- 4.1.5.45 Marine alignment sections C1 and C4 intersected with the Margate and Long Sands SAC.
- 4.1.5.46 Marine alignment section C3 intersected with the Kentish Knock East MCZ.
- 4.1.5.47 There was a particularly constrained area within the central section where the north-eastern extent of the Margate and Long Sands SAC abuts the Sunk Traffic Separation Scheme (TSS). Also present are several aggregate extraction areas and deep-water shipping channels.
- 4.1.5.48 In addition, there are three proposed projects in this area, namely the NeuConnect Interconnector and the proposed Five Estuaries and North Falls Offshore Wind Farms and associated export cables, as well as the existing Greater Gabbard and Galloper Offshore Wind Farms.
- 4.1.5.49 Considering the potentially conflicting constraints relating to the biological environment, shipping and navigation and existing and proposed new infrastructure in this central section, the emerging marine routing preferences were discussed with marine stakeholders, including nature conservation bodies, port authorities and other developers to obtain their feedback to help inform decision making.
- 4.1.5.50 The draft outputs of the marine options appraisal were presented to stakeholders to help inform the decision making and reduce potential for consenting risk. This was undertaken in advance of the planned project-specific marine survey (summer 2021), to ensure the most likely route was surveyed.
- 4.1.5.51 The most significant marine survey route refinements based on stakeholder feedback were in the following areas:
 - northeast of the Margate and Long Sands SAC
 - southwest of Thanet Offshore Wind Farm
- 4.1.5.52 These are discussed further below.

Northeast of the Margate and Long Sands SAC

- 4.1.5.53 The original proposed marine alignments in this area are the black routes shown on **Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 1 of 5**. These routes provided suitable seabed conditions for cable installation (geology and topography), whilst also being the most direct route to the Suffolk landfalls.
- 4.1.5.54 The route alignments were refined as a result of feedback from:
- Natural England;
 - Maritime and Coastguard Agency;
 - Trinity House;
 - Port of London Authority;
 - Harwich Haven Authority;
 - Port of Felixstowe;
 - North Falls Offshore Windfarm (OWF);
 - Five Estuaries Offshore Windfarm; and
 - the aggregate extraction operators of Areas 508, 509/3, 510/1 and 510/2 (**Figure 4.10.1 Offshore Infrastructure in the Study Area**).
- 4.1.5.55 Natural England expressed concerns regarding the potential impacts of crossing the proposed NeuConnect cable within the Margate and Long Sands SAC as the material required for the crossing would introduce hard substrate into a naturally sandy environment, which could permanently change the protected features in this site. Natural England also advised that their preference was for the Proposed Project to avoid any cable installation in the protected site.
- 4.1.5.56 The navigational bodies also expressed concerns regarding the cable routing in this area, specifically in relation to the potential for a reduction of navigable depths because of rock protection at the potential crossing with NeuConnect. Concerns were also raised relating to cable installation in this area, due to the high shipping density caused by the Long Sands Head Deep shipping channel; however, it was agreed that the implementation of a robust vessel management plan during installation could mitigate this issue.
- 4.1.5.57 The aggregate operators advised that their preference was for the route to be located to the east of the existing Area 510/2 aggregate production agreement area to minimise interaction with their operations.
- 4.1.5.58 Based on the above stakeholder feedback the black marine alignment furthest to the east (C8) was identified as this alternative:
- routes to the east of aggregate extraction Area 510/2; and
 - crosses NeuConnect in deep waters outside Margate and Long Sands SAC and Long Sands Two Way Shipping Channel.
- 4.1.5.59 However, following consultation with the developers of North Falls Offshore Wind Farm, it was established that they had identified the same area for their proposed export cables, and at the time of consultation, they were undertaking their offshore survey imminently. As such, the route was reviewed again to try to avoid potential

complications regarding crowding and installation and an alternative C8A (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 2 of 5**) was identified.

- 4.1.5.60 Discussions with Five Estuaries Offshore Windfarm highlighted potential constraints of the C8A alternative with their proposed export cable route.
- 4.1.5.61 Due to the proximity to the Sunk TSS, and the associated high shipping density to the north and east of these proposed export cable corridors, and the shallower waters and sensitive benthic habitats of the Margate and Long Sands SAC to the west, it was determined that a further deviation needed to be identified.
- 4.1.5.62 Factoring in the parameters (shipping density and water depth) provided by the navigational bodies, an additional marine alignment section, referred to as C8B (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 2 of 5**) was identified. This refined route alignment:
- avoids the higher density shipping areas in the Sunk TSS; and
 - keeps the crossings of the proposed NeuConnect cable and North Falls and Five Estuaries offshore windfarms export cables in deeper water and out of the busy shipping lanes.
- 4.1.5.63 This resulted in a route deviating east to the centre of the Sunk TSS approach channels, where the shipping density is lower and the crossings could be in deeper water, routeing north through the centre of the Sunk TSS, where the shipping density is again lower, before routing west, north of the Harwich and Port of Felixstowe approach channel to avoid the higher shipping density in this area. The revised route received the support of the navigational bodies.

Southwest of Thanet OWF

- 4.1.5.64 The original preferred marine routeing in this area was the black route shown on **Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 2 of 5** (marine alignment section C4). This route provided suitable seabed conditions for cable installation (geology and topography). However, following stakeholder engagement the route needed to be refined because of feedback from the Port of London Authority, who expressed significant concerns regarding the potential decrease in water depths that would occur where the route would cross the proposed GridLink interconnector.
- 4.1.5.65 The Port of London Authority advised that because this area is an important area for shipping, and water depths are too shallow, they would not be able to support the routeing as originally proposed. They also advised that the Thanet Extension Offshore Wind Farm DCO application, the export cable from which was also proposed to be in this area, was refused by the Secretary of State (SoS) due to potential impacts on shipping and navigation.
- 4.1.5.66 An alteration to the route was established, that has required a slight deviation to the original marine alignment section C4, referred to as C4A (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 2 of 5**) to increase the water depth of the crossing by an additional 3.5m. The Port of London Authority and other navigational bodies were consulted on the refined route and have advised that they are satisfied with the modification made to the route.

Summary

- 4.1.5.67 Considering the above factors, the preferred option from a marine appraisal perspective was marine alignment central section C8B and C4A (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 2 of 5**).

4.1.6 Offshore Scheme Description at Scoping

- 4.1.6.1 The evolution of the Offshore Scheme (**Volume 1, Part 1, Chapter 4, Description of the Proposed Project**) is illustrated on **Figure 4.1.1 Evolution of the Offshore Scheme, Sheets 1 to 5**.
- 4.1.6.2 The Offshore Scheme at Scoping comprised of a marine HVDC cable from preferred landfall area of search S2 or alternative landfall area of search S3 in Suffolk to landfall area of search K1 in Kent. Marine alignment sections S2 or S3N, C8B, C4A and K1c were preferred.
- 4.1.6.3 Based on the outputs of the Proposed Projects marine geophysical and geotechnical survey undertaken summer 2021, there were a number of routeing refinements proposed within the scoping boundary. This included potential routeing to avoid the Goodwin Sands MCZ.
- 4.1.6.4 For the purpose of scoping, the Offshore Scheme Scoping Boundary was 500m wide for the majority of the Offshore Scheme, representing a typical offshore working corridor within which the cable can be laid; however, the outputs of the Proposed Project marine survey undertaken in summer 2021 were analysed and as such there were some areas where the Offshore Scheme Scoping Boundary was widened to allow flexibility for route optimisation. The Offshore Scheme at Scoping is shown on **Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 3 of 5** with the widened areas discussed in further detail below.

Area 1 – Approaches to Suffolk Landfall

- 4.1.6.5 The Offshore Scheme Scoping boundary at Area 1 was extended from the 500m wide working corridor at the intertidal shoreline of the S2 Suffolk Landfall to allow for maximum flexibility of landfall alignments for the next design phase (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 3 of 5**).

Area 2 – Shipwash East

- 4.1.6.6 The Offshore Scheme Scoping boundary at Area 2, Shipwash East was extended from the 500m wide working corridor to facilitate avoidance of mobile sediment associated with the Shipwash East ridge, and to allow for the routing of the cable into deeper water (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 3 of 5**).

Area 4 – Gridlink Crossing

- 4.1.6.7 The Offshore Scheme Scoping boundary at Area 4 was extended from the 500m wide working corridor to allow for the flexibility of crossing design and optimization (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 3 of 5**).

Area 5 - West of Goodwin Sand MCZ and Approaches to Kent Landfall

- 4.1.6.8 The Offshore Scheme Scoping boundary at Area 5 was extended from the 500m wide working corridor following outputs of 2021 marine surveys where unfavourable seabed

topography was identified which would limit successful cable installation. Magnetic anomalies in this location were also identified during the 2021 marine surveys (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 3 of 5**).

4.1.7 Offshore Scheme Evolution from Scoping to the Proposed Project

Suffolk Landfall – Route Option Selection

- 4.1.7.1 Following feedback from non-statutory consultation, stakeholder engagement and further environmental, socio-economic and technical studies, landfall area of search S2 remains our emerging preference landfall in Suffolk and is being taken forward as the preferred landfall. This area of search remains our preferred landfall area of search due to the reasons set out in section 4.1.5 above and further technical studies confirming that a trenchless installation technique beneath the Leiston-Aldeburgh SSSI and North Warren RSPB Reserve could be utilised. Limited feedback was received through non-statutory consultation which provided any additional or new information regarding the feasibility of landfall area of search S2. Feedback was received through both non-statutory consultation and through the scoping opinion which identified the need to consider coordination and colocation with other projects in order to minimise impacts. Of the two landfall areas of search (S2 and S3N) that were consulted on during non-statutory consultation only landfall area of search S2 could facilitate colocation with other projects due to the space constraints at S3N both on the marine approach and terrestrial onward routeing.

Evolution of the Offshore Scheme

- 4.1.7.2 Following feedback from non-statutory consultation, stakeholder engagement and further environmental, socio-economic and technical studies, the Offshore Scheme has been refined from the Offshore Scheme Scoping Boundary to the Offshore Scheme boundary as illustrated on **Figure 1.1.4 Offshore Scheme Boundary**.
- 4.1.7.3 The Offshore Scheme for this preliminary environmental information report (PEIR) comprises of a bundled pair of HVDC cables and one bundled fibre optic cable. The Offshore Scheme boundary, illustrated on **Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 4 of 5**, is typically 500m wide for the majority of the Offshore Scheme, representing a typical offshore working corridor within which the cable can be laid.
- 4.1.7.4 There are three areas where the Offshore Scheme Boundary has either been widened or refined from the Offshore Scheme Scoping Boundary to the current draft Order Limits. The reasons for these refinements are explained in the sections below.

Area 1 - Approaches to Suffolk Landfall

- 4.1.7.5 The Offshore Scheme has been refined on the approach to the Suffolk landfall (S2 Landfall Area of Search). This is shown on **Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 4 of 5**.
- 4.1.7.6 This refinement follows a combination of analysis of the marine survey data collected in summer 2021 and further advances in the Proposed Project design to identify a proposed landfall location within the wider S2 landfall area of search. Refinements of the Offshore Scheme boundary at the Suffolk landfall have also been made in consideration of the location of the onshore transitional joint bay as presented in

Volume 1, Part 1, Chapter 4: Description of the Proposed Project, and also the location of the proposed trenchless crossing beneath the Leiston-Aldeburgh SSSI and North Warren RSPB Reserve.

Area 3 – North of the Sunk TSS

- 4.1.7.7 Area 3 located North of the Sunk TSS has now been extended from the Offshore Scheme Scoping Boundary to the Offshore Scheme boundary as illustrated on **Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 4 of 5**.
- 4.1.7.8 This extension at Area 3 follows stakeholder engagement feedback from the Harwich Haven Authority regarding concerns to shipping and navigation and a subsequent request to move the cable route north of the W1 buoy and out of the existing pilotage area. This extension of the boundary allows for flexibility in route optimisation at this location and also to reduce the risk to shipping and navigation.

Area 5 – Approaches to Kent Landfall

- 4.1.7.9 Area 5 located at approaches the Kent landfall (K1) has now been refined from the Offshore Scheme Scoping Boundary to the Offshore Scheme boundary **Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 4 of 5**.
- 4.1.7.10 This refinement follows a combination of analysis of the marine survey data collected in summer 2021 and further advances in the Proposed Project design which consider engineering and construction activities. This has considered the location of the Cliffsend historical landfill site, and the standoff required from the existing Nemo Link cables within Pegwell Bay.

4.1.8 Additional Marine Surveys 2023

- 4.1.8.1 There are a number of additional routing refinement areas proposed within the Offshore Scheme boundary (**Figure 4.1.1 Evolution of the Offshore Scheme, Sheet 5 of 5**). This includes potential routing to avoid the Goodwin Sands MCZ. All route refinements will be informed by further project survey work which are planned for late summer 2023. No re-scoping is planned post marine surveys 2023 as the additional survey areas do not present a material change to the scoping boundary submitted to the Planning Inspectorate in October 2022.

4.1.9 References

Ref 1.1: DNV (2016) Recommended Practice: Subsea power cables in shallow water. [online] Available at: <https://dokumen.tips/documents/dnvgi-rp-0360-subsea-power-cables-in-shallow-water-a-3242-addition-of-the.html?page=1>. [Accessed 19 April 2023].

Ref 1.2: The Conservation of Habitats and Species Regulations (2017). [online] Available at: <https://www.legislation.gov.uk/uksi/2017/1012/contents/made>. [Accessed 17 April 2023].

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