Options, Siting and Routeing Report

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LIONLINK

Contents

Tables

Figures

Appendices

Executive summary

National Grid Lion Link Limited (NGLLL) is developing its plans for the LionLink Project, a new subsea electricity cable (known as an interconnector) between Great Britain (GB) and The Netherlands (NL). LionLink will enable the cross-border transmission of clean electricity with the capacity to deliver up to 2.0 gigawatts (GW) of electricity, which will be vital in supporting greater energy security and delivering more affordable energy for consumers. As an Offshore Hybrid Asset (OHA), LionLink would also connect to a Dutch offshore wind farm (OWF).

This report provides a summary of the methodology and key findings of the options, siting and routeing work that has been undertaken to date. It identifies the emerging preferences for the location of the Proposed Scheme components (defined as the part of the Project within the British jurisdiction) comprising the Landfall, Converter Station and Cable corridors (onshore and offshore), with particular focus on the work from the non-statutory consultations that took place in 2022 and in 2023.

The siting and routeing of the Proposed Scheme has been informed by a number of environmental and technical assessments as part of an iterative optioneering process from 2018 – 2022 which informed the short list of options taken forward as part of the non-statutory consultation in 2022 (24 October – 18 December 2022) and additional Landfall and cable routeing options that were presented as part of a supplementary non-statutory consultation in 2023 (8 September – 3 November 2023). In March 2024, the Proposed Scheme sought a Scoping opinion from the Planning Inspectorate on behalf of the Secretary of State in relation to the proposed onshore and offshore scheme.

Options consulted on in 2023 covered five landfall options and four Converter Station site options. The feedback received during the 2022 and 2023 non-statutory consultations was carefully reviewed and considered, alongside ongoing environmental and engineering feasibility studies. The work has also been informed by opportunities to co-locate key infrastructure components with other infrastructure projects in the region.

<u>2023 Landfall options:</u>

- Landfall at Southwold and alternative onshore High Voltage Direct Current (HVDC) cable corridor to the north of Southwold
- Landfall at Walberswick A (original)
- Landfall at Walberswick B (alternative)
- Landfall Dunwich
- Landfall Aldeburgh

<u>2023 Converter Station options:</u>

- Site 1 – located approximately 1.75km southeast of Kiln Lane Substation
- Site 3– located approximately 1.3km northwest of Kiln Lane Substation
- Site 4– located the furthest from Kiln Lane Substation (approximately 3.2km northeast) and comprises the former Royal Air Force Leiston airfield
- Site 5– located approximately 0.3km northeast of Kiln Lane Substation

The 2023 options were presented following further technical studies, environmental surveys, and a range of environmental, socio-economic and design considerations, the emerging Landfall preferences identified were:

- Landfall at Southwold and alternate onshore HVDC cable corridor to the north of Southwold
- Landfall at Walberswick B (alternative)

Further appraisal concluded that the Walberswick B Landfall site and the associated marine and onshore route corridors, which connects into the common corridor, is the preferred Landfall option.

Site 3 (located approximately 1.3km northwest of Kiln Lane Substation) was identified as the preferred option for the Converter Station location, which presents the opportunity for colocation, a key theme from the 2023 non-statutory consultation feedback.

The Offshore Scheme was developed using environmental constraints to inform the routeing work, mapped from the coast to the European Economic Zone (EEZ). There were five options for crossing the EEZ based on an end point of the cable being at a planned Dutch OWF converter station.

EEZ Crossing Points:

- A – Most northerly crossing point and closest to the OWF Nederwiek Gamma planned offshore converter station
- B – Second most northerly crossing point and closest to Dutch OWF Nederwiek Beta planned offshore converter station
- X – Central crossing point and closest to Dutch OWF Nederwiek Alpha proposed offshore planned station
- C – Central crossing point and South of Dutch OWF Nederwiek Alpha and West of Dutch OWF Ijmuiden Alpha planned offshore converter stations
- D – Southern crossing point, South of Dutch OWF Ijmuiden Alpha planned offshore converter station

After considering constraints on both sides of the EEZ UK and NL, crossing point A was taken forward.

As a result of this ongoing work, NGLLL is now consulting on the preferred options as part of the Statutory Consultation.

1 Introduction

1.1 Purpose of document and structure

1.1.1.1 LionLink ('the Project')[1], is a proposal by the Applicant, NGLLL, to deliver an electricity interconnector between GB and NL. The Proposed Scheme, which is the subject of this statutory consultation, comprises all GB elements of the Project up to the EEZ and this will be the subject of an application for development consent. The Applicant holds an electricity interconnector licence granted pursuant to Section 6(1)(e) of the Electricity Act 1989, meaning that the Applicant is classed as a statutory undertaker for certain purposes.

1.1.1.2 In line with our statutory duties under the Electricity Act 1989 (Schedule 9), NGLLL's role as an interconnector transmission license holder is to:

> *"have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and shall do what it reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects."*

1.1.1.3 The Proposed Scheme seeks to deliver an interconnector connection to the UK national grid at the Kiln Lane Substation and will make landfall within East Anglia. The Project will also connect to a Dutch OWF in the North Sea.

1.1.1.4 The purpose of this report is to:

- provide an overview of the study area
- present the options appraisal work, with particular focus upon the non-statutory consultations in 2022 and 2023
- describe how the Proposed Scheme has evolved, including how we have developed the emerging preferred location of the Project infrastructure within the identified study area
- describe the 3 key stages used during the optioneering process to assess and identify the feasible options for the landfall, converter station sites and potential route corridors onshore and offshore (also reported in the Preliminary Environmental Information Report (PEIR) – **Chapter 3: Alternatives and Design Evolution**):

1.1.1.5 The report summarises the key onshore and offshore technical and environmental findings and describes the constraints that have been considered to inform the decisions taken.

1.1.1.6 This includes the shortlist presented at the non-statutory consultations in 2022 and the supplementary non-statutory consultation in 2023, the considerations of feedback, and further appraisals undertaken to select the emerging preferred

[1] The project was previously known as EuroLink. In April 2023, EuroLink was renamed LionLink to better reflect our Anglo-Dutch partnership. The fundamentals of the project remain the same, only the name was changed.

options onshore, and the offshore route development work presented in this statutory consultation.

1.2 Background information on the project and needs case

1.2.1.1 The UK is rapidly transforming its energy system, moving away from fossil fuels and toward clean, low-carbon technologies.

1.2.1.2 International electricity interconnectors are a key part of this strategy. They enable the sharing of renewable energy between countries, improving system resilience, reducing costs and making energy more sustainable.

1.2.1.3 By enabling the rapid transfer of electricity between markets, interconnectors enable energy to be imported and exported depending on the needs of the market and in line with market prices. Interconnectors are also an effective tool to support the intermittent nature of renewable energy and help to support the network when demand is high.

1.2.1.4 GB has experienced success from existing interconnectors, which have connected energy between GB and Belgium, Denmark, France, Ireland and NL.

1.2.1.5 OHAs are seen as the next generation of interconnector, that will connect OWFs to multiple countries.

1.2.1.6 In addition to facilitating the sharing of energy between countries, OHAs will also help to speed up the connection of offshore wind and maximise the use of wind generation. They will also reduce the impact on local communities by reducing the amount of connection points and onshore infrastructure required to connect this clean energy to the shore. The North Sea holds significant potential for both the UK and Europe to achieve significant increases in offshore wind energy.

1.2.1.7 LionLink is an OHA. The Office of Gas and Electricity Markets (Ofgem) has made an initial project assessment and consider that LionLink is likely to be in the interest of GB consumers, and therefore Ofgem has decided to grant the project a Pilot OHA regulatory regime in principle. This decision is supported by National Electricity System Operator's (NESO) System Impact Assessment Report.

1.2.1.8 The UK Government has recognised the significant role that international electricity interconnectors play in facilitating a secure, stable and clean energy system[2]. Accordingly, the Government's National Policy Statements acknowledge the importance and benefits of increasing levels of interconnection as part of national planning policy, and there is wide energy policy support for increased interconnection development.

1.2.1.9 The objective of the Project is to connect the British and Dutch National Transmission Systems (NTS), as well as facilitating a connection to Dutch offshore wind generation, for the purpose of achieving the energy security and supply benefits that come with a project of this scale. LionLink would also continue to boost interconnector capacity, and contribute towards the UK government's commitment of reaching net zero by 2050.

[2] The Needs Case relevant references are listed on page 131

1.2.1.10 The Project therefore delivers on core aspects of the UK Government's energy strategy : it supports a reduction in carbon emissions; contributes towards addressing the current unreliable nature of renewable energy supply and it provides the security, stability and cost savings that are associated with interconnectors. It is a step towards a more coherent and therefore more efficient electricity transmission network. This is supported by the Initial Project Assessment decision and subsequent conditional amendment provided by Ofgem in agreeing the Regulatory parameters in which the Project will operate.

1.2.1.11 When determining the connection point for LionLink, NESO, which oversees the strategic planning of Great Britain's electricity grid, assessed a range of environmental, technical, and cost factors. Following discussions with National Grid Ventures (NGV), NESO identified East Suffolk as the optimal connection point for LionLink in Great Britain. In 2017, NESO granted a connection agreement for the project to link to a new substation in the Leiston area1. This has been re-confirmed through a modification to the connection agreement in June 2025. The Applicant considers the connection point to be appropriate and consentable, and from an electricity system perspective is also consistent with NESO's East Anglia Study.

1.3 Description of the project

1.3.1.1 The LionLink Project will enable the cross-border transmission of clean electricity with the capacity to deliver up to 2.0GW of electricity, which will be vital in supporting greater energy security and delivering more affordable energy for consumers see **Figure 1-1**.

1.3.1.2 As an OHA, LionLink will also connect to a Dutch OWF and would connect GB and NL NTSs, supporting the UK Government's energy objectives.

1.3.1.3 Development within GB territory ("the Proposed Scheme") includes the following components:

- Kiln Lane Substation;
- Underground High Voltage Alternating Current (HVAC) Cables between Kiln Lane Substation and the Converter Station;
- Converter Station;
- Underground HVDC Cables between the proposed Converter Station east of Saxmundham, and the Landfall Site at Walberswick;
- Landfall Site at Walberswick;
- Offshore HVDC Cables from the proposed Landfall Site at Walberswick at the UK coast, to the edge of the UK EEZ.

1.3.1.4 The Proposed Scheme also includes the following works:

- Associated enabling works, construction activities and temporary land take to deliver the Proposed Scheme; and
- Required landscaping, drainage and biodiversity environmental mitigation measures.

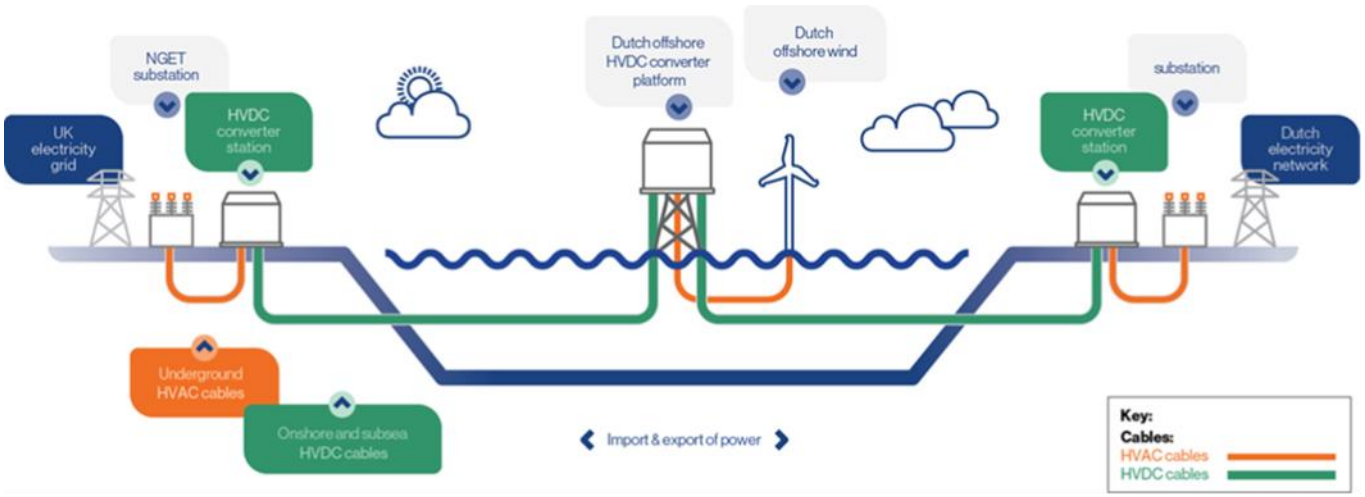

Figure 1-1: Schematic of the proposed works

1.4 Proposed Cable Technology

1.4.1.1 HVDC technology is an alternative to HVAC for point-to-point power transmission and is utilised on interconnectors, such as the Project, for bulk power transfer over longer distances or between different grids to reduce cost and reduce power loss.

1.4.1.2 It is more efficient to use HVDC technology to transmit electricity between the two countries, rather than HVAC, due to the physical distance involved. At longer distances, HVDC technology is more efficient as it can transmit larger volumes of electricity with fewer losses than an equivalent HVAC system.

1.4.1.3 The description and installation techniques for cable options are depicted in **Chapter 2: Description of the Proposed Scheme** of the PEIR.

1.5 Kiln Lane Substation

1.5.1.1 Kiln Lane Substation[3] has already been consented as part of other third-party Development Consent Orders, specifically the Scottish Power Renewables (SPR) East Anglia One North (EA1N) and East Anglia Two (EA2) Consents. It is anticipated that Kiln Lane Substation will be delivered in advance of the Proposed Scheme coming forward, under the extant SPR EA1N and EA2 Consents by 2028. National Grid Energy Transmission (NGET) have also sought to consent Kiln Lane Substation as part of their Sea Link project, which is currently going through the Development Consent Order (DCO) examination process.

1.5.1.2 The Proposed Scheme proposes a connection to the existing transmission network via the consented Kiln Lane Substation and is discussed in more detail in **Section 2.2**. The Kiln Lane Substation as consented by SPR does not include sufficient connection capacity for the Proposed Scheme, therefore in order to facilitate connection of the Proposed Scheme some additional extension works would be

[3] 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. See also Network Connection Point detailed in **section 2.2**.

required at the Kiln Lane Substation – these works are currently expected to be included within the application for development consent for the Proposed Scheme.

1.5.1.3 In order to account for the unlikely scenario that the Kiln Lane Substation is not delivered pursuant to the SPR consent(s), and to avoid the Proposed Scheme being reliant on third party works which are yet to be implemented, the Applicant is currently proposing to consent delivery of the Kiln Lane Substation in its entirety as an alternate consenting scenario in order to safeguard the future connection requirements of the Proposed Scheme. Consenting scenarios are further described in **Chapter 5 EIA Approach and Methodology** of the PEIR.

1.6 Project Objectives

1.6.1.1 The consideration of the Project's objectives is relevant to the options, siting and routeing work within this report. National policy and legislation require that Applicants must demonstrate that reasonable alternatives to the proposed development have been considered and appropriately assessed. In considering reasonable alternatives for a Proposed Development that they should be realistic and capable of meeting the project's objectives, amongst other requirements.

1.6.1.2 The Project's primary and secondary objectives are**:**

1.6.1.3 Primary Objectives

- Develop a multi-purpose interconnector linking NL and the UK electricity transmission networks and connecting and exporting offshore wind in Dutch waters to the UK
- Deliver increased interconnector capacity by 2035 towards Government targets
- Deliver security of supply to the UK by allowing sharing of electricity reserves, generation capacity and ancillary services, thereby allowing for increased reliance on intermittent renewable energy sources
- Deliver energy market integration allowing transportation of renewable energy throughout Europe.
- Deliver competition in electricity and capacity markets, lowering the cost of energy to the consumer
- Project infrastructure should be consentable and deliverable.

1.6.1.4 Secondary Objectives

- Deliver the most efficient offshore and onshore cable routes
- Deliver as far as possible a co-ordinated offshore and onshore transmission network, allowing Dutch OWFs to be linked to a single connection point onshore in the UK
- Mitigate as far as possible the impact of multiple onshore connections in the UK
- Ensure that the installation, operation and eventual decommissioning of the Project can be undertaken in a safe and efficient manner
- To avoid where possible, or otherwise minimise the distance through which the route crosses protected sites
- To avoid where possible impact on leisure and business users.

  To minimise disruption to shipping and fishing.

2 Methodology

2.1 Introduction

2.1.1.1 The methodology used during the options, siting and routeing process to assess and identify the feasible options for the landfall, converter station sites and potential route corridors is summarised in three stages (also reported in the **PEIR Chapter 3: Alternatives and Design Evolution)**:

- **Stage 1:** Identification of environmental baseline for the study areas (see sections 2.3 - 2.5) within which the Proposed Scheme components could be developed, based on the network connection point (covered in **Section 2.2**)
- **Stage 2:** Development and appraisal of a long list of options based on the defined study area to identify a short list for further appraisal and presented as part of the 2022 non-statutory consultation (covered in **Section 4**)
- **Stage 3:** Appraisal of the options short list using feedback from the 2022 non-statutory consultation, technical and environmental assessments, and a further supplementary non statutory consultation in 2023 (covered in **Section 5**) and identification of preferred option(s).

2.1.1.2 The environmental appraisals have focused on the following broad topics within the relevant national and local policy and legislative framework (see **Appendix A**):

- Landscape and visual;
- Historic environment;
- Biological environment;
- Physical environment;
- Socio-economic factors, including
  - Settlement and population;
  - Tourism and recreation;
  - Land/marine use;
  - Infrastructure;
  - Traffic and access; and
  - Shipping and navigation.

2.1.1.3 Throughout the appraisal process relevant constraints mapping related to each topic area has been reviewed in detail and consideration has been given to the information to inform the decision-making process for each component of the Proposed Scheme.

2.1.1.4 Throughout the appraisal process, there has been an ongoing backcheck of outcomes and recommendations. The process has been the subject of periodic design reviews and validation exercises to ensure the decisions made through the options appraisal process remain valid as further information becomes available through surveys and stakeholder feedback.

2.1.1.5 In March 2024, the Applicant sought a scoping opinion under Regulation 10 of the Infrastructure Planning Environmental Impact Assessment (EIA) Regulations 2017.

On 16 April 2024 this was formally adopted by the Planning Inspectorate on behalf of the Secretary of State.

2.2 Network connection point (pre-stage 1)

2.2.1.1 In 2017 the Project applied to National Grid Electricity System Operator (NGESO) for an interconnector connection to the GB National Electricity Transmission System (NETS), following the Connection and Infrastructure Options Note (CION) process NGESO made an offer for connection at the proposed Leiston 400kV substation.

2.2.1.2 The CION outlined the comparative assessment of connection options led by National Grid as electricity System Operator (SO) of the electricity transmission system across Great Britain (NGESO) and included input from National Grid Ventures (NGV) as the then Applicant for the development and from the Transmission Owner (TO) part of National Grid (NGET). Note that in 2024 NGESO was made a public body under the Energy Act (2023), referred to as the National Electricity System Operator (NESO).

2.2.1.3 The assessment 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 Electricity Act 1989 requires National Grid (as transmission, distribution or interconnector owners) to be efficient, co-ordinated and economical when formulating proposals, whilst also having regard to the environment. When the development being connected is offshore, such as an interconnector, the offshore aspects are also considered. The process is illustrated in **Figure 2-1.**

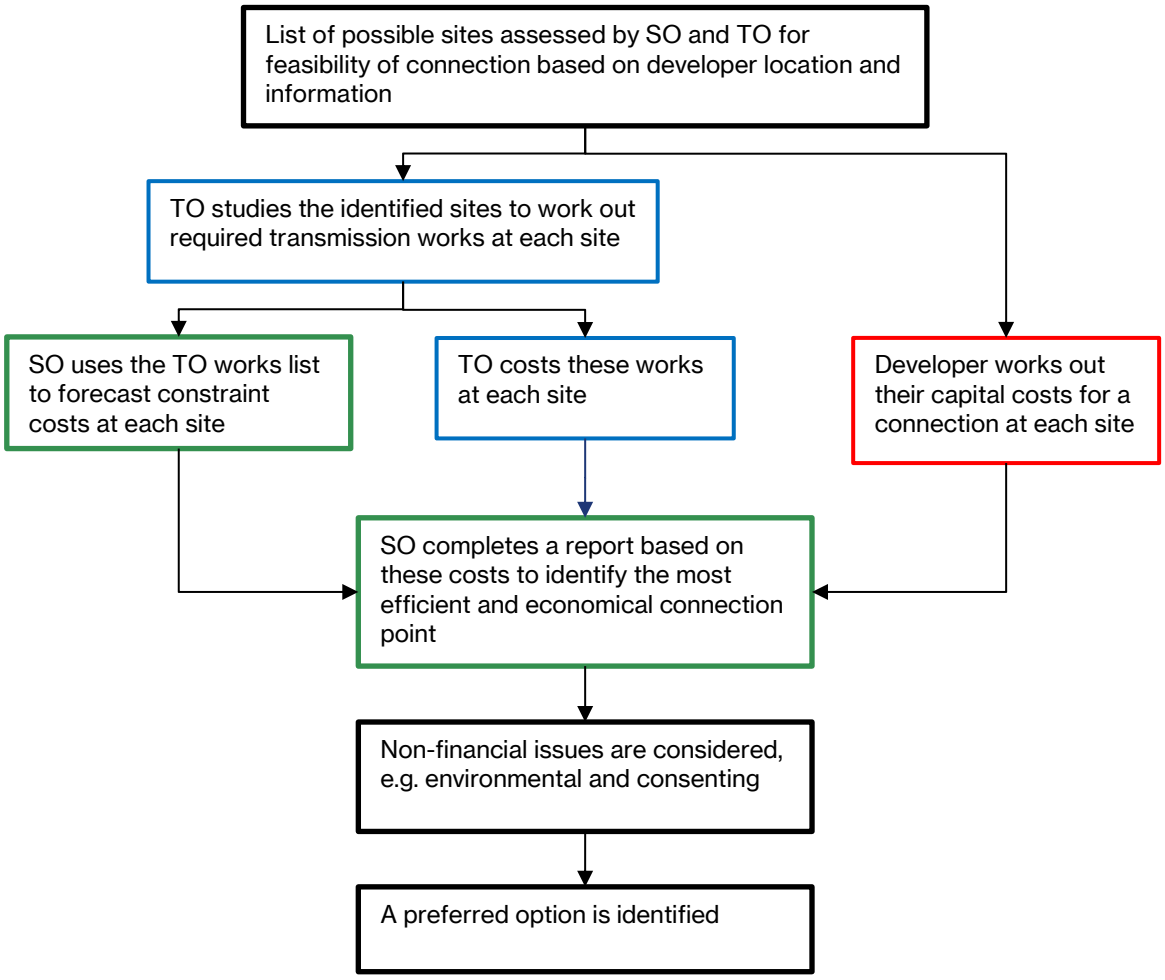

Figure 2-1: CION process

2.2.1.4 Through the CION, it was established that the most efficient and economical connection point was the then newly proposed Leiston 400kV substation (now known as Kiln Lane). The CION assessment considered the proposed location of the LionLink project alongside the proposed location of the Nautilus project, with the CION recommending that both projects enter into a connection agreement. After an initial assessment, shortlisted substation sites across the southeast coast of England included:

- Grain 400kV Substation,
- Norwich Main 400kV Substation,
- Rayleigh Main 400kV Substation,
- Sizewell 400kV Substation, and
- Kiln Lane 400kV Substation (formally known as “Leiston 400kV”)

2.2.1.5 The analysis by NGESO found that the most economic and efficient connection site was the newly proposed substation, provisionally referred to as “Leiston 400kV” substation.

2.2.1.6 The recommended option of the CION (2017) was a connection at a new 400kV substation located close to the existing Sizewell 400kV substation and was provisionally referred to as “Leiston 400kV” substation.

2.2.1.7 A preferred location for the “Leiston 400kV” substation was identified near Friston, this became the Kiln Lane Substation (further information on the previous names for the Kiln Lane Substation is **covered in Section 1.5**).

2.2.1.8 The Kiln Lane substation was consented on 31 March 2022 when the Secretary of State Department for Business, Energy and Industrial Strategy (BEIS) granted development consent for Scottish Power Renewables’ ‘East Anglia ONE North’ and ‘East Anglia TWO’ offshore wind farms.

2.2.1.9 LionLink has also secured regulatory approval on this basis. National Grid Ventures applied to Ofgem’s cap and floor Offshore Hybrid Asset (OHA) Pilot for Initial Project Approval (IPA) in October 2022 with grid connection at “Leiston 400kV”. In March 2024 Ofgem published their OHA Pilot IPA consultation minded-to approve LionLink with “Leiston 400kV” connection point and subsequently confirmed approval in their November 2024 IPA Decision.

2.2.1.10 In March 2025 National Grid Ventures submitted a ModApp to NESO (formally NGESO) seeking to update certain aspects of the connection agreement (specifically the date of connection and connection capacity aligned to the current objectives of the Project). The connection offer that was made by NGESO in conjunction with NGET, and which was subsequently entered into, retained Kiln Lane as the most economic and efficient point of connection[4]. At the time of the ModApp the Nautilus project had rescinded its connection agreement in Suffolk as such this was the baseline that was considered by NGESO in its assessment.

2.3 Connection point with TenneT

2.3.1.1 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.

[4] The connection point will be referred to as Kiln Lane Substation for the remainder of this report.

3 Stage 1: Study Area Identification

3.1 Study Area: Potential Converter Station Sites

3.1.1.1 Having established the network connection point as the Kiln Lane Substation. the study area for potential Converter Station Sites was identified as a 5km radius from the proposed substation. The approach was to develop an economic and efficient cable route having regard to environmental constraints.

3.1.1.2 The most efficient technical solution is to locate the converter station as close to the proposed substation as possible. This reduces the length of the HVAC cable circuits needed to connect the proposed substation and the converter station. Longer HVAC cable routes result in increased reactive power transmission losses which can require extra equipment in the converter station to compensate these losses. A maximum distance of 5km was identified as this is considered to reduce the likelihood of needing this extra equipment and therefore limited the land area required for the converter station.

3.1.1.3 In addition, HVAC cable routes typically require a larger working width than that of HVDC cables. A longer HVAC cable route between the converter station and the substation, therefore, has the potential to impact a larger area of land. Minimising the distance between the infrastructure helps reduce disruption and the land take required for cable burial.

3.2 Study Area: Potential Landfall Sites

3.2.1.1 The initial study area considered Landfall Sites including the stretch of coastline adjacent to the converter station search area with the objective of reducing disturbance from cable installation as far as possible and by adopting the most direct route as far as reasonably practicable. As part of a joint study for the Nautilus and LionLink Projects, the study area encompassed Aldeburgh in the south to Dunwich in the north (see **Figure 3-1**).

3.2.1.2 For LionLink this was subsequently extended northwards to encompass the coastline to Lowestoft to ensure a sufficiently broad area was considered in finding the most suitable site. A further distance of 5km seaward from the coastline was included in the study area to ensure marine environmental constraints in the nearshore area with the potential to influence landfall feasibility were adequately considered.

3.2.1.3 The assessment included technical assumptions for all onshore and up to 5km offshore infrastructure components, with the basic parameters considered for these components outlined in **Table 3-1**.

Table 3-1: Maximum parameters used for Technical Components

Component	Requirements
Landfall	Working area: 2 hectares

Component	Requirements
Cable Route	HVDC working corridor width: Trenched 30m (trenchless 50m) with an additional 35m precautionary width either side (i.e. 100m as the DCO boundary.
	HVAC working corridor width: Trenched 50m (trenchless 60m) with an additional 50m precautionary width either side (i.e. 150m as the DCO boundary.
Converter Station	Minimum footprint required: 5 hectares
	Broadly rectangular layout on a flat site
	Maximum height: 26m above ground level[5]
	Route for abnormal indivisible loads
	Additional temporary working area: 3 hectares

[5] Initial studies (2020) considered a Converter Station height of 24 metres, with later studies identifying a maximum height of 26 metres.

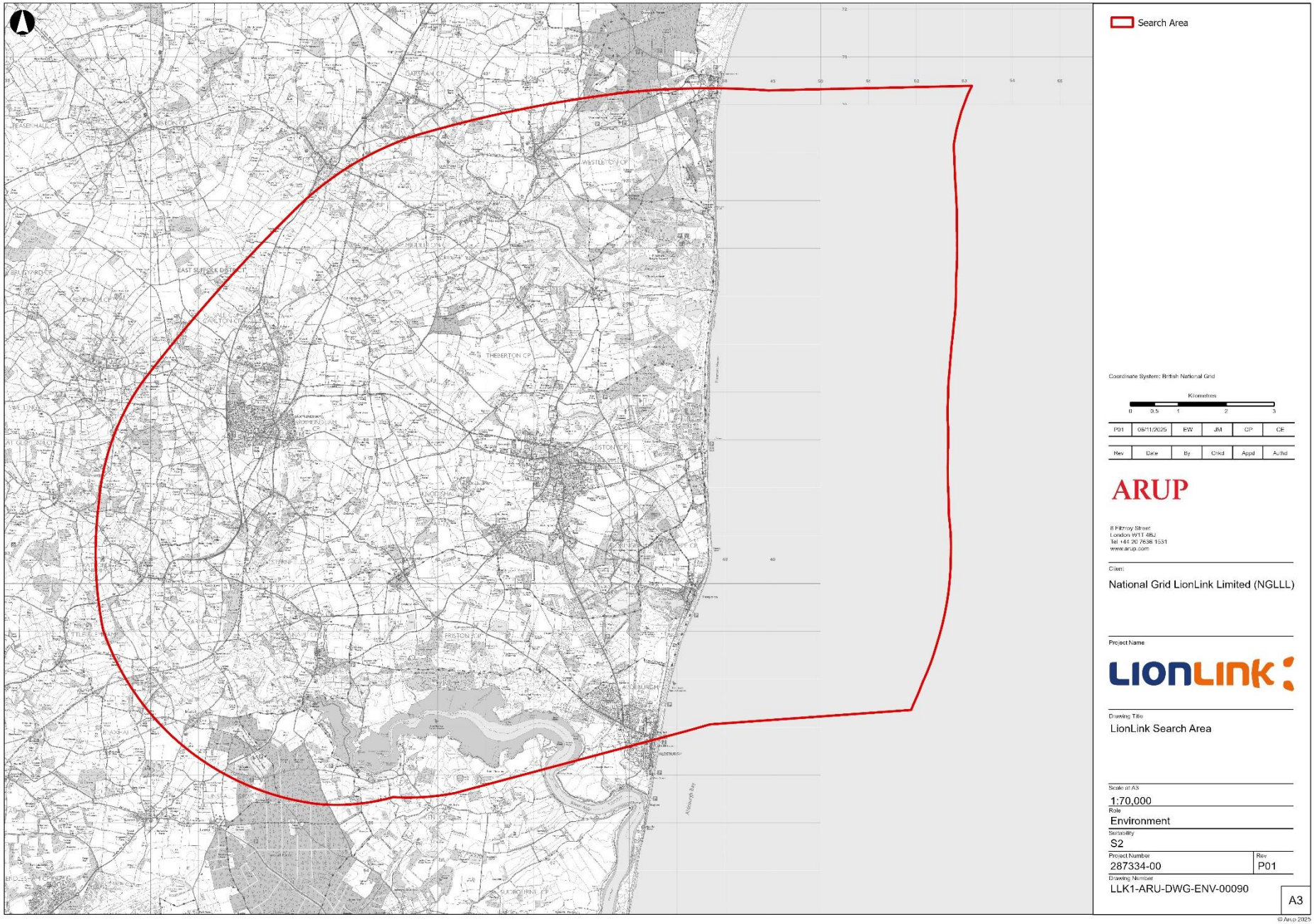

Figure 3-1: Study Area for Nautilus and LionLink (previously named EuroLink)

3.3 Study Area: Exclusive Economic Zone (EEZ) crossing point

3.3.1.1 The Project proposal includes a connection to an OWF in Dutch waters. Therefore, border crossing points at the EEZ were required. These were to connect to a converter platform in one of six planned offshore windfarms in NL (from North to South);

- Nederwick Gamma
- Nederwick Beta
- Nederwiek Alpha
- Ijmuiden Ver Gamma
- Ijmuiden Ver Beta
- Ijmuiden Ver Alpha

3.3.1.2 The identification of the EEZ crossing locations, as well as the landfall study area, aided in the identification of the study area for marine cable routeing (as shown in **Figure 2-3**).

3.3.1.3 The EEZ border crossing points have been established by undertaking a routeing assessment from the platform locations in NL (provided by TenneT) to areas along the UK/NL territorial border where it is practical for both the UK and NL routes to join around existing windfarms and constraints. The potential border crossings between UK and NL waters also considered the degree of available space on either side of the EEZ.

3.3.1.4 EEZ crossing points A, B, C and D were initially proposed as options for crossing points of the EEZ. An additional point X on the EEZ boundary was later identified in the event a connection could be utilised there

3.3.1.5 The result was five proposed locations for the cable to cross the EEZ (A, B, C, D and X) (**Figure 3-2**). However, Connection Point D was discounted due to the route length and number of third-party infrastructure crossings in Dutch waters.

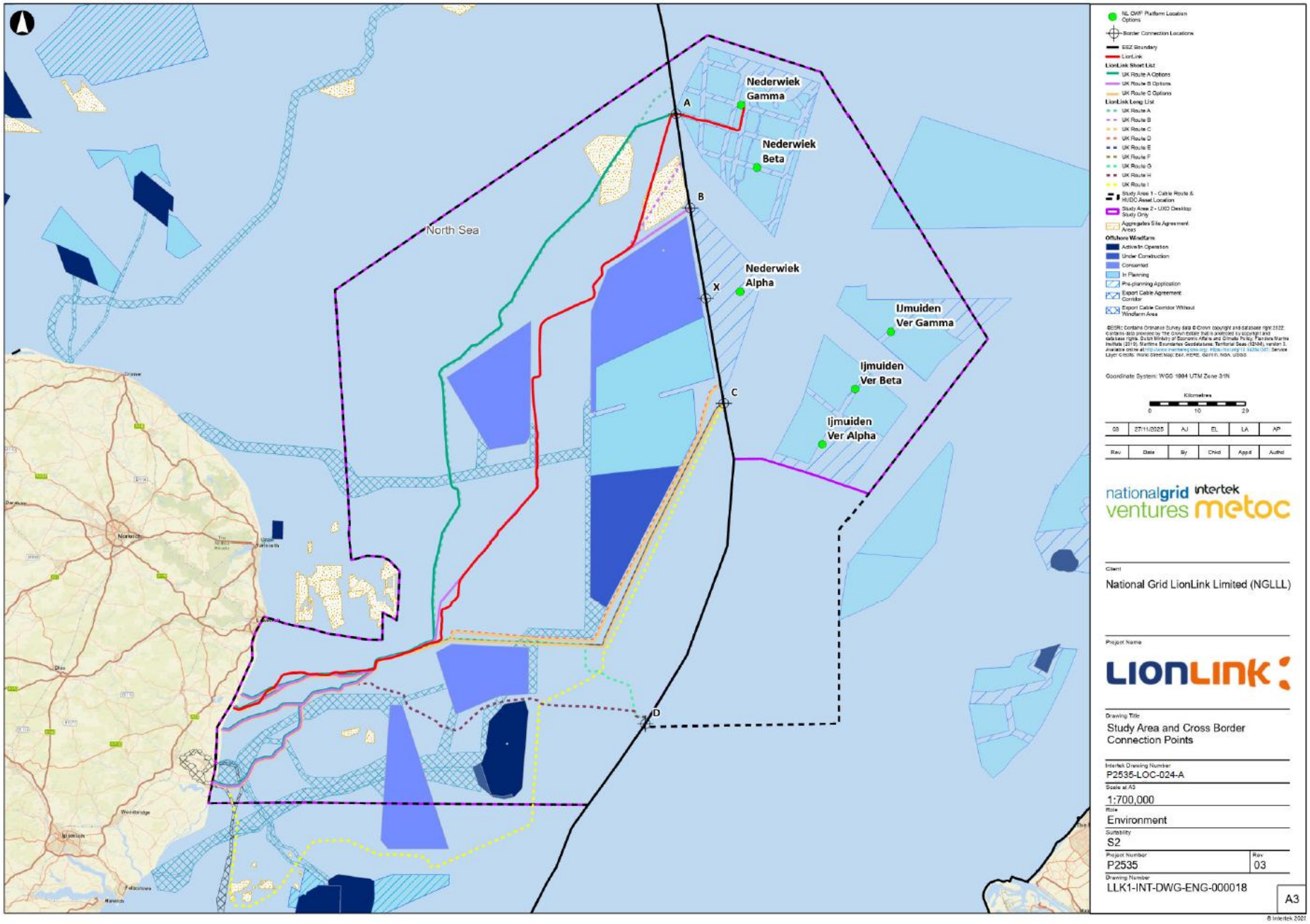

Figure 3-2: Offshore EEZ Crossing Points

3.4 Substation Back-check and Review

3.4.1.1 NGLLL has considered the location of the substation following the technical changes to the Project since the original connection offer in 2017. These changes include:

- The re-location of the Nautilus connection point from Kiln Lane Substation, Suffolk to the Isle of Grain, Kent;
- The change from the project as a point-to-point interconnector to an OHA (including the identification of the connection point to a Dutch OWF– see **Section 2.5**);
- The change in connection date to 2035; and
- The increase in capacity of the Project to allow for up to 2GW export and 1.8GW import.

  NGLLL considers that the proposed Kiln Lane Substation remains the most appropriate network connection point.

3.4.1.2 The consentability of the substation at Kiln Lane has been considered by NGLLL throughout the siting and routeing process. Kiln Lane substation has been consented through two development consent orders for non-interconnector power projects (for the projects EA1N/EA2) and, due to potential consenting scenarios, is also being consented through NGET's Sea Link project as discussed in **Section 1.5**. Therefore, NGLLL considers that Kiln Lane is an appropriate and consentable substation location for the project.

3.4.1.3 NGLLL has reviewed the connection point of the project from a strategic perspective as covered in the Needs case in **Section 1.2**. NESO has undertaken the East Coast Study, which includes a holistic assessment of ten network configuration options that transfer power across and around the East Coast region. In all assessment scenarios, there is an assumption of one interconnector connection at Kiln Lane Substation. This assumption remains valid, with LionLink being the only interconnector to connect into Kiln Lane Substation. NGLLL considers that its approach to consenting also aligns with NESO's East Coast Study.

3.5 Criteria for evaluating options and other considerations

3.5.1.1 An options appraisal is used to consider the implications of the selection of certain options when developing infrastructure projects. NGV have developed a set of over-arching guiding principles for option appraisals for onshore and offshore routes and sites. These principles assist in the decision-making process by helping achieve an appropriate balance between the different competing interests that need to be looked at during an options appraisal. There is no hierarchy in the principles, and they are as follows:

- Using or adapting existing infrastructure will generally be given priority over creating new infrastructure.

- Shorter routes will generally be given priority over longer ones, as smaller-scale infrastructure projects are likely to have lower environmental, safety, sustainability and cost implications (for comparable technology options).
- Financially less-expensive options, both in terms of capital and lifetime cost, will generally be given priority. Options which avoid or minimise and mitigate impacts on environmental or socio-economic constraints will generally be given priority over those which have likely significant residual effects, as less environmentally and/or socially damaging routes, following the mitigation hierarchy in support of the Applicant's duty to 'have regard to the desirability of preserving amenity'

3.5.1.2 Three topic areas were considered during the option appraisal process: environment, socio-economic and technical. Within these topic areas a list of sub-topics which align with best practice informed by the requirements of the EIA Regulations, were defined.

3.5.2 Onshore Appraisal Criteria

3.5.2.1 Following the connection agreement, a feasibility study for the Proposed Scheme components was undertaken in 2018, with a study area compromising the land around Leiston and Sizewell extending inland along the existing 400kV OHL running between Sizewell and Bramford. It provided a baseline analysis of the surrounding location and topography, with consideration of the following key environmental aspects:

- National Character Area 82: Suffolk Coast and Heaths
- National Character Area 83: South Norfolk and High Suffolk Claylands
- Suffolk and Essex Coast and Heaths National Landscape (formerly Suffolk Coast Area of Outstanding Natural Beauty (AONB))[6]
- Sand Dunes and Shingle Ridges
- Coastal Levels
- Estate Sandlands
- Southern North Sea candidate Special Area of Conservation (SAC)
- Outer Thames Estuary Special Protection Area (SPA)
- Minsmere-Walberswick Ramsar Site, SAC, SPA and Site of Special Scientific Interest (SSSI)
- Sandlings SPA
- Alde Ore Estuary Ramsar site, SPA, SAC and SSSI
- Leiston-Aldeburgh SSSI
- Sizewell Marshes SSSI

3.5.2.2 The feasibility also considered the location of Tree Preservation Orders, ancient woodland, designated heritage assets, Public Rights of Way (PRoWs) and local footpaths and the potential for flood risk.

[6] In November 2023 all designated AONBs were renamed as National Landscapes, and reference to National Landscapes is used throughout this document.

3.5.3 Offshore Appraisal Criteria

3.5.3.1 **Table 3-2** shows the sub-topics considered by the marine options appraisal. These topics (and sub-topics) were used to assess the offshore HVDC route corridor and potential landfall locations.

Table 3-2: Sub topics used during the marine options appraisal

Sub-topic	Constraints
Biological Environment	Highly Protected Marine Areas European Sites: SACs, SPA, Ramsar Sites Marine Conservation Zones (MCZ) SSSI Geological Conservation Review sites National Nature Reserves (NNR)/Marine Nature Reserves National Parks National Landscapes National Scenic Areas World Heritage Sites United Nations Educational, Scientific and Cultural Organization Biosphere Reserves Heritage Coasts Local Landscape Designations (various names) Important Bird Areas (IBA) Annex I Habitat (List of habitats designed as important for conservation and biodiversity and are therefore protected by law) Species of Conservation Interest / Priority Coastal Habitats Sensitive Fish Habitat
Physical Environment	Geology, including Sub Cropping or Outcropping Bedrock and Superficial Sediments Mobile Sediments e.g., sandbanks, sandwaves Bathymetric Features e.g., large intertidal expanse, bathymetric deeps, steep slopes Shoreline management e.g. coastal erosion rates and, coastal defences, shoreline management plans
Historic Environment	Protected Wrecks Charted Wrecks Other identified archaeological features
Socio-Economic Environment	Infrastructure (existing, consented or planned) e.g., OWFs, pipelines, cables, oil and gas structures

Sub-topic	Constraints
	Shipping and Navigation e.g., shipping lanes/density, traffic separation schemes, restricted navigation channels, anchorages, port limits, navigation lines, pilotage stations Restricted Areas e.g., military practice and exercise areas, marine aggregate areas, carbon capture and storage areas, geological disposal facilities Commercial Fisheries e.g., bottom drift netting areas, static gear areas, shellfish waters Recreational activities, tourism, and bathing waters

3.5.3.2 The risk that each sub-topic presented to the viability of development of the proposed Scheme from either a technical or consenting perspective was assessed by the project team. For any given section of the cable route there will be multiple constraints. The cable routeing would be undertaken to avoid constraints based on available data at the time of the assessment.

3.6 Baseline Onshore Environment

3.6.1 Introduction

3.6.1.1 This section provides a high-level summary of the baseline environment surrounding the area between the proposed connection point at the Kiln Lane Substation and the coastline, where the offshore cables will make landfall. The study area is determined to account for the potential siting of all of the Proposed Scheme's components, as defined in **Section 1.3.1.3**.

3.6.1.2 Converter stations, cable corridors and landfall locations were considered within a study area extending from Aldeburgh to Lowestoft, covering a coastal search area of approximately 36 kilometres. Additionally, the assessment included a consideration of these project components alongside the potential environmental and consenting implications.

3.6.1.3 The assessment considered a range of terrestrial, environmental and socio-economic factors for the study area around the connection point, including (but not limited to) environmental designated sites, heritage assets, hydrology features, publicly accessible land and recreational areas, landscape designations, settlements and known existing infrastructure.

3.6.1.4 The siting and routeing process sought to identify sufficiently sized parcels of land to accommodate the Proposed Scheme components within the study area in **Figure 3-1** according to the core design requirements, as outlined in **Table 3-1**.

3.6.1.5 Converter Station technical assumptions identified that a plot of land around 5 hectares would be required for the converter station. It is assumed that the maximum height would be 24m and may require a mixture of building configurations.

3.6.1.6 HVDC technical assumptions for the onshore HVDC cable corridor identified that a single circuit would be required from the landfall to the converter station. As stipulated in **Table 3-1** routeing for a 100m corridor was assumed to accommodate

cable installation and some flexibility, it was assumed a 15m permanent easement would be needed.

3.6.1.7 HVAC technical assumptions identified that a short connection between the converter station and the connection to the alternating current transmission system would be a preferred option to minimise costs and reduce the environmental risks associated with a connection. Routeing for a 150m corridor was sought, as per parameters in **Table 3-1**.

3.6.1.8 A summary of the environmental and socio-economic constraints considered as part of the siting and routeing work to identify potential locations for the components of the Proposed Scheme (Converter Station, Onshore Cable Corridors and Landfall) are listed below:

- Physical environment and infrastructure
  - Existing mapped infrastructure such as 400kV OHL, ports and harbours, airports, railways, motorways and trunk roads as well as rivers and water bodies.
- Cumulative development
  - Emerging proposals in relation to Nationally Significant Infrastructure Projects (NSIP) such as Électricité de France (EDF) Energy's Sizewell C project and SPR's EA1N and EA2 OWFs applications as well as planning applications.
- Population, tourism and heritage
  - Settlements, national parks, PRoW, cycle routes, national trails, and golf courses.
- Biological environment
  - Designated sites such as sites of SSSI, special areas of conservation (SACs), SPAs, Ramsar sites, ancient woodland, nature reserves, Royal Society for the Protection of Birds (RSPB) reserves, important bird areas (IBAs, Country Wildlife Sites (CWS), and proposed landscape and ecological enhancements associated with Sizewell and SPR projects.
- Landscape and visual
  - National parks, National Landscapes, Special Landscape Areas (SLA), heritage coast, national trails, and national character areas.
- Historic environment
  - Scheduled monuments, Conservation Areas, designated Archaeology, National Trust interests, registered parks and gardens, world heritage sites, registered battlefields, and listed buildings.

3.6.2 Physical environment

3.6.2.1 The superficial geology around the general area of the proposed Kiln Lane Substation and converter station is the Lowestoft Formation, comprising Diamicton overlying areas of sand and gravel. The underlying geology is of the Crag Group, which comprises sands, gravels, silts and clays.

3.6.2.2 The Lowestoft Formation is designated as a Secondary A aquifer (where mapped as sand and gravel deposits), a Secondary B aquifer (where mapped as clay and silt deposits) and a Secondary (Undifferentiated) aquifer were mapped as Diamicton.

3.6.2.3 Made ground is anticipated to be present associated with previous development. Current and historic potentially contaminative land uses include farms and sand/gravel extraction pits.

3.6.2.4 No geologically-designated SSSI or County GeoSites were identified.

3.6.2.5 The risk of UXO is generally considered to be low.

3.6.2.6 The area near the coast is typically low-lying with numerous small ponds and drainage ditches. Major rivers within the study area include: the Dunwich River, Minsmere River and Hundred River.

3.6.2.7 The entire Onshore Scoping Boundary sits within the Suffolk Coastal Operational Catchment. Watercourses generally flow eastwards towards the East Anglian coastline.

3.6.2.8 Coastal erosion is a recognised consideration in this area this would need to be taken into account in the design of the landfall solution to 'future proof' the cables from future coastal erosion and exposure. The coastal defences around Sizewell Power Station to the north are managed to 'hold the line' to secure the nuclear facility from coastal erosion.

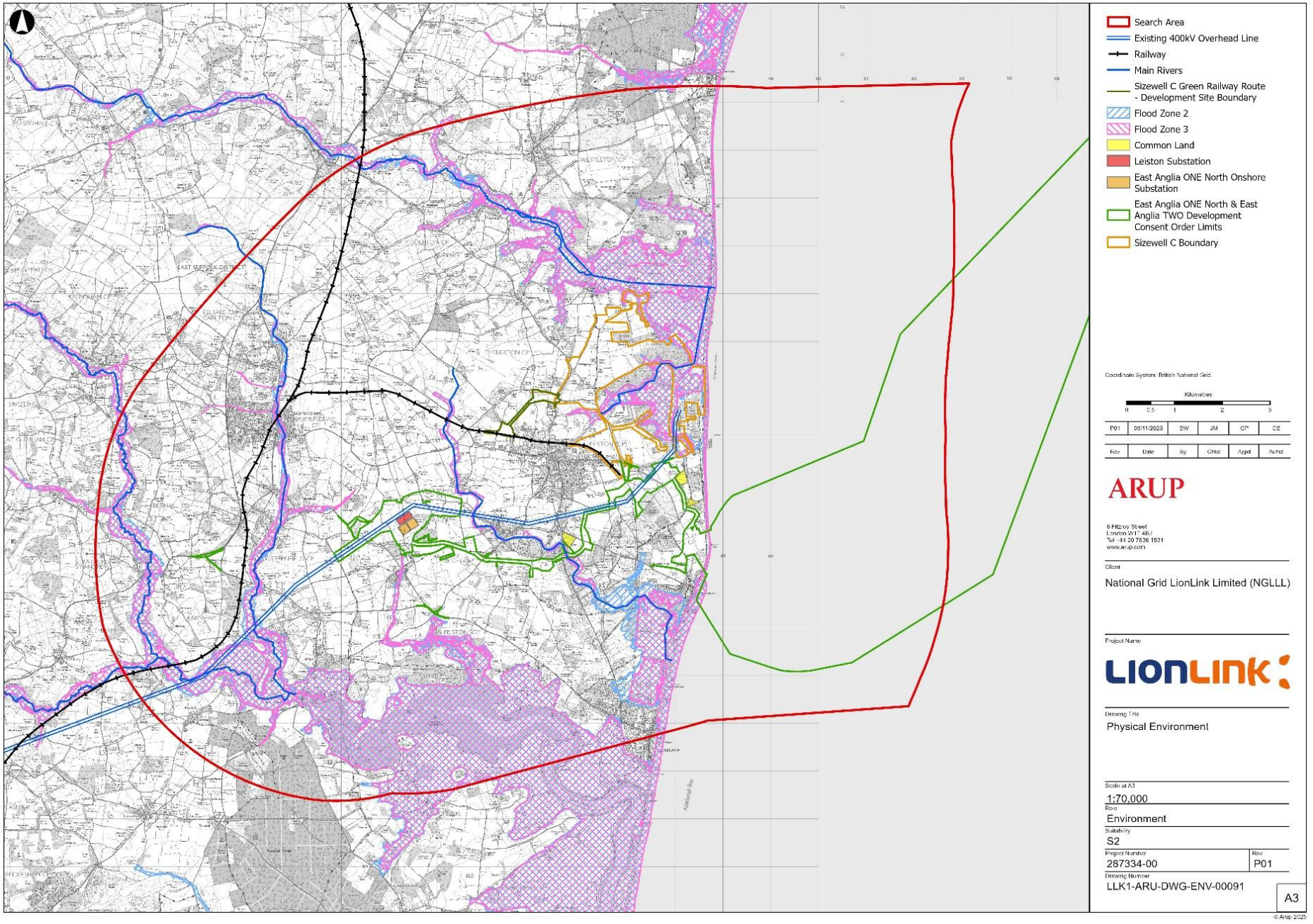

Figure 3-3: Physical environment

3.6.2.9 Two 400kV OHLs run in parallel southwest from Sizewell to Bramford Substation to the west of Ipswich. Leiston 132kV Substation has been constructed approximately 1km to the southeast of Sizewell Substation at Broom Covert to connect the Greater Gabbard OWF to the electricity transmission system. At the time of the assessment, another substation to connect Galloper OWF was under construction (now complete) to the immediate west of the Greater Gabbard substation. There are existing 400kV OHLs running between Sizewell and Bramford (**Figure 3-3**).

3.6.2.10 Southwold harbour and Lowestoft harbour are located within the study area.

3.6.2.11 The area is well served by A and B class roads. A railway line runs between Saxmundham in the west to Leiston in the east.

3.6.2.12 Transport links include National Cycle Network (NCN) Routes 31 and 42. NCN Route 31 runs through Barnaby Green to Southwold in the north of the Study Area and NCN Route 42 passes through Blackheath and Dunwich before approaching Leiston.

3.6.2.13 A significant number of PRoWs are located within the parishes of Southwold, Reydon, Wangford, Uggeshall, Sotherton, Wenhaston, Brampton, Walberswick, Blythburgh, Thorington, Westleton, Middleton, Theberton, Knodishall, Sternfield and Friston.

3.6.3 Nationally Significant Infrastructure Projects

3.6.3.1 NSIPs in the area that are either planned or consented include:

- EA1Noffshore windfarm;
- EA2offshore windfarm;
- East Anglia THREE offshore windfarm;
- Norfolk Boreas offshore windfarm;
- Norfolk Vanguard offshore windfarm;
- Sea Link; and
- Sizewell C.

3.6.4 Population and tourism

3.6.4.1 At the time of the 2021 Census, the population of East Suffolk was 246,058. Of this, 56.3% was of working age (aged between 16 and 64), considerably lower than the national average of 63%. The proportion of children aged under 16 was slightly below average at 16% compared with 18.6% for England, and the proportion of residents aged 65 and over was considerably higher than average, at 27.8% compared with 18.4%.

3.6.4.2 Suffolk as a whole had a population of 760,689. The county also had lower than average proportions of children and working age residents, and a higher than average proportion of residents aged 65 and over. Across the East of England, the total population was 6,335,075, and the age profile was broadly in line with the national average.

3.6.4.3 The Suffolk Coast Path runs along the coast at each of the potential landfalls. There are also informal routes through the dunes and cliffs down to the beach. The

Sandlings Walk long distance footpath also runs parallel to the coast slightly inland at Landfalls A and B before heading further inland through the Sandlings SPA.

3.6.4.4 Promoted recreational routes identified within the local study area are:

- The Suffolk Coast Path;
- The Sandlings Walk; and
- The East Suffolk Lines – Halesworth to Southwold and The Garden of Suffolk walks.

3.6.4.5 The Suffolk Coast area is promoted as a visitor destination by The Suffolk Coast Ltd Destination Management Organisation, covering the stretch of coast between Lowestoft in the north and Felixstowe in the south. Parts of the local study area also fall within the Suffolk and Essex Coast and Heaths National Landscape.

3.6.5 Biological environment

3.6.5.1 Numerous statutory designated sites of international and national value have been identified within the study area. These include (but are not limited to):

- **Designated sites of international value**
- Minsmere-Walberswick SPA and Minsmere-Walberswick Ramsar site
- The Minsmere to Walberswick Heaths and Marshes SAC
- Benacre to Easton Bavents SPA
- Benacre to Easton Bavents Lagoons SAC
- Sandlings SPA,
- Alde-Ore Estuary SPA,
- Alde-Ore Estuary Ramsar site and
- Alde, Ore and Butley Estuaries SAC occur near Aldeburgh
- Orfordness-Shingle Street SAC
- **Designated sites of national value**
- Minsmere-Walberswick Heaths and Marshes SSSI
- Pakefield to Easton Bavents SSSI
- Benacre National Nature Reserve (NNR)
- Suffolk Coast NNR
- Westleton Heath NNR
- Alde-Ore Estuary SSSI
- Leiston Aldeburgh SSSI

3.6.5.2 Irreplaceable and notable habitats have also been recorded within the overall study area.

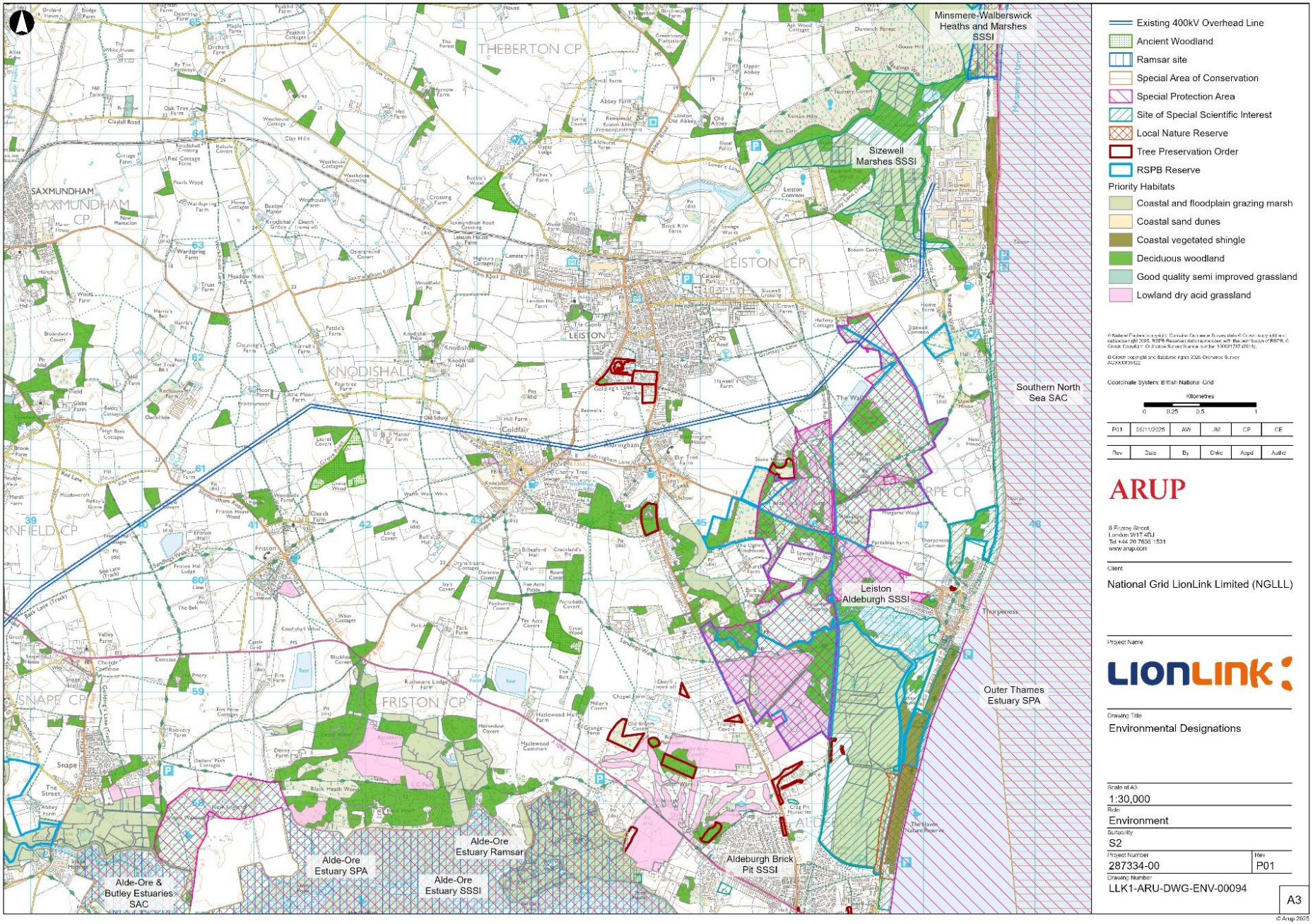

Figure 3-4: Environmental designations

3.6.6 Landscape and visual

3.6.6.1 The topography of the study area varies between the flat marshes which line parts of the coast and river valleys and the gently rolling hinterland. The land is relatively low- lying and has been shaped by the underlying Crag geology, which is most evident along the coastline in the form of shingle beaches and receding sandy cliffs.

3.6.6.2 A series of small rivers including the Blyth, Minsmere and Dunwich run eastwards along the bottom of broad, shallow valleys which divide the study area. Intertidal mudflats and salt marshes within the Blyth estuary are extensive.

3.6.6.3 Landcover within the study area mostly comprises arable farmland with an irregular pattern of reedbeds and grazing marsh along river valleys, lowland heathland on sandy soils and woodland on the estuary slopes. The scale of arable fields varies dramatically across the study area based on the extent of agricultural intensification and level of tree cover. Small scale fields are commonly found around the village fringes and within the floodplains where the hydrology pattern remains largely intact.

3.6.6.4 The lowland heath known as the Sandlings and the coastal levels are strong defining features of the eastern part of the study area and have multiple ecological designations recognising their ecological and wildlife importance.

3.6.6.5 Settlement is generally sparse, and typically comprises small, remote villages which have undergone little modern expansion and isolated farmsteads. Larger settlements within the study area are limited to Southwold and Reydon in the north and Saxmundham and Leiston in the south.

3.6.6.6 Parkland landscapes containing ancient woodland are found in the western part of the area and coniferous plantations such as the extensive Dunwich Forest in the east. The National Landscape extends along the coastline between Kessingland near Lowestoft in the north to the River Stour in the south. It is characterised by farmland interspersed with picturesque villages and occasional seaside towns. The area was once dominated by extensive heathland known as The Sandlings but is today found together with plantation woodland and freshwater marshes. Five river estuaries including the Blyth also form unifying features of the National Landscape, containing intertidal mudflats and saltmarsh (see **PEIR Chapter 13 – Landscape and Visual**)[7].

3.6.7 Historic environment

3.6.7.1 The key historic environment constraints are shown in **Figure 3-5**. Installation works could have an adverse effect on any buried archaeological remains.

3.6.7.2 All landfalls are within the Heritage Coast and landfall installation has the potential to temporarily effect this undeveloped coast during installation.

3.6.7.3 All designated heritage assets are considered to be of national significance. Designated assets include "listed" buildings, which are of special architectural or historic interest, considered to be of national importance and therefore worth protecting.:

[7] In November 2023 all designated AONBs were renamed as National Landscapes.

- Grade I listed buildings (buildings of the highest significance)
- Grade II* listed buildings (buildings are particularly important buildings of more than special interest);
- Grade II listed buildings (buildings are of special interest);
- Scheduled monuments (nationally important archaeological sites);
- Registered parks or gardens (register of parks and gardens of special historic interest in England); and
- Conservation areas (Conservation areas exist to protect the special architectural and historic interest of a place).

3.6.7.4 Non-designated Heritage Assets are present within the study area. These range in date from the early Palaeolithic period to the 20th century in date.

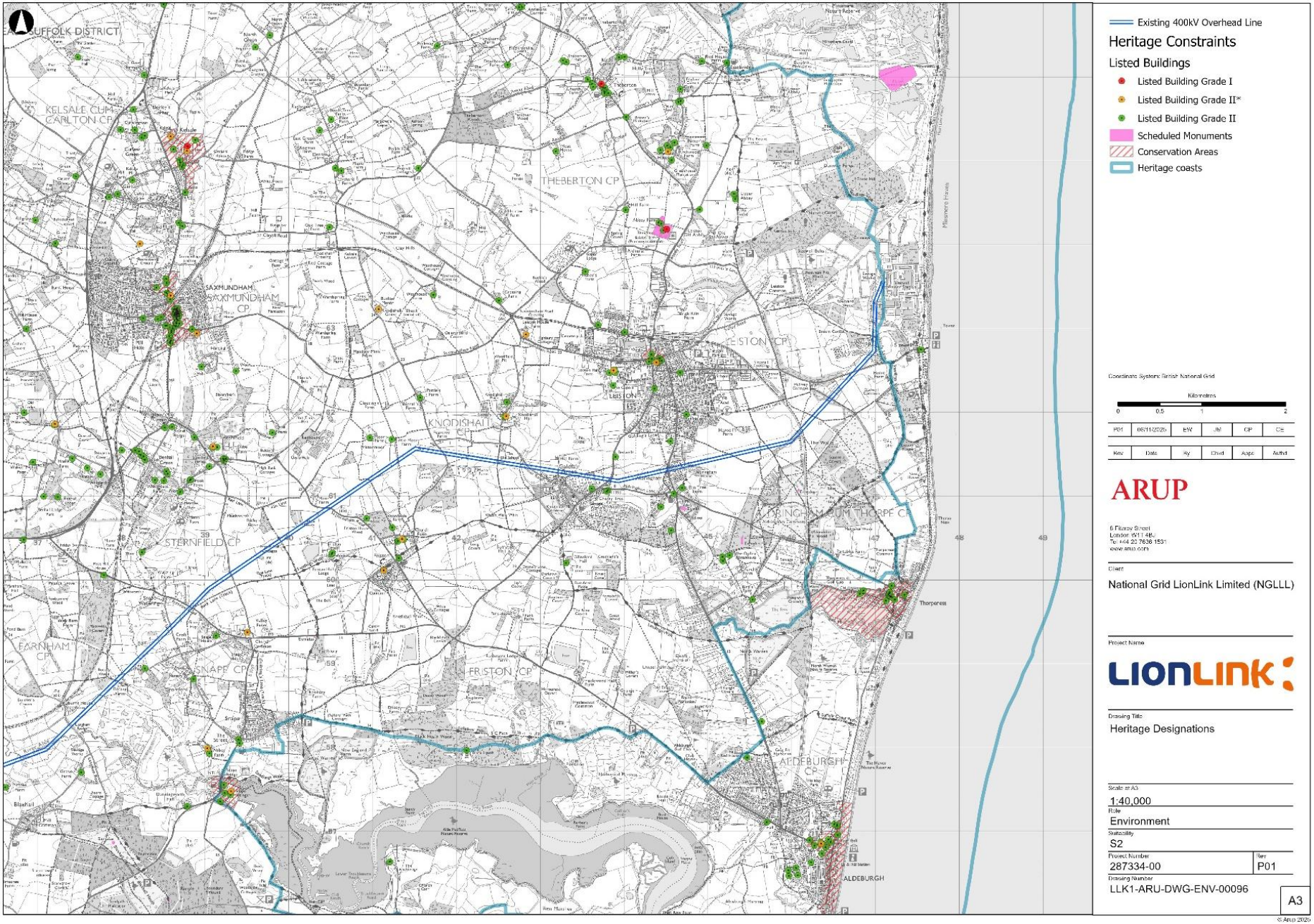

Figure 3-5: Heritage designations

3.7 Baseline Offshore environment

3.7.1 Introduction

3.7.1.1 This section presents the potential biological, historical, physical and socio-economic constraints considered when developing and appraising marine alignments.

3.7.1.2 The following constraints have been taken into consideration to undertake the appraisal of the marine alignment options:

- Environmental
  - Biological environment (environmental designations, habitats, Annex 1 habitats and shellfish)
  - Historic environment (wrecks and obstructions)
  - Physical Environment
  - Bathymetry (slopes and sandbanks)
  - Offshore Geology (bedrock, sediment type and thickness)
- Socio-Economic
  - Infrastructure (oil and gas, offshore wind and cables)
  - Shipping and Navigation (density, anchorage areas and traffic separation scheme (TSS))
  - Restricted Areas (military, dredging and aggregate areas, UXO)
  - Commercial Fisheries (vessel monitoring systems and sensitive fishing areas)
  - Marine Planning (East Inshore and Offshore Marine Plans)

3.7.1.3 Refining the marine alignment for the LionLink project has considered the vision and objectives set out in the East Inshore and East Offshore Marine Plan. The objective of Marine Plan is to ensure that marine resources are used in a sustainable way in line with the high-level marine objectives and thereby: promote sustainable economic development; enable the UK's move towards a low-carbon economy. The long-term vision of this plan can be summarised as follows:

- By 2034 sustainable, effective and efficient use of the East Inshore and East Offshore Marine Plan Areas has been achieved, leading to economic development while protecting and enhancing the marine and coastal environment, offering local communities' new jobs, improved health and well-being. As a result of an integrated approach that respects other sectors and interests, the East marine plan areas are providing a significant contribution, particularly through offshore wind, to the energy generated in the United Kingdom and to targets on climate change.' (HM Government, 2014).

3.7.1.4 The following sections summarise the key constraints within the study area **Figure 3-6**. The study area is defined as the area between the landfalls and the potential EEZ crossing points (**Section 3.3**).

3.7.1.5 The study area encompasses UK and NL waters in the North Sea from Leiston in Suffolk, UK to the IJmuiden Ver and Nederwiek windfarm zones in the NL sector. The Study Area are approximately 160 km in length (from north to south) and approximately 170 km wide (southwest to northeast) at its widest point.

3.7.1.6 The study areas go round the aggregate areas to the Northeast of Lowestoft. Each of the potential offshore HVDC cable route options (longlist) are shown on **Figure 3-6**.

3.7.2 Biological Environment

3.7.2.1 Potential interactions with ecological designations (**Figure 3-6**) that have boundaries that fall below Mean High Waters Springs (MHWS) and extend into the marine environment were considered as part of the baseline environment. This included the following types of designation found in the study area:

- Special Areas of Conservation (SACs)
- SPA
- MCZ
- SSSI
- Designated Shellfish Waters
- Annex 1 Reefs
- Annex 1 Protected Sandbank
- Coralline Crag

3.7.2.2 Further designations were also considered, not shown on (**Figure 3-6**):

- Ramsar Sites
- NNR
- Local Nature Reserves

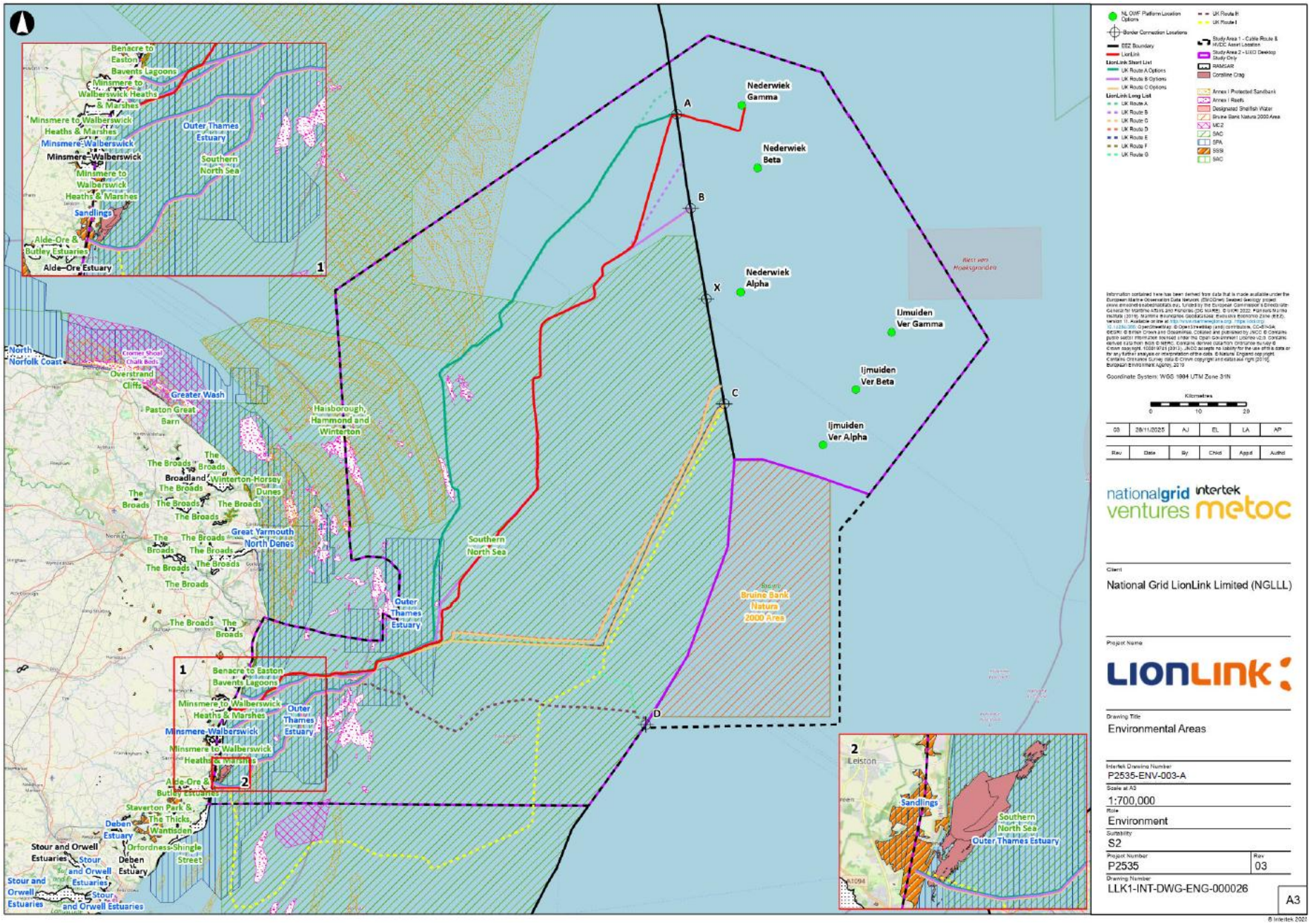

Figure 3-6: Environmental designations, annex 1 habitats and shellfish waters and location of the Coralline Crag

3.7.3 Historic Environment

3.7.3.1 Historical environment covers protected historic wrecks, war graves, other wrecks) and marine archaeology. Europa Technologies Marine Themes Vector data, UK Hydrographic Office (UKHO) and Rijkswaterstaat data has been used to identify wrecks and obstructions (termed 'culturally significant sites' in International Cable Protection Committee Recommendation No. 9) within the study area as shown in **Figure 3-7**.

3.7.3.2 There is one protected wreck (Dunwich Bank) within UK waters of the study area and is highlighted by the red point which is north of Leiston on **Figure 3-7**. The site was designated for the presence of the presence of the ordnance under the Protection of Wrecks Act 1973 in 1994 as a bronze gun, cannon and 2m tall concretion mound had been found on previous investigation dives. The site has a management plan with the main aim to "identify a shared vision of how the values and features of the Dunwich Bank can be conserved, maintained and enhanced" (Historic England, 2017). Any cable survey or installation activities that may impact the site will require consultation.

3.7.3.3 The Dunwich settlement (**Figure 3-7**) is a medieval town, the remains of which are located on the seabed off the coast of the village of Dunwich, Suffolk. The ruins are located in 3 – 10m water depth and present a major complication to routeing so have been considered a primary constraint. It is highlighted within the inset of **Figure 3-7**.

3.7.3.4 Other wrecks as noted in **Figure 3-7**, will be routed round (where feasible).

3.7.3.5 Up to a 250m separation distance has been used from locations of known shipwrecks in the UK and NL as this is considered to reduce the risk to both feature and cables based on project experience.

3.7.3.6 Up to a 50m separation distance has been used around obstructions such as known points/locations of obstruction, foul ground, rock; and marine infrastructure (e.g., piles, stakes, and harbour facility) as this is considered to reduce the risk to cables based on project experience.

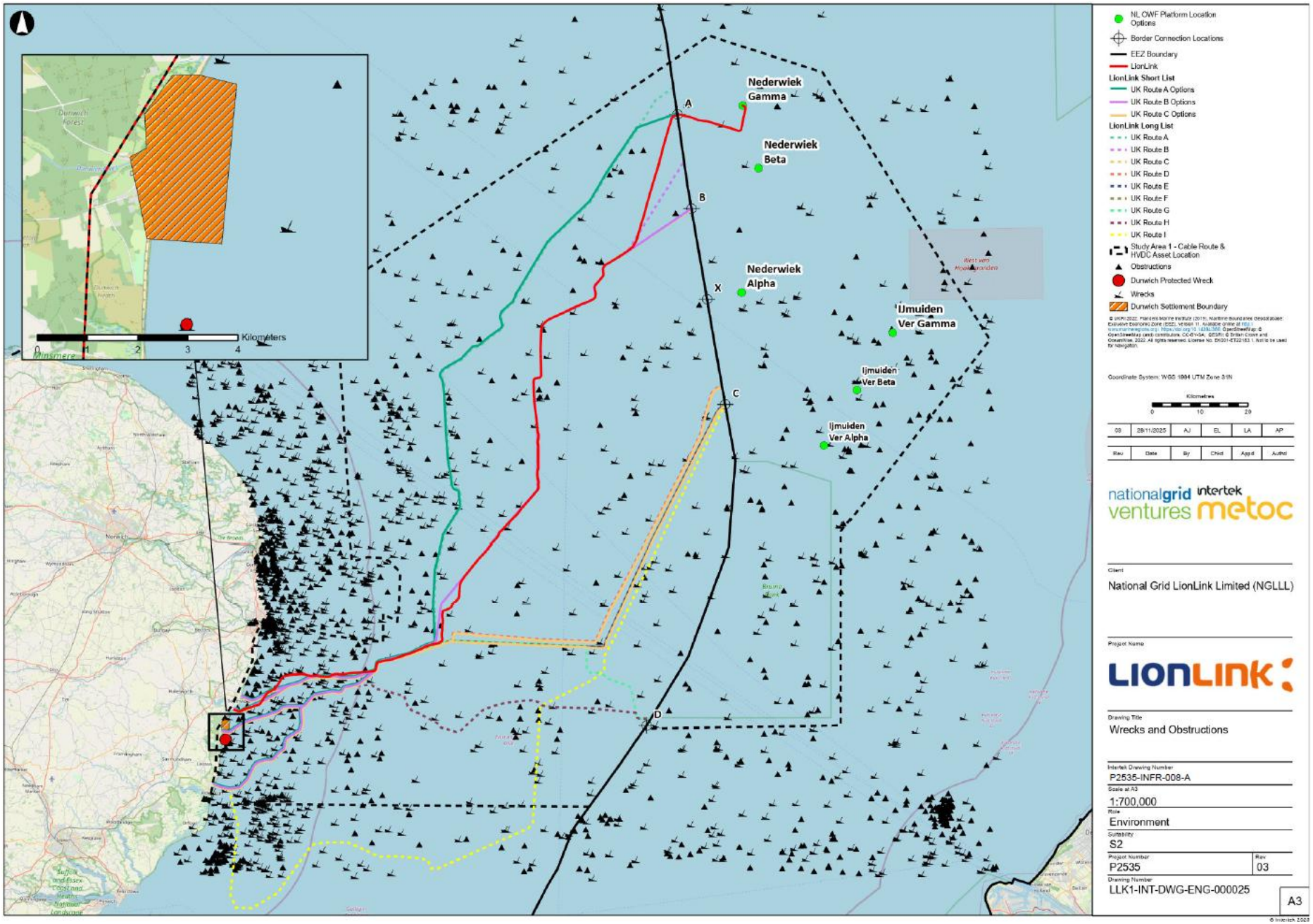

Figure 3-7: Wrecks and historical sites

3.7.4 Physical Environment

Bathymetry

3.7.4.1 Bathymetry data was obtained from European Marine Observation and Data Network (EMODnet) and the UKHO. **Figure 3-8** shows the EMODnet data. There are several areas of large natural seabed features observed in the data that are associated with sandbanks and bedforms (likely to be mobile) within the UK and NL waters. These features have been considered while undertaking route engineering.

3.7.4.2 The following bathymetric constraints were identified.

- Sandwaves greater than 1m in amplitude (height above mean seabed level)
- Steep slopes (exceeding 5 degrees) which may cause stress on the cable if it is in suspension
- Sub-surface channels, depressions, or ditches which also may cause stress on the cable
- Nearshore sandbanks are significantly important for coastal protection along the Suffolk coastline from erosion, acting as a natural offshore breakwater and reducing wave energy through refraction and attenuation.

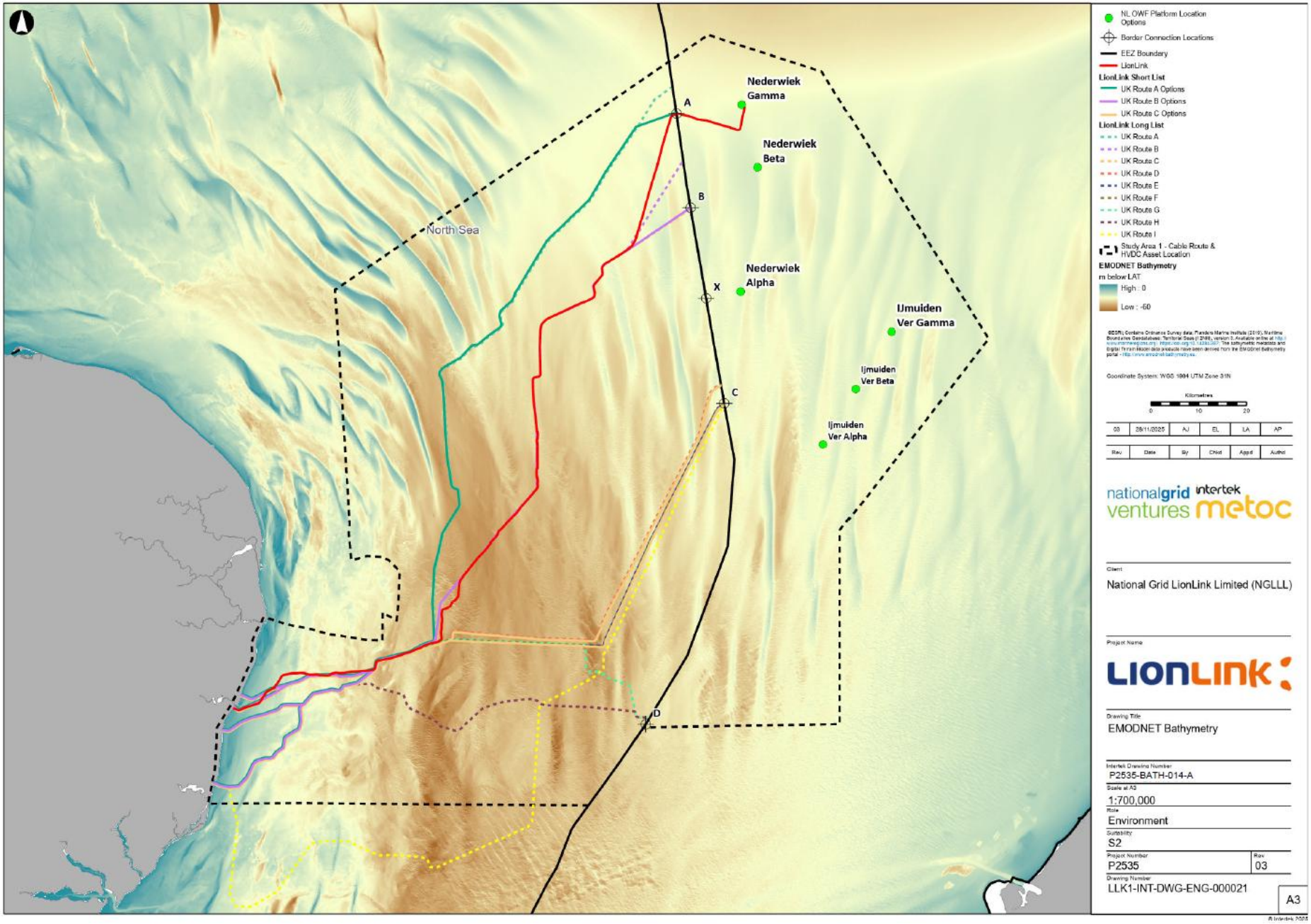

Figure 3-8: Bathymetry EMODNET Data

3.7.4.3 Bathymetry data **Figure 3-8**, shows water depths of up to 60m below Lowest astronomical tide (LAT) within the study area with the deepest waters approximately 40 km off the Suffolk coastline associated with an area between the East Anglia One North and East Anglia Two windfarms. Once leaving the coast generally, the range of water depths for the anticipated cable routes are between 10m and 40m below LAT.

3.7.4.4 There are several areas of large natural seabed features observed in the data that are associated with sandbanks and bedforms (likely to be mobile) within the UK and NL waters. These features were considered while undertaking route engineering.

3.7.4.5 Seabed slope was calculated using the bathymetry datasets and does not generally exceed 5° across the study area. The highest slopes are associated with the sandbanks and bedforms.

3.7.4.6 Three areas of sandbanks have been considered in the study area Dunwich Bank, Sizewell Bank and Aldeburgh Ridge. Aldeburgh is the least relevant as the majority of the bank is located outside of the study area, with a small section to the north included in the boundary. This bank has been crossed by four cables previously and one remains in service. The Dunwich Bank is more relevant and is important to the current coastal stability seen along the Dunwich-Minsmere shoreline. The Sizewell Bank, is the most relevant and is considered to be of great importance to the protection of Sizewell nuclear facility due to its role in protecting the shoreline.

Offshore Geology and Sediment

3.7.4.7 Geology data was obtained from multiple sources including boreholes and geotechnical core samples have been downloaded from the British Geological Survey and are generally well distributed within the study area.

3.7.4.8 The following geology constraints were considered:

- Bedrock types and formations: where sediment thickness is shallow, important to know how hard the bedrock is for cable burial. Formations may also be important for coastal protection, creating a barrier between the coast and the open sea and reducing erosion.
- Sediment thickness: where there is insufficient sediment thickness to bury the cable, either the cable either has to be cut into the bedrock and then buried afterwards usually with rock or directly buried with rock.
- Sediment types: where hard sediment can make burial of the cable difficult (similar to bedrock), obstacles are present such as boulders or the sediment is mobile, leaving a risk the cable may become exposed after burial.
- Sediment transport: which areas are likely to be eroding and which are likely to be accreting and where material in suspension is likely to be transported to/from.

3.7.4.9 The geology across the study area is characterised by Holocene sand deposits overlying Quaternary deposits, with the thickness of Holocene sands generally varying from around 1m to more than 20m across sandwave fields. Quaternary sediments defined as sediments deposited at the end of the last ice age may be present where there are veneers of surficial sediments. Quaternary sediments include marine clay, coarse sands to large boulders. The underlying Quaternary

deposits are typically more than 50m thick within the study area, except for a small area at the inshore end of the Draft Order Limits where deposits are 30-50m thick.

3.7.4.10 There are three main types of bedrock identified, mudstone, sandstone and chalk, with additional types of bedrock of tuff, limestone and halite-stone mostly to the North-West. Exposed bedrock is not expected to be encountered within the study area (for a cable burial of up to 2 m) however, however it is still feasible for some isolated areas to be encountered.

3.7.4.11 Sediment distribution (**Figure 3-9**) of the surficial deposits across the study area and is predominantly made up of sand with isolated patches of coarse substrate and muddy sand.

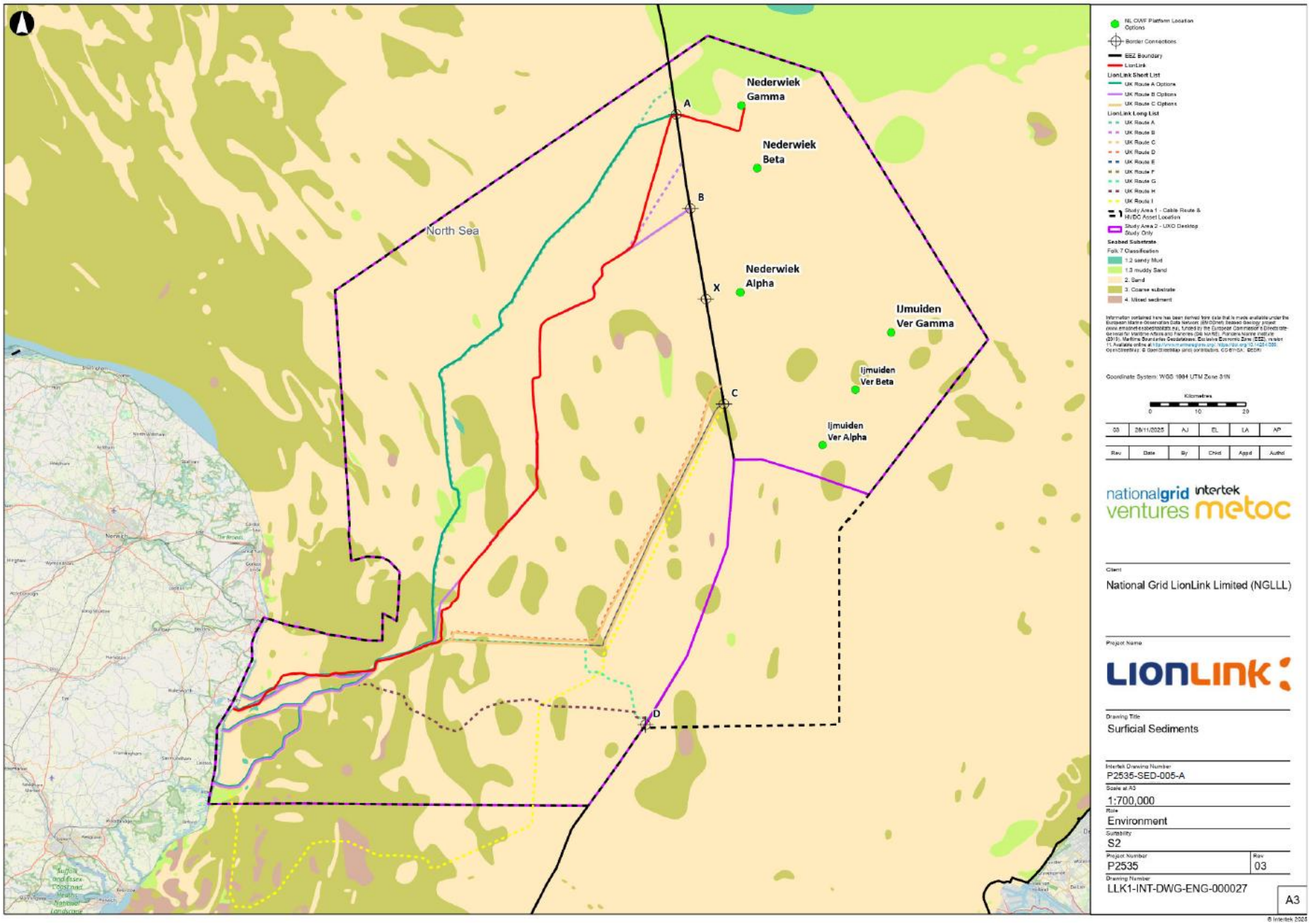

Figure 3-9: Seabed Sediments

3.7.4.12 Coralline Crag Case Study

3.7.4.13 The coralline crag (**Figure 3-6**) is an important bathymetrical and geological features in the routeing development and was identified in 2017 by the project team. The coralline crag is a geological formation of approximately 423ha and comprises of a series of marine deposits found near the Suffolk coastline. It is characterised by bryozoan and mollusc debris and consists of erosion-resistant cemented carbonate sands and silty sands that extend sub tidally to the north-east from the Thorpeness Headland.

3.7.4.14 Off the coast of Sizewell is the Sizewell – Dunwich Bank, which is a single sedimentary feature, 8km in length and located 1.2 – 1.7 km from the shore. The north and south ends are referred to as Dunwich Bank (-4 to -5 m elevation) and Sizewell Bank (-3 and -5 m elevation), respectively and represent elevations joined by a lower region (-7 m elevation).

3.7.4.15 The coralline crag formation outcrops between Thorpeness and Sizewell Bank where it forms a shallow platform with a series of descending shallow ridges that extend seaward (north-east) to Sizewell Bank and extends below the bank before outcropping again on the seaward side.

3.7.4.16 The growth of Sizewell Bank is thought to be sustained by sand supply from the coast; this is supported by the size and north-east orientation of the coralline crag ridges. It is believed that there is a net southward movement of sand along the longshore bars, which accumulates near the apex of Thorpeness and is then funnelled seaward to the bank by the north-east coralline crag ridges. The coralline crag outcrop also helps maintain a ness feature; this and sandbank both have important positive feedback interactions on the relative long-term stability of the Sizewell shore.

3.7.4.17 The coralline crag is located in the coastal waters of the study area, particularly around Sizewell, affecting the offshore routes to and from potential landfalls in the area.

3.7.4.18 The coralline crag is not protected under statutory legislation, and it is not a designated site. However as stated above it plays a critical role in the stabilisation of the coastline and is recognised as a significant challenge for consenting. Other DCO projects in the area (EA1N and EA2) both have conditions as part of their development consent order to avoid damage or impacts to this feature when conducting their landfall works. Avoidance of the coralline crag would avoid impacts to coastal processes which are important for both EDF's sea defences and the nearshore sandbank systems (Sizewell Sandbank) which protect Sizewell A, B, and the planned C nuclear power stations.

3.7.5 Shipping and Navigation

3.7.5.1 Shipping and navigation data was obtained from multiple sources including EMODnet data and defined as vessel hours per month (**Figure 3-10**). There are numerous designated Traffic Separation Schemes (TSSs), deep water channels, recommended routes and caution areas within the study area including areas of high vessel intensity indicating unofficial shipping lanes and pinch points between

wind farms. Laying cables in a shipping channel or anchorage area is considered to present additional constraints:

- Disrupts shipping and navigation during cable laying and affects safe navigation;
- Poses a risk to the cable from anchoring by vessels, either in an anchorage or pilot area or by emergency anchoring in a shipping channel, increasing the depth of burial required, time and cost of the operation.

3.7.5.2 All routes cross a shipping lane at some point in the routeing process and have been engineered to cross at 90 degree to the shipping lane (perpendicular) as far as practical to minimise distance through the area so effects to existing shipping during the marine campaigns are reduced.

3.7.5.3 Designated shipping lanes (**Figure 3-10**) and deep-water channels are highlighted on Admiralty charts. These have been avoided or minimised the distance through them in the route engineering process.

- Off Friesland and West Friesland TSS and Deep-water route
- Brown Ridge TSS and Deep-water route
- Off Botney Ground TSS
- Deep-water route via DR 1 light-buoy, which leads to the Off Botney Ground TSS

3.7.5.4 There are three anchorage areas in UK waters.

- One unnamed area south of Lowestoft
- Two anchorage points associated with Southwold Port: One immediately next to Southwold port and another further east.

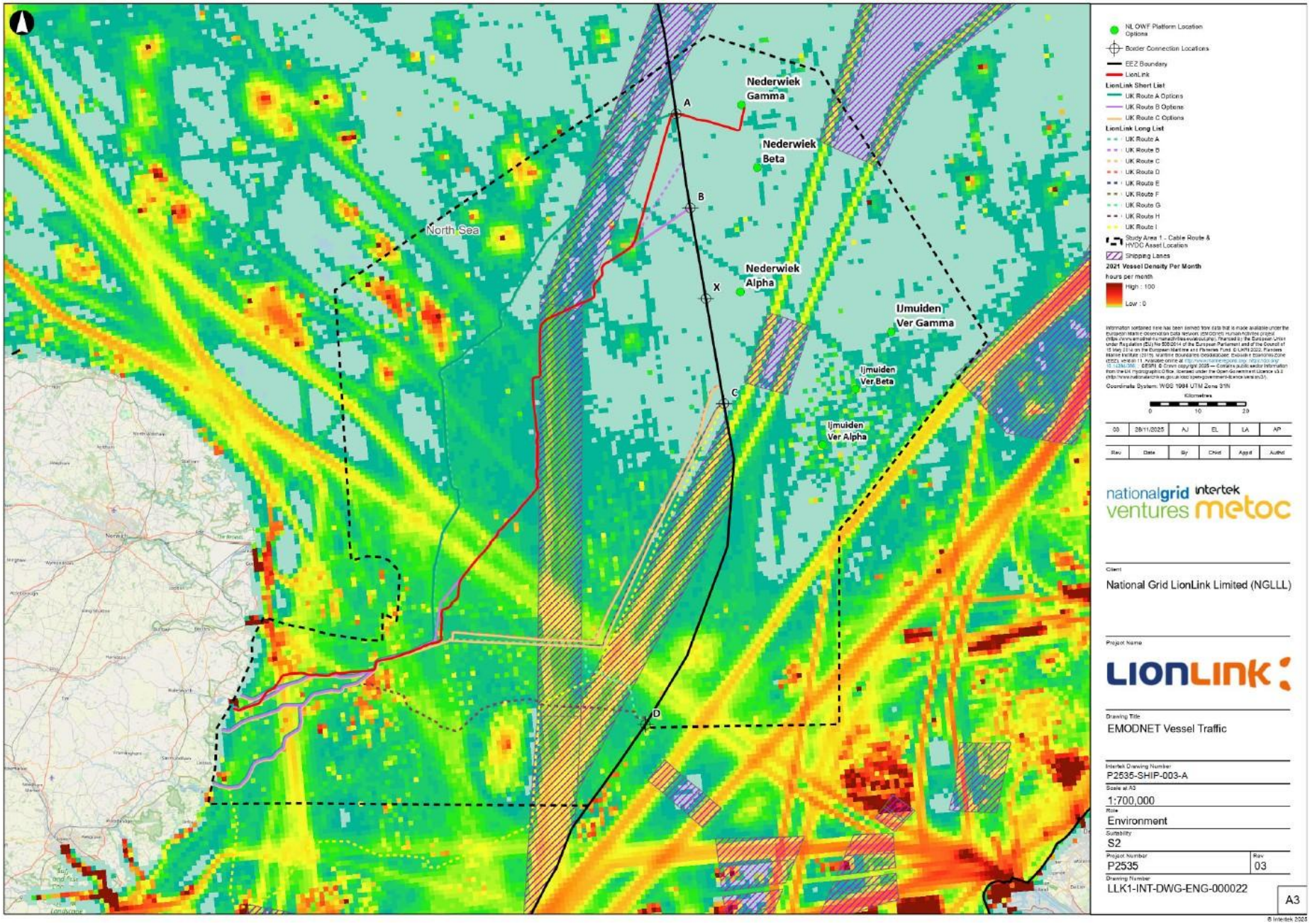

Figure 3-10: Shipping density, vessel hours per month

3.7.6 Restricted Areas and Infrastructure

3.7.6.1 There are numerous restricted areas in the study area including military, aggregate extraction and dredged disposal sites. There is substantial offshore infrastructure such as oil and gas, cables and offshore windfarms. These areas require the licence owner of the areas permission to route the cable though and present significant challenges to consent.

3.7.6.2 Restricted areas include the following constrained areas shown in **Figure 3-11**:

- Dredging locations
- Explosive dumping grounds
- Dredging spoil dumping areas
- Aggregate areas out of service
- Aggregate areas in service
- Military exercise areas and danger areas
- UXOs

3.7.6.3 Other restricted areas, not on **Figure 3-11**but included in the routeing assessment are:

- Oil and gas wells platforms, pipelines, offshore production areas, offshore licence blocks on offer, offshore licenced blocks (**Figure 3-11**):
- Power and telecom cables in service, out of service or planned
- Meteorological and ocean agreed monitoring areas, such as masts and fixed buoys
- Active or planned windfarms
- Export cable agreement corridors (including Sea Link)

3.7.6.4 The only military area within the study area is Ten Westen Van Haakgronden (NL). There are no explosive dumping grounds within the study area.

3.7.6.5 UXOs are a safety issue for laying the cable, as they may explode on contact and are therefore routed round, where feasible. Where not feasible to route round they can be moved (lifted and shifted) underwater, sent to shore or destroyed. Prior to surveying the route an UXO desk-based assessment was completed, to develop a route where UXO areas could be avoided, where possible. To define the route, UXO areas were split into three categories and shown in **Figure 3-11.**

- Primary avoidance areas: are areas in which it is anticipated there are likely to be UXOs which are not magnetic (non-ferrous). Non-ferrous UXOs are not detectable by conventional survey methods and therefore pose additional risks to the project. Therefore, these areas should be routed round, or if they are crossed, then the shortest route to cross the area is preferred.
- Secondary avoidance areas: are areas in which it is anticipated that there are likely to be UXOs which have a low magnetic signature (low-ferrous). Low-ferrous UXOs are detectable by conventional survey methods but not easily and therefore pose some risk to the project. Therefore, these areas are preferred to be routed round if possible or if they are crossed, then the shortest route to cross the area is preferred.

- Tertiary avoidance areas: are areas in which it is anticipated that there are likely to be UXOs which have a magnetic signature (ferrous). Ferrous UXOs are detectable by conventional survey methods and therefore pose a lower risk to the project.

3.7.6.6 The map shows that most of the study area is a tertiary avoidance area, with some areas of secondary and primary avoidance nearer to the coast. Due to the history of the study area (World War One (WWI) and World War Two (WWII)) there are no areas which do not pose an UXO risk.

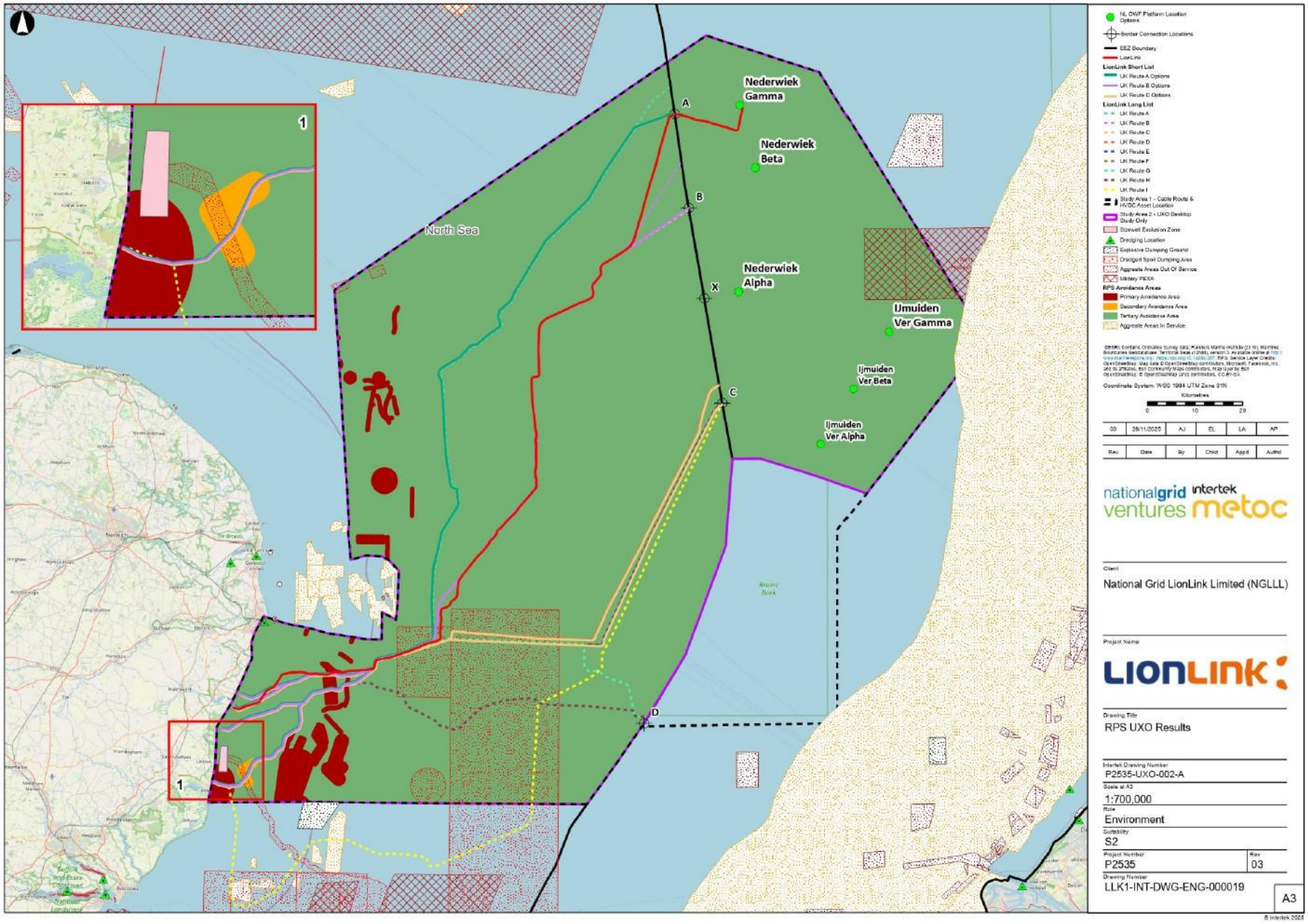

Figure 3-11: UXO, spoil dumping, aggregate and military areas

3.7.6.7 There are dredging spoil dumping areas (**Figure 3-11**). These areas may receive material from ports and therefore such material may have a higher level of contamination (such a heavy metals), compared to surrounding areas. Note placement of spoil on top of the cable can affect its technical ability to function (due to pressure and/or heat). Dredging spoil dumping areas should be routed round, or if they are crossed, then the shortest route to cross the area is preferred.

3.7.6.8 Sand extraction areas (aggregate areas) (**Figure 3-11**), risk damage to the cables and cable areas risk creating areas within aggregate sites where sand extraction will no longer be feasible. The following rules have been applied to routeing the cable through sand extraction areas:

- Sand extraction activities should not take place within a safety perimeter of 250m (both sides) of cables.
- Therefore, these areas should be routed round, or if there is no alternative, then new cables should be bundled as much as possible on one side of the sand extraction area, to minimize their impact.

3.7.6.9 The following conditions have been applied to routeing the cable through oil and gas infrastructure (**Figure 3-12**):

- A 500m separation distance has been used from known pipelines and other oil and gas infrastructure as per UK Continental Shelf Guidelines for Offshore Marine Operations.
- A safety zone is an area extending 500m from any part of offshore oil and gas installations and is established automatically around all installations which project above the sea at any state of the tide as per the UK Health and Safety Executive.
- Where crossing pipelines is required the number of crossings should be minimised and the crossing done where feasible at a perpendicular angle.

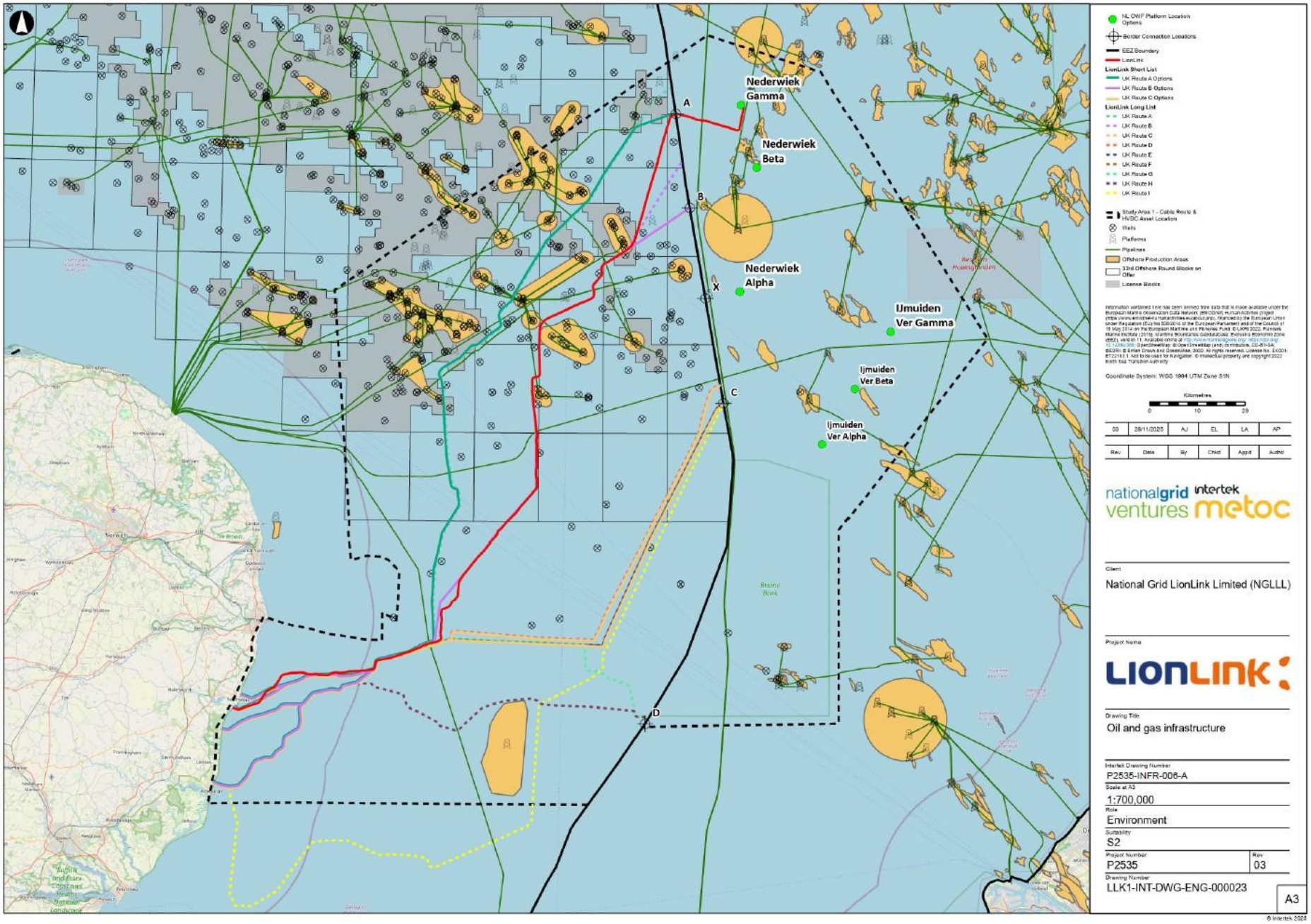

Figure 3-12: Oil and gas infrastructure

3.7.6.10 The following conditions have been applied to routeing the cable across other subsea cable infrastructure (**Figure 3-12**).

- A 250m separation distance has been used from existing and proposed cable routes; and cable corridor extents as per Submarine Cables and Offshore Energy Installations Proximity Study Report (2012).
- A 50m separation distance has been used from out of service cables which is based on previous project experience.
- Where crossing cables is required the number of crossings should be minimised and the crossing done where feasible at a perpendicular angle.

3.7.6.11 The following conditions have been applied to routeing the cable through OWF infrastructure (**Figure 3-13**):

- A 500m separation distance has been used around locations of existing turbines as discussed in The Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007 (SI 2007 No. 1948).

3.7.6.12 TCE data was reviewed to determine the location of lease areas associated with wave buoys, weather stations, tide stations and other infrastructure within the study area. Lease areas were found and generally are located within planned windfarms therefore have been avoided during routeing.

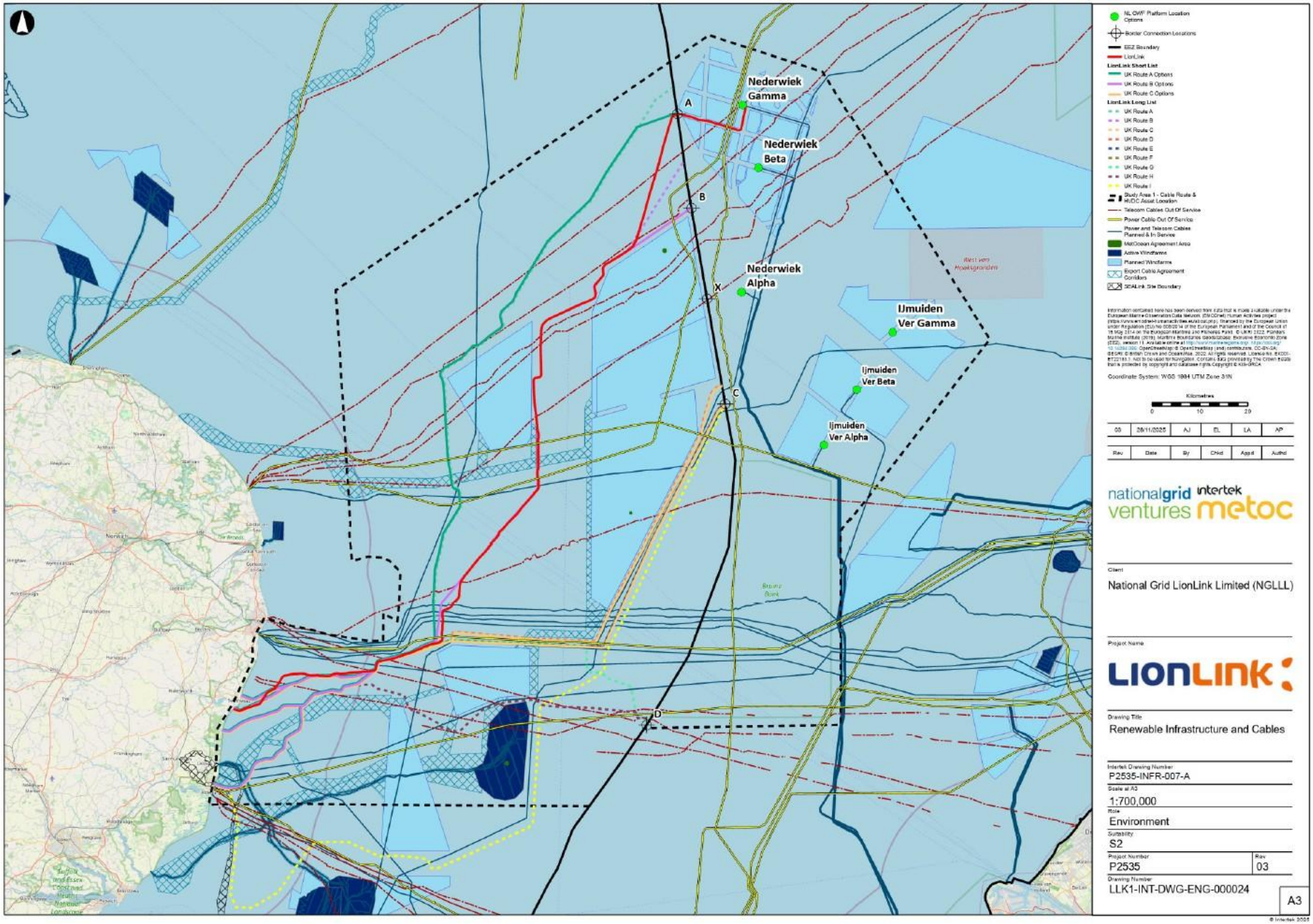

Figure 3-13: Renewable Infrastructure and Cables

3.7.6.13 Coastal construction projects such as new port facilities, outfalls and intake structures were considered. These include:

- There are several existing Sizewell B intake and outfall structures and pipelines, with planned structures and pipelines for the Sizewell C expansion. A 300m no development buffer has been applied to Sizewell B outfall structures as per East Anglia 1 North DCO and Galloper OFW DCO. Sizewell C outfall structures have been considered as a primary constraint and the Project will be avoiding any cables routeing in this area.
- There are coastal defences located along most of the Suffolk shoreline due to the ongoing threat of coastal erosion. The location of the defences has been obtained from the Environment Agency, Marine Themes Vector Data and local Shoreline Management Plans where applicable. Trenchless installation techniques may be required to avoid coastal defence structures at some landfalls.

3.7.7 Commercial Fisheries

3.7.7.1 Impacts on commercial fisheries were considered for the routeing assessment (**Figure 3-14**), within the study area. The aim being to identify the fisheries areas and then to follow the constraints hierarchy. Fisheries activity is predominantly based on a vessel monitoring system called Automatic Identification System (AIS). Vessels over 15m must have an AIS system, but for vessels under 15m it is optional.

3.7.7.2 The majority of commercial fishing activity of relevance to the Project is by local UK vessels deploying static gears, Dutch beam trawlers, and Belgian beam trawlers.

3.7.7.3 Activity by UK owned, and registered vessels is mostly concentrated within the 12nm limit and much of it within the 6nm limit. The local fleet utilise a number of methods, however it is recorded as being from predominantly whelk potting and to a lesser extent from netting and lining targeting Dover sole, bass, lobster, and thornback ray. Key areas for drift netting occur within the study area in the vicinity of the landfall, specifically on banks off Aldeburgh.

3.7.7.4 In addition to beam trawling, moderate levels of Dutch seine netting are shown to occur in the middle of the study area.

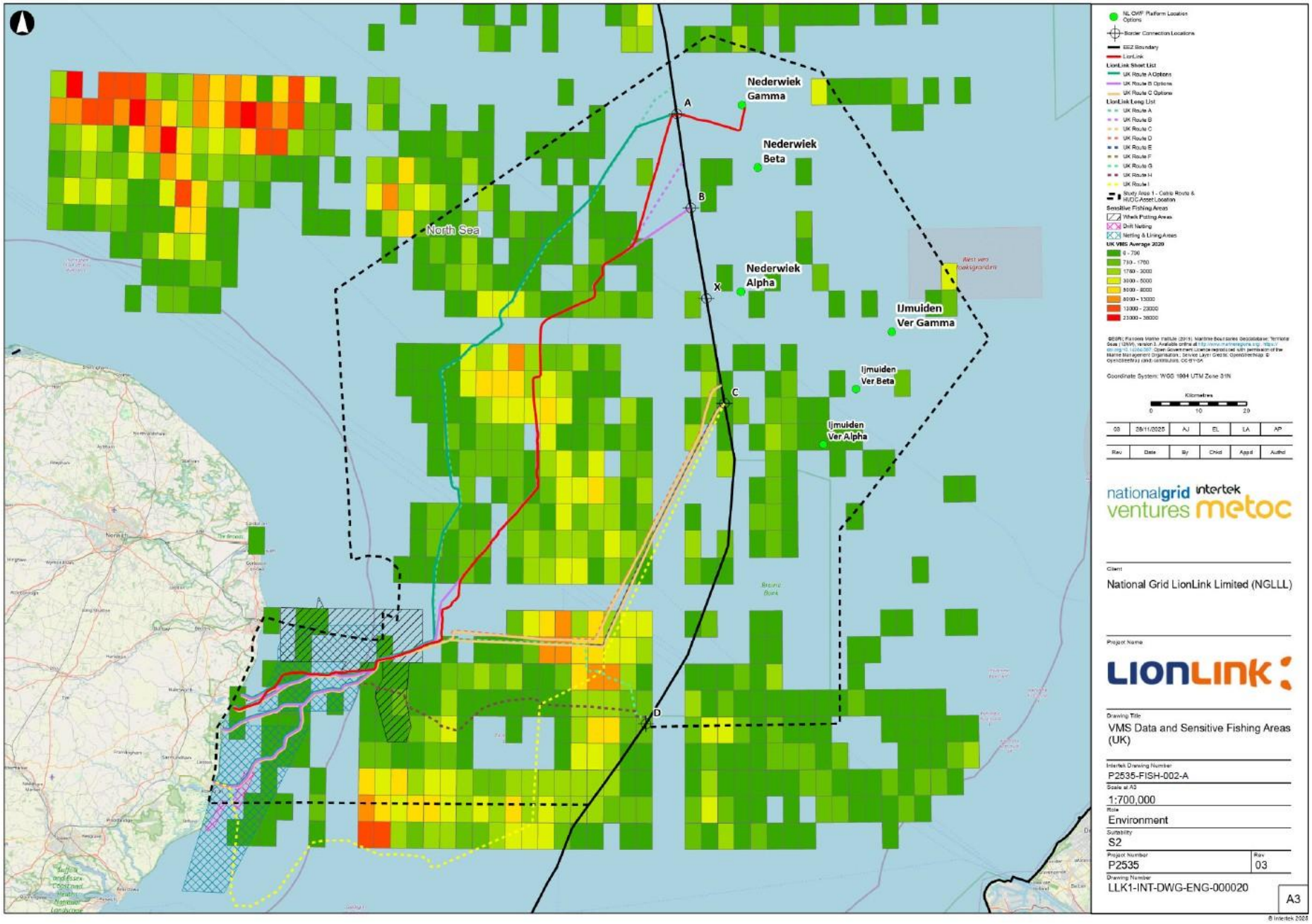

Figure 3-14: Fisheries - Vessel Monitoring and UK sensitive fisheries areas

4 Stage 2: Development of long list of options to identify a short list

4.1 Introduction

4.1.1.1 This section provides further details of the evolution of the site selection process for both onshore and offshore infrastructure associated with the Proposed Scheme. It outlines the progression from the initial connection agreement issued by NGESO in 2017 (outlined in **Section 2.2**) and the identification of the study area (outlined in **Section 3.1 to 3.33)**, through to the development and presentation of options at the Non-Statutory Consultation held in 2022.

4.1.1.2 The assessment process was informed by a balanced consideration of environmental, socio-economic (including land use (ownership/type), and technical factors.

4.2 Onshore options

4.2.1.1 The long list of options was developed through assessments that were undertaken to identify landfall sites, converter station sites and cable route options.

4.2.1.2 Given the onshore cable route options are dependent on the location of the Landfall and Converter Station, an Onshore Cable Corridor was developed on the basis of avoiding the main environmental constraints, settlements and approved and proposed developments within the study area.

4.2.1.3 Offshore cable corridors were developed considering a range of factors, all options identified were based on constraints identified in **Section 3** and maximum parameters (see **Table 3-1**), using the grid connection point as the geographic starting point and the onshore study area in **Figure 3-1**.

4.2.2 Early Joint Assessment and appraisal reports (LionLink and Nautilus)

4.2.2.1 NGLLL has considered the early assessments that were carried out as a joint study for LionLink and the Nautilus Project. As part of the ongoing optioneering process the Applicant considers that these reports are robust and remain reliable, and the necessary back-checks were undertaken to ratify this. Further, the assessments which were either joint or specific to the Nautilus Project are capable of being relied upon for the purpose of the Proposed Scheme, as all assessments considered the same type of infrastructure located in a similar geography and connecting into the same proposed substation. This work was therefore considered as part of the development of the long list of options for the Proposed Scheme.

4.2.3 2021-2022 detailed assessments

4.2.3.1 Further detailed assessment work in 2021-2022 built upon the earlier 2018 and 2020 joint assessment feasibility studies. This work examined physical and environmental constraints and considered engineering options for converter station

siting, landfall locations (Leiston North and Leiston South), and HVAC and HVDC cable routeing between the A12 and the Suffolk coast.

4.2.4 Feasibility methodology and multi-criteria appraisal

4.2.4.1 The feasibility studies used an Analytical Hierarchy Process[8] (AHP) aligned with project objectives. These studies critically reviewed the key project components comprising the HVAC and HVDC cable routes and converter station options around the substation area (now known as Kiln Lane Substation). Each option underwent an environmental constraints appraisal, after which they were re-appraised comparatively to inform the 2022 non-statutory consultation options.

4.2.5 Landfall site overview

4.2.5.1 The consideration of potential landfall locations broadly covered two geographic extents, referred to as Leiston South and Leiston North.

4.2.5.2 The proposed works at any potential landfall site were expected to comprise the following:

- Trenchless Crossing Techniques such as Horizontal Directional Drilling (HDD): The HDD would be started on land and directed out to sea, to avoid disturbance of the environmentally designated sites, coastal cliffs and beach. The primary HDD activity that interacts with the marine environment is when the HDD breaks through the sediment onto the seabed. During the HDD punch out, drilling fluid[9] and cuttings would be released from the bore on to the seabed.

  Use of trenchless installation techniques allows the cable to be installed below the surface, without disturbing the ground surface.
- The Underground HVDC Cables: The cables would be protected within ducts connected via a Transition Joint Bay (TJB) to the proposed Offshore HVDC Cables. The all the proposed HVDC Cables in this location would be installed using HDD.
- The Transition Joint Bay: this is where the onshore and offshore HVDC cables would be jointed. The TJB is proposed to be located as close to the coast as possible but would not be sited on the beach itself, whilst taking account of environmental and technical constraints. The TJB will contain the joints for all three cables (and the fibre optic cable).

4.2.5.3 The Applicant has committed to using trenchless installation techniques at the landfall. There are no plans to utilise open-cut techniques.

4.2.5.4 The design and final position of the TJB and trenchless installation alignment will take into consideration predicted coastal erosion, flood zones and beach draw down rates to ensure that it is positioned sufficiently far back from the coast and that the ducts are sufficiently deep below the surface that the infrastructure would not become exposed with changes to coastline.

[8] The AHP Methodology is a widely used multi-criteria decision analysis method wherein, given the criteria and the alternative solutions of a specific problem, the decision maker is asked to pairwise compare the components in order to determine their priorities.

[9] The drilling fluids to be used for the HDD are likely to be a modified version of bentonite. Bentonite is classified by the Centre for Environment, Fisheries and Aquaculture Science (Cefas) as Posing Little Or No Risk (PLONOR) to the marine environment.

4.2.5.5 Long term (up to 2105) coastal erosion rates for each landfall were taken from the area Shoreline Management Plan, using the closest shoreline transect to the proposed landfall site. The erosion rates assumed that the coastline continued With Present Management measures in place.

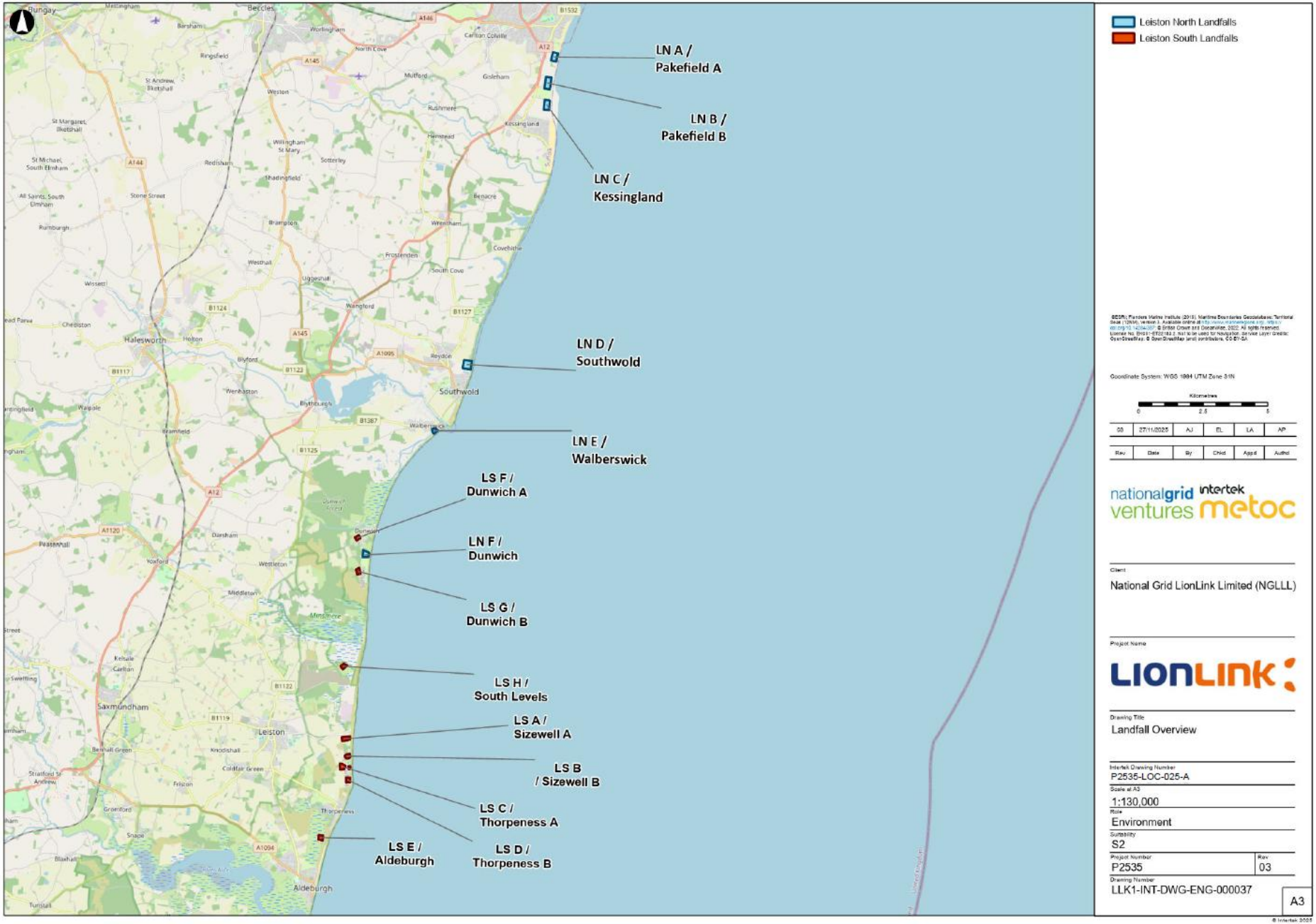

Figure 4-1: Potential long list landfall locations

4.2.6 Leiston North Landfall Long List Locations

4.2.6.1 Landfalls Pakefield A (LN A), Pakefield B (LN B) and Kessingland (LN C) are in close proximity to each other (**Figure 4-1**) and share similar environmental constraints, although Pakefield A (LN A) is more distant from these and therefore was ranked marginally higher in respect of environmental constraints. All northern landfalls would result in a lengthy onshore cable route, and Landfall Pakefield A (LN A) would result in the longest onshore cable route.

Landfall Pakefield A (LN A) (3.4km south of Lowestoft and 2.3km north of Kessingland)

4.2.6.2 The Pakefield A landfall site (**Figure 4-1**) is not adjacent to any onshore statutory ecological designations, the site lies on the coastline of the Outer Thames Estuary SPA. Pakefield to Easton Bavents SSSI is >600m to the south (geological). No IBAs or RSPB reserves were within 1km.

4.2.6.3 There are limited heritage constraints within 500m of the site. The site is not within the Suffolk Coast and Heaths National Landscape or Suffolk Heritage Coast areas.

4.2.6.4 The site lies within Flood Zone 1, though the beach adjacent to the east is classed as Flood Zone 3. There are several agricultural ditches onsite including Leiston Beck 1.7km to the north. There is a Medium – High groundwater vulnerability rating at this site which means that any excavation into the Principal Aquifer within the bedrock has the potential to contaminate potable water sources.

4.2.6.5 Historic data in 2009 forecast long-term erosion (up to 2105) in proximity to the landfall site. In 2022 an updated coastal trends assessment from the Environment Agency indicated that the coastal change had stabilised. According to the National Coastal Erosion Risk Mapping (NCERM) 2018, no coastal defences were present along this part of the coastline. The beach offset height is approximately 13.9m above sea level which makes the site unsuitable for open cut trenching.

4.2.6.6 Other receptors are close to the proposed landfall site, including those at south Lowestoft industrial estate, Pakefield High School to the north, Pakefield Holiday Park (adjacent) to the north, Pontins and Pakefield holiday village to the south 1.2km, Lowestoft Community Church to the west (in industrial estate), which could be disrupted as a result of construction. This landfall would have the longest onshore cable route to the proposed converter station sites.

4.2.6.7 A military camp was based on or in close proximity to the site and a UXO investigation would therefore be required.

4.2.6.8 Landfall Pakefield A (LN A) was not recommended for continued assessment as it had a significant height offset to the shoreline (13.9m). Long term coastal erosion is forecast for this landfall, although an assessment of recent coastal trends indicate the rate of change has stabilised. It would also require a longer onshore underground HVDC cable route (11 and 14km compared to the more southerly landfalls of Southwold and Walberswick) to reach the converter station site options. This longer distance would lead to a greater interaction with the National Landscape area during construction. Other environmental and technical criteria at

the landfall were not sufficiently beneficial to take this landfall forward for further consideration.

Landfall Pakefield B (LN B) (4.6km south of Lowestoft and 1.2km north of Kessingland)

4.2.6.9 The Pakefield B (LN B) landfall site (**Figure 4-1**) is adjacent to ecological designated constraints. The site lies on the coastline of the Outer Thames Estuary SPA and Southern North Sea SAC. The Pakefield to Easton Bavents SSSI lies adjacent to the east (geological). No IBAs or RSPB reserves were within 1km.

4.2.6.10 There are limited heritage constraints within 500m of the site. The site is not within the Suffolk Coast and Heaths National Landscape or Suffolk Heritage Coast areas.

4.2.6.11 The site lies within Flood Zone 1, though the beach adjacent to the east is classed as Flood Zone 3. It lies over 50m from a water course. There is a medium groundwater vulnerability rating at this site which means that any excavation into the Principal Aquifer within the bedrock has the potential to contaminate potable water sources.

4.2.6.12 Historic data in 2009 forecast long-term erosion (up to 2105) in proximity to the landfall site. In 2022 an updated coastal trends assessment from the Environment Agency indicated that the coastal change had stabilised. According to the NCERM 2018, no coastal defences are present along this part of the coastline. The beach offset height is approximately 14m to 19m above sea level which makes the site unsuitable for open cut trenching.

4.2.6.13 Other receptors are close to this landfall site, such as Pontins (adjacent) and Pakefield holiday village to the north, Heathland Beach camping/holiday homes (adjacent) to the south and communities which could be disrupted as a result of construction. The landfall would have a long onshore cable route to the proposed converter station.

4.2.6.14 A military camp was based on or in close proximity to the site and a UXO investigation would be required

4.2.6.15 Pakefield B (LN B) Landfall was not recommended for continued assessment as it had a significant height offset to the shoreline (14m to 19m). Long term coastal erosion is forecast for this landfall, although an assessment of recent coastal trends indicate the rate of change has stabilised. It would require a longer onshore cable route (10 and 13km compared to more southerly landfalls of Southwold and Walberswick) to reach the converter station site options. This longer distance would lead to a greater interaction with the National Landscape area during construction. Other environmental and technical criteria at the landfall were not sufficiently beneficial to take this landfall forwards for further consideration.

Landfall Kessingland (LN C) (5.5km south of Lowestoft and 500m north of Kessingland)

4.2.6.16 The Kessingland (LN C) landfall site (**Figure 4-1**) is adjacent to ecological designated constraints. The site lies on the coastline of the Outer Thames Estuary SPA and Southern North Sea Special SAC. The Pakefield to Easton Bavents SSSI lies adjacent to the east (geological). No IBA's or RSPB reserves were within 1km.

4.2.6.17 There are limited heritage constraints within 500m of the site. The site is not within the Suffolk Coast and Heaths National Landscape or Suffolk Heritage Coast areas.

4.2.6.18 The site lies within Flood Zone 1, though the beach adjacent to the east is classed as Flood Zone 3. It lies over 50m from the nearest water course. There is a Medium – High groundwater vulnerability rating at this site which means that any excavation into the Principal Aquifer within the bedrock has the potential to contaminate potable water sources.

4.2.6.19 Historic data in 2009 forecast long-term erosion (up to 2105) in proximity to the landfall site. In 2022 an updated coastal trends assessment from the Environment Agency indicated that the coastal change had stabilised. According to the NCERM 2018, no coastal defences are present along this part of the coastline. The beach offset height was between 16m and 21m above sea level which made the site unsuitable for open cut trenching.

4.2.6.20 Other receptors are close to the proposed landfall such as Heathland Beach camping/holiday homes (adjacent) and Pontins and Pakefield holiday village to the north which could be disrupted as a result of construction. The landfall would have a long onshore cable route to the proposed converter station.

4.2.6.21 A military camp was based on or in close proximity to the site and a UXO investigation would be required.

4.2.6.22 The Kessingland (LN C) Landfall was not recommended for continued assessment as it had a significant height offset to the shoreline (16m to 21m). Long term coastal erosion is forecast for this landfall, although an assessment of recent coastal trends indicate the rate of change has stabilised. It would require a longer onshore cable route (8 and 11.5km compared to more southerly landfalls at Southwold and Walberswick) to reach the converter station site options. This longer distance would lead to a greater interaction with the National Landscape area during construction. Other environmental and technical criteria at the landfall were not sufficiently beneficial to take this landfall forwards for further consideration.

Southwold Landfall (LN D) (200m north of Southwold and 320m east of Reydon)

4.2.6.23 The Southwold landfall site (**Figure 4-1**) is adjacent to onshore ecological designated constraints. The site lies on the coastline of the Outer Thames Estuary SPA and Southern North Sea SAC. The Pakefield to Easton Bavents SSSI lies adjacent to the east (geological). The Benacre to Easton Bavents IBA lies to the north and the Minsmere – Walberswick IBA to the south. No RSPB reserves were within 1km.

4.2.6.24 The landfall is located within 500m of a heritage conservation area with listed buildings in the vicinity. The landfall lies within the Suffolk Coast and Heaths National Landscape and within Suffolk Heritage Coast areas.

4.2.6.25 The site lies upon Flood Zone 3. It lies adjacent to the north of the Buss Creek, with several agricultural ditches onsite. There is a Medium – High groundwater vulnerability rating at this site which means that any excavation into the Principal Aquifer within the bedrock has the potential to contaminate potable water sources.

4.2.6.26 The site lies upon agricultural land, with agricultural ditches within the site, and adjacent to the beach. There are residential receptors to the west in Reydon and south in Southwold. A PRoW runs through the centre of the site.

4.2.6.27 Landfall occurs on the outskirts of Southwold, with residential and community receptors >250m away from the site. Beach huts holding significant value are present along the sea wall.

4.2.6.28 Historic data in 2009 forecast long-term erosion (up to 2105) in proximity to the landfall site. In 2022 an updated coastal trends assessment from the Environment Agency indicated that the coastline was still eroding. According to the NCERM 2018, the site lies on land protected by sea defences (concrete wall with steel sheet piled toe and concrete apron). Coastal erosion behind the sea wall is not expected to occur as long as the asset is maintained.

4.2.6.29 There was a 2m height offset between the land on either side of the wall making open trench cable installation methods suitable at this site. A small section of HDD could be required to get past the sea wall.

4.2.6.30 The landfall would have a shorter length of onshore cable route to the proposed converter station (compared to the northerly landfall options).

4.2.6.31 The landfall is considered to have a high UXO risk rating and there is a high probability that UXO will be found at the site.

4.2.6.32 Southwold Landfall (LN D) was recommended for continued assessment. There was a reduced coastal erosion risk due to the presence of an existing sea wall, and a minimal height offset to the shoreline (2m). It would require a shorter cable route of between 8 and 11 km than the more northerly landfalls of LN A, B and C to reach the converter station site options. This shorter distance would lead to a lower interaction with the National Landscape area during construction. It was recognised that although there were a number of environmental constraints, there were appropriate construction methodologies available that would avoid and mitigate impacts on these constraints, and as a result the landfall and was taken forwards for further assessment.

Walberswick (LN E) Landfall (50m south of Walberswick and 4.2km north of Dunwich)

4.2.6.33 The Walberswick (LN E) landfall site (**Figure 4-1**) lies on the coastline of the Outer Thames Estuary SPA and Southern North Sea SAC. Minsmere-Walberswick SPA and Ramsar, Minsmere to Walberswick Heaths and Marshes SAC, Minsmere-Walberswick Heaths and Marshes SSSI, and Minsmere -Walberswick IBA lie adjacent to the south. The RSPB Dingle Marshes reserve is just over 1km away from the site.

4.2.6.34 The site is located within 500m of a heritage conservation area with listed buildings in the vicinity. The site lies within the Suffolk Coast and Heaths National Landscape and within Suffolk Heritage Coast areas.

4.2.6.35 The site lies adjacent to the south-east of the Dunwich River, and within Flood Zone 3. There is a Medium – Low groundwater vulnerability rating at this site which means that any excavation into the Principal Aquifer within the bedrock is unlikely to

contaminate potable water sources. The flood defence wall (at the Dunwich River) is also located in close proximity to the landfall.

4.2.6.36 Historic data in 2009 forecast long-term erosion (up to 2105) in proximity to the landfall site. In 2022 an updated coastal trends assessment from the Environment Agency indicated that the change in coastline had shifted to accretion. The beach and inland area of the proposed landfall are approximately 5m above sea level. The gradual nature of the slope and low height offset mean that this site is suitable for trenched cable installation.

4.2.6.37 Other receptors are close such as holiday parks such as Southwold Caravan Park 420m north and Walberswick Caravan Park adjacent to the south. There are residential properties within the vibration boundary at 100m and the noise boundary at 250m and communities such as Walberswick which could be disrupted as a result of construction.

4.2.6.38 The landfall would have a shorter length of onshore cable route to the proposed converter station (of between 11 and 14 km than the more northerly landfalls of LNA, B and C) compared to the northerly landfall options).

4.2.6.39 The landfall has a low UXO risk.

4.2.6.40 Although there were a number of environmental constraints, Walberswick (LN E) Landfall was deemed favourable due to the shingle sea defences and the relatively low height offset onshore (approximately 5m) making the proposed landfall installation method (at the time) of open cut trenching method technically feasible.

4.2.6.41 Walberswick landfall (LN E) was recommended for further assessment. The landfall had a minimal height offset to the shoreline (5m) with relatively flat land behind the shingle berms which would facilitate the landfall works. It would require a shorter cable route than the more northerly landfalls to reach the converter station site options. This shorter distance would lead to a lower interaction with the National Landscape area during construction. The landfall has a long term forecast of coastal erosion, although a recent assessment of the coastline has indicated it is accreting. The current management plan in the area is Hold The Line which lowers the risk of future coastal erosion. It was recognised that although there were a number of environmental constraints, the landfall was taken forwards for further assessment.

Dunwich Landfall (LN F) (700m south of Dunwich 5.7km north of Sizewell C)

4.2.6.42 The Dunwich (LN F) Landfall site (**Figure 4-1**) lies on the coastline of the Outer Thames Estuary SPA and Southern North Sea SAC. The Minsmere-Walberswick SPA and Ramsar, Minsmere to Walberswick Heaths and Marshes SAC, Minsmere RSPB Reserve, and Minsmere – Walberswick IBA lie to the south and west. The Suffolk Sandlings IBA lies upon Dunwich Forest, located north-west of the site. Dingle Marshes RSPB Reserve lies to the west of the site and Potton Hall Fields, Westleton SSSI lies to the west.

4.2.6.43 The site is located within 500m of a heritage conservation area with listed buildings in the vicinity. There is a small section of scheduled monument within 500m. The site lies within the Suffolk and Essex Coast and Heaths National Landscape and

within Suffolk Heritage Coast. The site is near Geological Places to Visit (England) recognised for the sediments exposed in the cliffs at Dunwich – Norwich Crag.

4.2.6.44 The site lies upon Flood Zone 1 and within 50m of a watercourse. There is a Medium – Low groundwater vulnerability rating at this site which means that any excavation into the Principal Aquifer within the bedrock is unlikely to contaminate potable water sources

4.2.6.45 There are a number of holiday parks in close proximity, including Dunwich Cliffs Estate Caravan Park and Cliff House Holiday Park adjacent to the south; and communities such as Dunwich.

4.2.6.46 The landfall would have a shorter length of onshore cable route to the proposed converter station (compared to the northerly landfall options).

4.2.6.47 Historic data in 2009 forecast long-term erosion (up to 2105) in proximity to the landfall site. In 2022 an updated coastal trends assessment from the Environment Agency indicated that the coastal change had shifted to accretion. There is a significant height offset to the beach (>15m). The landfall is protected by sea defences (shingle banks).

4.2.6.48 Dunwich landfall (LN F) was recommended for further assessment. It would require a shorter cable route than the more northerly landfalls to reach the converter station site options. This shorter distance would lead to a lower interaction with the National Landscape area during construction. The landfall had a substantial height offset to the shoreline (>15m). The close proximity of multiple environmentally designated sites presents an engineering challenge. Any potential HVDC cable route alignment would require HDD to travel beneath the designated sites; the shortest width is approximately 1.5km which is approaching the limits of HDD feasibility. It was recognised that although there were a number of environmental and technical constraints, the landfall was taken forwards for further assessment.

Leiston North Landfall Summary

4.2.6.49 Landfall Pakefield A (LN A) was not recommended for continued assessment as it had a significant height offset to the shoreline (13.9m). Long term coastal erosion is forecast for this landfall, although an assessment of recent coastal trends indicate the rate of change has stabilised. It would require a longer onshore cable route (compared to more southerly landfalls) to reach the converter station site options. This longer distance would lead to a greater interaction with the National Landscape area during construction. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forward for further consideration.

4.2.6.50 Pakefield B (LN B) Landfall was not recommended for continued assessment as it had a significant height offset to the shoreline (14m to 19m). Long term coastal erosion is forecast for this landfall, although an assessment of recent coastal trends indicate the rate of change has stabilised. It would require a longer onshore cable route (compared to more southerly landfalls) to reach the converter station site options. This longer distance would lead to a greater interaction with the National Landscape area during construction. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration.

4.2.6.51 The Kessingland (LN C) Landfall was not recommended for continued assessment as it had a significant height offset to the shoreline (16m to 21m). Long term coastal erosion is forecast for this landfall, although an assessment of recent coastal trends indicate the rate of change has stabilised. It would require a longer onshore cable route (compared to more southerly landfalls) to reach the converter station site options. This longer distance would lead to a greater interaction with the National Landscape area during construction. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration.

4.2.6.52 Southwold Landfall (LN D) was recommended for continued assessment. There was a reduced coastal erosion risk due to the presence of an existing sea wall, and a minimal height offset to the shoreline (2m). It would require a shorter cable route than the more northerly landfalls to reach the converter station site options. This shorter distance would lead to a lower interaction with the National Landscape area during construction. It was recognised that although there were a number of environmental constraints, the landfall and was taken forwards for further assessment.

4.2.6.53 Walberswick landfall (LN E) was recommended for further assessment. The landfall had a minimal height offset to the shoreline (5m) with relatively flat land behind the shingle berms which would facilitate the landfall works. A recent assessment of coastal trends indicated that accretion was occurring at the landfall. It would require a shorter cable route than the more northerly landfalls to reach the converter station site options. This shorter distance would lead to a lower interaction with the National Landscape area during construction. It was recognised that although there were a number of environmental constraints, there were appropriate construction methodologies available that would avoid and mitigate impacts on these constraints, and as a result the landfall was taken forwards for further assessment.

4.2.6.54 Dunwich landfall (LN F) was recommended for further assessment. The landfall would require a shorter cable route than the more northerly landfalls to reach the converter station site options which would lead to a lower interaction with the Suffolk Coast and Heaths National Landscape and Suffolk Heritage Coast areas during construction. The landfall has a substantial height offset to the shoreline (>15m). A recent assessment of coastal trends indicated that accretion was occurring at the landfall. The close proximity of multiple environmentally designated sites presents an engineering challenge. Any potential HVDC cable route alignment would require HDD to travel beneath the designated sites; the shortest width is approximately 1.5km which is approaching the limits of HDD feasibility. It was recognised that although there were a number of environmental and technical constraints, the landfall was taken forwards for further assessment.

4.2.7 Leiston South Landfall Longlist Locations

Sizewell A Landfall (LS A) (1.7km east of Leiston and 0.5km south of Sizewell)

4.2.7.2 Sizewell A (LS A) landfall (**Figure 4-1**) was closest landfall to the existing NGET 400kV OHL and substation. The site was not adjacent to other onshore ecological constraints (except for North Warren RSPB). It is approximately 200m from the Outer Thames Estuary SPA, and further away from Sandlings SPA and Leiston-

Aldeburgh SSSI. It is in close proximity to a Suffolk Shingle Beaches CWS and the North Warren RSPB.

4.2.7.3 The site lies within the Suffolk Coast and Heaths National Landscape and the Suffolk Heritage Coast.

4.2.7.4 The landfall is located within Flood Zone 3 and the Leiston Beck, Minsmere Old River, and the Hundred River catchments. A Secondary Aquifer lies above the Principal Aquifer in the area which means that any excavation into the Principal Aquifer within the bedrock has the potential to contaminate potable water sources.

4.2.7.5 Other receptors close to the landfall site include an individual farmstead approximately 20m to the west and a number of individual properties and caravan site adjacent to the south (Beach View Holiday Park) which could be disrupted as a result of construction. Further properties exist within 1km to north and south. There are limited existing screening opportunities, and the existing views are influenced by Sizewell power station.

4.2.7.6 The landfall is adjacent to land utilised for underground energy infrastructure associated with Galloper OWF and subject to an application for its operation and maintenance activities required over the operational lifetime.

4.2.7.7 Historic data in 2009 forecast long-term erosion (up to 2105) in proximity to the landfall site. In 2022 an updated coastal trends assessment from the Environment Agency indicated that the change in coastline had shifted to accretion. The proposed landfall is offset approximately 11m above sea level and protected by sea defences (dunes and an embankment) to the east.

4.2.7.8 The landfall would have a shorter length of onshore cable route to the proposed converter station (compared to the northerly landfall options).

4.2.7.9 The marine route to the landfall would cross the Sizewell Bank. This sandbank is considered essential to coastal sediment processes and provides flood protection to Sizewell A and B Nuclear Power Stations. EDF indicated during consultation (July 2021) that they would have concerns around installation across the bank and extensive modelling would be required to demonstrate trenching would not affect the natural breakwater.

4.2.7.10 The landfall is within the Sizewell exclusion zone. The 'Tidally restricted shallow water area/Vessel transit and Loafing Exclusion Zone' would require written agreement from EDF to conduct work in the exclusion zone to demonstrate that there was no risk to the Sizewell B intake and its function (SPR, 2021).

4.2.7.11 An outcrop of the Coralline Crag geological formation is located offshore of landfall locations LS A to LS D. It consists of erosion-resistant cemented carbonate sands and silty sands that extend sub tidally to the north-east from the Thorpeness Headland. It is regarded as a sensitive feature for its role in coastal processes along the shoreline. Landfall LS A could cause direct disturbance to the current mapped extent of the Coralline Crag. EA1N and EA2 have already sought permission to include this area within consent applications and been refused.

4.2.7.12 Sizewell A (LS A) landfall was not recommended for continued assessment as it had a significant height offset to the shoreline (11m). The proximity of the landfall to the

Sizewell nuclear site presented significant consenting, environmental (e.g. Coralline Crag) and technical constraints (e.g. proximity of Galloper infrastructure). Long term coastal erosion is forecast for this landfall, although an assessment of recent coastal trends indicated the coastline has started accreting. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration.

Sizewell B Landfall (LS B) (2.2km south-east of Leiston 1.2km south of Sizewell

4.2.7.13 The Sizewell B (LS B) Landfall site (**Figure 4-1**) is close to ecological designations, within 50m of CWS Dower House and less than 100m to Leiston-Aldeburgh SSSI and the site is constrained by existing woodland. Located within 100m of Outer Thames Estuary SPA, and 450m from Sandlings SPA.

4.2.7.14 There are limited heritage constraints within 500m of the site. The site lies within the Suffolk Coast and Heaths National Landscape and within Suffolk Heritage Coast.

4.2.7.15 The landfall is located within Flood Zone 3. A Secondary Aquifer lies above the Principal Aquifer in the area which means that any excavation into the Principal Aquifer within the bedrock has the potential to contaminate potable water sources.

4.2.7.16 Other receptors include a caravan park (Beach View Holiday Park) which could be affected during construction. Existing vegetation provides some opportunity for screening. This landfall is further away from larger communities than other landfall options.

4.2.7.17 The landfall is adjacent to land included in the DCO for EA1N and EA2 as part of their onshore cable route.

4.2.7.18 The landfall would have a shorter length of onshore cable route to the proposed converter station (compared to the northerly landfall options).

4.2.7.19 Historic data in 2009 forecast long-term erosion (up to 2105) in proximity to the landfall site. In 2022 an updated coastal trends assessment from the Environment Agency indicated that the change in coastline had shifted to accretion. The proposed landfall is offset approximately 12m to 13m above sea level. There are no sea defences at the landfall.

4.2.7.20 The marine route to the landfall would likely cross the Sizewell Bank. This sandbank is considered essential to coastal sediment processes and provides flood protection to Sizewell A and B Nuclear Power Stations. EDF indicated during consultation (July 2021) that they would have concerns around installation across the bank and extensive modelling would be required to demonstrate trenching would not affect the natural breakwater.

4.2.7.21 The landfall is within the Sizewell exclusion zone. The 'Tidally restricted shallow water area/Vessel transit and Loafing Exclusion Zone' would require written agreement from EDF to conduct work in the exclusion zone to demonstrate that there was no risk to the Sizewell B intake and its function (SPR, 2021).

4.2.7.22 An outcrop of the Coralline Crag geological formation is located offshore of landfall locations LS A to LS D. It consists of erosion-resistant cemented carbonate sands and silty sands that extend sub tidally to the north-east from the Thorpeness

Headland. It is regarded as a sensitive feature for its role in coastal processes along the shoreline. Landfall LS B could cause direct disturbance to the current mapped extent of the Coralline Crag. It is located within 200m of the proposed EA1N and EA2 cable route corridors, with the projects having previously sought permission to include this area within consent applications and been refused.

4.2.7.23 Sizewell B (LS B) landfall was not recommended for continued assessment as it had a significant height offset to the shoreline (12m to 13m). The proximity of the landfall to the Sizewell nuclear site presented significant consenting, environmental (e.g. Coralline Crag) and technical constraints (close proximity to EA1 and EA2 DCO cable route). Long term coastal erosion is forecast for this landfall, although an assessment of recent coastal trends indicated the coastline has started accreting. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration.

Thorpeness A Landfall (LS C) (2.4km south-east of Leiston 1.7km south of Sizewell)

4.2.7.24 The Thorpeness A (LS C) Landfall site (**Figure 4-1**) is close to ecological designations, within 100m of Leiston-Aldeburgh SSSI and potentially within a small section of the SSSI and Sandlings SPA and the North Warren RSPB and Suffolk Sandlings IBA. It is approximately 150m from CWS Dower House.

4.2.7.25 There are limited heritage constraints within 500m of the site. The site lies within the Suffolk Coast and Heaths National Landscape and within Suffolk Heritage Coast.

4.2.7.26 The landfall is located within Flood Zone 3. A Secondary Aquifer lies above the Principal Aquifer in the area which means that any excavation into the Principal Aquifer within the bedrock has the potential to contaminate potable water sources.

4.2.7.27 The landfall is in a rural setting with a small number receptors within 500m. Ness House is approximately 40m to the south and other individual properties are within 1km. Existing vegetation provides some opportunity for screening. This landfall is further away from larger communities than other landfall options.

4.2.7.28 The landfall is adjacent to land included in the DCO for EA1N and EA2 as part of their main site boundary.

4.2.7.29 The landfall would have a shorter length of onshore cable route to the proposed converter station (compared to the northerly landfall options).

4.2.7.30 Historic data in 2009 forecast long-term erosion (up to 2105) in proximity to the landfall site. In 2022 an updated coastal trends assessment from the Environment Agency indicated that the coastline continued to erode. The proposed landfall is offset by approximately 13m above sea level. There are no sea defences at the landfall.

4.2.7.31 The route to the landfall would likely cross the Sizewell Bank – the sandbank is essential to coastal sediment processes and provides flood protection to Sizewell A and B Nuclear Power Stations. EDF indicated during consultation (July 2021) that they would have serious concerns around installation across the bank and extensive modelling would be required to demonstrate trenching would not affect the natural breakwater.

4.2.7.32 The landfall is within the Sizewell exclusion zone – the 'Tidally restricted shallow water area/Vessel transit and Loafing Exclusion Zone'. A written agreement would need to be sought from EDF to conduct work in the exclusion zone and it would be up to the applicant to demonstrate that there was no risk to the Sizewell B intake and its function (SPR, 2021).

4.2.7.33 An outcrop of the Coralline Crag geological formation is located offshore of landfall locations LS A to LS D. It consists of erosion-resistant cemented carbonate sands and silty sands that extend sub tidally to the north-east from the Thorpeness Headland. It is regarded as a sensitive feature for its role in coastal processes along the shoreline. Landfall LS C could cause direct disturbance to the current mapped extent of the Coralline Crag.

4.2.7.34 Thorpeness A (LS C) landfall was not recommended for continued assessment as it had a significant height offset to the shoreline (13m). The proximity of the landfall to the Sizewell nuclear site presented significant consenting (e.g. Sizewell Exclusion Zone), environmental (e.g. Coralline Crag) and technical constraints (close proximity to EA1 and EA2 DCO boundary). Long term coastal erosion is forecast for this landfall, and an assessment of recent coastal trends confirmed that the coastline was continuing to erode. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration.

Thorpeness B Landfall (LS D) (2.5km south-east of Leiston and 2.2km south of Sizewell)

4.2.7.35 The Thorpeness B (LS D) Landfall site (**Figure 4-1**) is close to ecological designations, adjacent to the S-Aldeburgh SSSI and <100m from North Warren RSPB. Within 100m of the Outer Thames Estuary SPA, and 500m from Sandlings SPA and Suffolk Sandlings IBA.

4.2.7.36 There are limited heritage constraints within 500m of the site. The site lies within the Suffolk Coast and Heaths National Landscape and within Suffolk Heritage Coast.

4.2.7.37 The landfall is also located within Flood Zone 3. A Secondary Aquifer lies above the Principal Aquifer in the area which means that any excavation into the Principal Aquifer within the bedrock has the potential to contaminate potable water sources.

4.2.7.38 The landfall is in a rural setting with a small number of receptors within 500m. Existing vegetation provides some opportunity for screening. This landfall is further away from larger communities than other landfall options.

4.2.7.39 The landfall would have a shorter length of onshore cable route to the proposed converter station (compared to the northerly landfall options).

4.2.7.40 Historic data in 2009 forecast long-term erosion (up to 2105) in proximity to the landfall site. In 2022 an updated coastal trends assessment from the Environment Agency indicated that the coastline continued to erode. The proposed landfall is offset by approximately 12m above sea level. There are no sea defences at the landfall.

4.2.7.41 There would be the requirement to cross the Greater Gabbard and Galloper export cables as well as the EA1N and EA2 cables, potentially in shallow water. Onshore, the landfall lies within the EA1N and EA2 - Onshore Main Site Boundary.

4.2.7.42 The route to the landfall is not expected to cause direct disturbance to the Sizewell Bank or the Coralline Crag formation. The HDD punchout It is outside of the Sizewell exclusion zone and over 3km from the proposed Sizewell C outfall structures.

4.2.7.43 Thorpeness B (LS D) Landfall was not recommended for continued assessment due to the extensive overlap with consented infrastructure (EA1N and EA2 DCO boundary). The overlap raised significant concerns regarding consenting, deliverability, and potential impacts on other projects. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration

Aldeburgh Landfall (LS E) (1.2km north of Aldeburgh and 1km south of Thorpeness)

4.2.7.44 The Aldeburgh (LS E) landfall (**Figure 4-1**) lies within the Leiston-Aldeburgh SSSI, the North warren RSPB reserve and the Alde – Ore Estuary IBA. Located approximately 300m from Outer Thames Estuary SPA, and 400m from Sandlings SPA.

4.2.7.45 There are limited heritage constraints within 500m of the site. The site lies within the Suffolk Coast and Heaths National Landscape and within the Suffolk Heritage Coast.

4.2.7.46 The landfall is located within Flood Zone 3, and approximately 30m from the Hundred River. There are no secondary aquifers below the site, but a Secondary A aquifer runs along the beachfront.

4.2.7.47 Historic data in 2009 forecast long-term erosion (up to 2105) in proximity to the landfall site. In 2022 an updated coastal trends assessment from the Environment Agency indicated that the coastline continued to erode. The proposed landfall is offset by approximately 1m above sea level. It is partially protected by a raised shingle shoreline to the east.

4.2.7.48 There are limited other receptors in the vicinity of the site. The landfall is in a rural setting and further away from larger communities than other options, although Thorpeness is located to the north and Aldeburgh to the south..

4.2.7.49 There are indications from the Sizewell C data set that the Coralline Crag extends south and is present in front of Landfall LS E, however indications are that it is approximately 500m wide where a cable corridor would be proposed. It may be possible to avoid disturbance to this feature.

4.2.7.50 The route to the landfall is not expected to cause direct disturbance to the Sizewell Bank and the HDD punchout It is outside of the Sizewell exclusion zone. The HDD punchout is over 3km from the proposed Sizewell C outfall structures.

4.2.7.51 There is the potential to co-locate landfall with the Sea Link project to reduce disturbance to social and environmental receptors.

4.2.7.52 The Aldeburgh (LS E) Landfall was recommended for continued assessment due to the potential to co-locate with the Sea Link project. Although it was recognised that the location of the landfall was within an environmentally designated area and the route potentially passed through the Coralline crag area.

Dunwich A Landfall (LS F)

4.2.7.53 The Dunwich A (LS F) Landfall site (**Figure 4-1**) is located north of Sizewell and close to the Minsmere-Walberswick SPA and SAC, the Minsmere-Walberswick Ramsar site, Minsmere-Walberswick Heaths and Marshes SSSI, the Minsmere to Walberswick Heaths and Marshes IBA, the Minsmere RSPB reserve, and the National Trust Dunwich Heath.

4.2.7.54 The landfall lies within Flood Zone 1. The Dunwich River is also close to the proposed landfall site.

4.2.7.55 The proposed landfall is approximately 300m from a Scheduled Monument, with the Dunwich Conservation Area lying adjacent to the south. Dunwich village also contains several listed buildings near the landfall. The site lies within the Suffolk Coast and Heaths National Landscape and the Suffolk Heritage Coast.

4.2.7.56 The landfall is located north of the Dunwich Bank wreck (designated as protected under the Protection of Wrecks Act 1973 with a 100 m exclusion zone). The landfall is also adjacent to the Dunwich Cliffs along which is the southern extent of an area of historical character and archaeology due to the lost (and sunken) settlement of Dunwich.

4.2.7.57 Other receptors close to the landfall include residential properties and the village of Dunwich. Despite a largely rural setting there would be some disruption to these receptors as a result of construction.

4.2.7.58 The landfall would have a shorter length of onshore cable route to the proposed converter station (compared to the northerly landfall options, being approximately 5km shorter than to the Walberswick landfall option).

4.2.7.59 Landfall LS F would require a shorter cable route than the more northerly landfalls to reach the converter station site options which would lead to a lower interaction with the Suffolk Coast and Heaths National Landscape and Suffolk Heritage Coast areas during construction.

4.2.7.60 Historic data in 2009 forecast long-term erosion (up to 2105) in proximity to the landfall site. In 2022 an updated coastal trends assessment from the Environment Agency indicated that the coastline continued to erode. The proposed landfall is approximately offset by 18m above sea level. There are no sea defences at the landfall.

4.2.7.61 The Dunwich A (LS F) landfall was not recommended for further assessment. The presence of the submerged historic settlement of Dunwich immediately offshore of the landfall presented a significant technical and consenting risk. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration

Dunwich B Landfall (LS G)

4.2.7.62 The Dunwich B (LS G) Landfall (**Figure 4-1**) site is located north of Sizewell and within 1km of the following environmental designations: Minsmere-Walberswick SPA and SAC, Minsmere-Walberswick Ramsar site, Minsmere-Walberswick Heaths and Marshes SSSI, Minsmere to Walberswick Heaths and Marshes IBA, Minsmere RSPB reserve and the National Trust Dunwich Heath.

4.2.7.63 There are limited heritage constraints within 500m of the site. There is a Scheduled Monument 520m north of the landfall. The site lies within the Suffolk Coast and Heaths National Landscape and the Suffolk Heritage Coast.

4.2.7.64 Other receptors close to the landfall include Cliff house holiday park and Dunwich Cliffs caravan park and cliff house holiday park are to the north. Despite a largely rural setting there would be some disruption to human receptors as a result of construction.

4.2.7.65 The landfall site is within Flood Zone 1. The landfall is situated within the Minsmere Levels, an area which forms the flood water catchment marshes that drain the area of land either side of the River Minsmere which runs from Sibton Lake through Yoxford, Reckford Bridge and Eastbridge through the New Cut and out to the sea via the sluice.

4.2.7.66 The landfall would have a shorter length of onshore cable route to the proposed converter station (compared to the northerly landfall options).

4.2.7.67 Historic data in 2009 forecast long-term erosion (up to 2105) in proximity to the landfall site. In 2022 an updated coastal trends assessment from the Environment Agency indicated that the change in coastline had shifted to accretion. The proposed landfall is approximately offset by 17m above sea level. The Minsmere cliffs are eroding intermittently and at a slightly slower rate than the Dunwich cliffs.

4.2.7.68 The Dunwich B (LS G) landfall was not recommended for further assessment. The presence of multiple environmental designations immediately adjacent to the proposed landfall site and the beach height offset presented significant technical challenges. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration.

South Levels Landfall (LS H)

4.2.7.69 The South Levels (LS H) Landfall site is located north of Sizewell and adjacent or partially within the Minsmere-Walberswick Heaths and Marshes SSSI and Minsmere - Walberswick IBA (depending on boundary). The landfall is adjacent to the Minsmere RSPB reserve and approximately 300m from the Minsmere-Walberswick SPA, Minsmere to Walberswick Heaths and Marshes SAC, Minsmere-Walberswick RAMSAR. It is located within the Southern Minsmere Levels CWS.

4.2.7.70 There are limited heritage constraints within 500m of the site. There is a Scheduled Monument 520m north of the landfall. The site lies within the Suffolk Coast and Heaths National Landscape and the Suffolk Heritage Coast.

4.2.7.71 The site lies with Tidal Flood zone 2 and 3. The site lies adjacent to area of land with multiple drains and 330m from Leiston Beck. The Minsmere Tidal Sluice, which collects water from three channels before discharging into the sea on Minsmere

beach is just on the edge of the Sizewell exclusion zone which provides another constraint to potential cable routeing in this area.

4.2.7.72 The landfall would have a shorter length of onshore cable route to the proposed converter station (compared to the northerly landfall options).

4.2.7.73 Historic data in 2009 forecast long-term erosion (up to 2105) in proximity to the landfall site. In 2022 an updated coastal trends assessment from the Environment Agency indicated that the coastline continued to erode. The proposed landfall is approximately offset by 1m above sea level. Landfall LS H would require a shorter cable route than the more northerly landfalls to reach the converter station site options which would lead to a lower interaction with the Suffolk Coast and Heaths National Landscape and Suffolk Heritage Coast areas during construction.

4.2.7.74 The landfall lies within the Sizewell exclusion zone - the 'Tidally restricted shallow water area/Vessel transit and Loafing Exclusion Zone'. A written agreement would need to be sought from EDF to conduct work in the exclusion zone and it would be up to the Applicant to demonstrate that there was no risk to the Sizewell B intake and its function.

4.2.7.75 To avoid the exclusion zone and the tidal sluice, a longer onshore cable route would be needed to avoid conservation designations, the Minsmere to Walberswick SPA and Ramsar site and the Minsmere to Walberswick Heaths and Marshes SAC.

4.2.7.76 The South Levels (LS H) landfall was not recommended for further assessment. The presence of the overlapping Sizewell exclusion zone presented significant technical and consenting risk. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration.

Leiston South Landfall Summary

4.2.7.77 Sizewell A (LS A) landfall was not recommended for continued assessment as it had a significant height offset to the shoreline (11m). The proximity of the landfall to the Sizewell nuclear site presented significant consenting, environmental (e.g. Coralline Crag) and technical constraints (e.g. proximity of Galloper infrastructure). Long term coastal erosion is forecast for this landfall, although an assessment of recent coastal trends indicated the coastline was accreting. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration.

4.2.7.78 Sizewell B (LS B) landfall was not recommended for continued assessment as it had a significant height offset to the shoreline (12m to 13m). The proximity of the landfall to the Sizewell nuclear site presented significant consenting, environmental (e.g. Coralline Crag) and technical constraints (close proximity to EA1 and EA2 DCO cable route). Long term coastal erosion is forecast for this landfall, although an assessment of recent coastal trends indicated the coastline was accreting. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration.

4.2.7.79 Thorpeness A (LS C) landfall was not recommended for continued assessment as it had a significant height offset to the shoreline (13m). The proximity of the landfall to the Sizewell nuclear site presented significant consenting (e.g. Sizewell Exclusion Zone), environmental (e.g. Coralline Crag) and technical constraints (close proximity

to EA1 and EA2 DCO boundary). Long term coastal erosion is forecast for this landfall, and an assessment of recent coastal trends confirmed this forecast . Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration.

4.2.7.80 Thorpeness B (LS D) Landfall was not recommended for continued assessment due to the extensive overlap with consented infrastructure (EA1N and EA2 DCO boundary). The overlap raised significant concerns regarding consenting, deliverability, and potential impacts on other projects. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration

4.2.7.81 The Aldeburgh (LS E) Landfall was recommended for continued assessment due to the potential to co-locate with the Sea Link project. Although it was recognised that the location of the landfall was within an environmentally designated area and the route potentially passed through the Coralline crag area.

4.2.7.82 The Dunwich A (LS F) landfall was not recommended for further assessment. The presence of the submerged historic settlement of Dunwich immediately offshore of the landfall presented a significant technical and consenting risk. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration

4.2.7.83 The Dunwich B (LS G) landfall was not recommended for further assessment. The presence of multiple environmental designations immediately adjacent to the proposed landfall site and the beach height offset presented significant technical challenges. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration.

4.2.7.84 The South Levels (LS H) landfall was not recommended for further assessment. The presence of the overlapping Sizewell exclusion zone presented significant technical and consenting risk. Other environmental and technical criteria at the landfall were not sufficient to take this landfall forwards for further consideration.

Landfall Summary

4.2.7.85 The following landfall options (**Figure 4-1**) were taken forward for non-statutory consultation (2022):

- Leiston North (LN) Landfall D (non-statutory landfall F - Southwold)
- Leiston North (LN) Landfall E (non-statutory landfall G - Walberswick)
- Leiston North (LN) Landfall F (non-statutory landfall H - Dunwich)
- Leiston South (LS) Landfall E (non-statutory landfall E - Aldeburgh)

4.2.8 Converter Station options

Introduction

4.2.8.1 An initial feasibility study identified 7 search areas (Site 1 to Site 7) for a potential converter station site (**Figure 4-2**). These search areas were then used to define 13 initial Converter Site locations (C1 to C13) between Saxmundham and Sizewell, and between the A12 and the Suffolk coastline. A technical review of the converter station site options identified two more potential locations (C14 and C15) prior to the non-statutory consultation in 2022, within Site 1 and Site 6 (**Figure 4-2**).

Siting Considerations

4.2.8.2 Areas of land within the search area that met the core design requirements (Table 4-1) were taken forward as potential converter station site options.

Table 4-1: Maximum design parameters

Component	Requirement
Converter station	Minimum footprint: 5 hectares
	Maximum height: 24m above ground
	Additional temporary working area: 3 hectares

4.2.8.3 The constraints mapping was reviewed to identify what environmental, socio-economic and special land ownership features were located within or immediately adjacent to the potential sites. Table 4-2 describes the criteria that each of the potential sites were compared against. Initial underground HVDC and HVAC cable corridors between potential converter sites and landfall locations formed part of the early siting studies (see **Section 4.3** for more details).

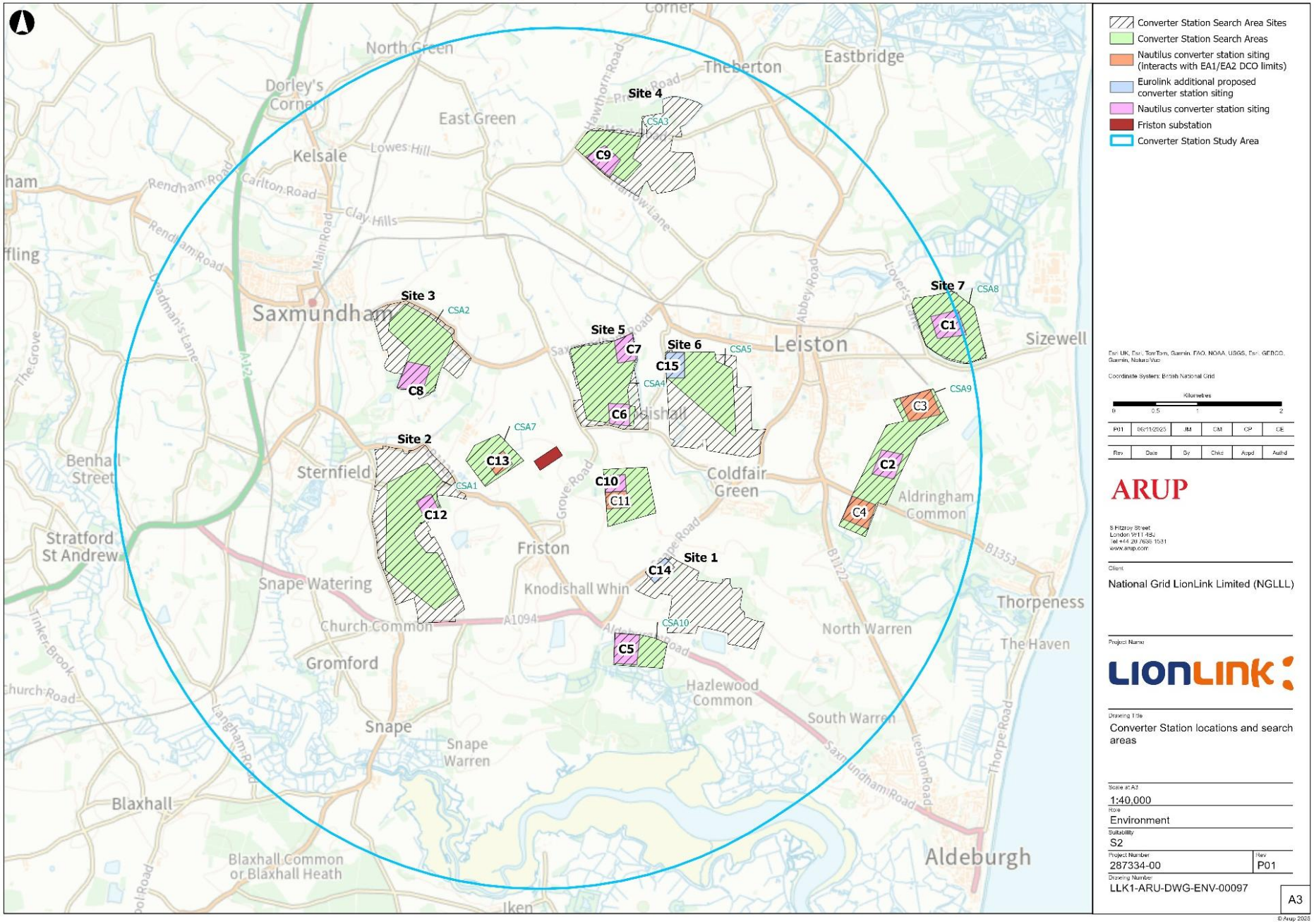

Figure 4-2: Converter Station locations and search areas

Table 4-2: Terrestrial siting considerations

Component	Considerations
Landscape and visual	Potential to affect the special qualities and landscape character of the Suffolk and Essex Coasts and Heaths National Landscape and Heritage Coast
	Proximity to local level landscape designations e.g. SLAs
	Potential to affect protected/ valued landscape features: ■ Ancient woodland ■ Tree Preservation Orders
	Landscape Character: Opportunities for Siting
	Proximity to Sensitive Visual Receptors - Residential / Settlement
	Proximity to other existing/ future development that may result in potential cumulative visual effects
Ecology and nature conservation	Proximity to local designated sites
	Proximity to national designated sites
	Proximity to European designated sites
	Proximity to ancient woodland or native plantation
	Proximity to features likely to support protected species
	Potential value of habitat
	Potential for protected or notable species
Heritage/Archaeology	Proximity to nationally designated assets e.g. Scheduled Monuments, grade I listed buildings, conservation areas, inventoried gardens, and designed landscapes, and archaeology
Water environment	Proximity to flood risk zone
	Groundwater Source Protection Zone (SPZ)
	Presence of potentially contaminated land
	Groundwater (superficial and bedrock) – principal aquifer
	Surface water quality – proximity to watercourses
Community and land use	Proximity to dwellings or other sensitive receptors
	Proximity to PRoW and cycle routes
	General conformity with Minerals and Waste Policy
	UXO risk
	Agricultural Land Classification
Planning	General conformity with Planning policy
	Current planning applications, potential for other development use or potential for cumulative impacts

Common baseline

4.2.8.4 Data gathering, and site analysis identified commonalities between the sites from an environmental, constructability and design perspective, these are summarised below:

- Site research concluded that the radon level is less than 1%, meaning that working on site/on excavations would not expose anyone to radon gas beyond everyday amounts. In addition, there are no authorised or historic landfill sites on or adjacent to the proposed Converter Stites, it would be unlikely that leached pollutants and harmful substances would have entered the sites that may cause damage to constructed elements or a health and safety hazard during the works.
- Historic land use studies concluded that the sites have been used for Enclosed Agriculture meaning that contaminants from industrial activities are unlikely to be present on site. Contaminants such as hydrocarbons, heavy metals and solvents can damage foundations and other underground construction.
- Bedrock for all sites is an undivided sedimentary Crag Group – mainly fine-grained buff to brown, locally shelly, micaceous sands with local rounded flint gravels. Cohesive bedrock is suitable for piles utilising friction over end bearing designs. Shallow foundations in sands are likely to not be affected by a high-water table, however exact ground conditions need to be confirmed.
- Principal aquifers reside under all sites owing to the porous bedrock. Secondary aquifer classification varies by site. Care must be taken to ensure that pollutants from construction and operation of the Converter Sites / landfalls do not leak onto the ground as this may lead to aquifer contamination.
- All sites lie above a Zone III source protection area, except C5 and C12 which are not above source protection zones. This is the least strict zone type however care must be taken during construction and site operations to ensure that pollutants do not enter drinking water aquifers. This can be addressed during the construction phase with the development and application of a drainage management plan. The design of the permanent drainage system shall take in to account the local aquifers to mitigate risk of pollution.
- Access to the sites from any exit on the A12 near Leiston will encounter a minimum of one level crossing. Level crossings can influence the scheduling of deliveries and are weak points in the road surface where increased heavy goods vehicles traffic and the movement of Abnormal Indivisible Load (AIL) can accelerate damage. As axle loads are assumed in accordance with UK regulations the amount of damage anticipated is minimal.
- There are OHLs that cross the main access routes to the sites. Clearance assessment is beyond the scope of this report, but it is important to consider AIL delivery heights, so they stay within the acceptable clearances for the OHLs. Planned outages, circuit diversions / cable burial or the construction of lowered sections of road are potential issues if clearance is not achievable, although the road is assumed to currently be used by high sided vehicles.
- There are few sites with vibration receptors which is favourable as vibration monitoring is likely not required. Vibration pollution is only anticipated to occur during the construction phase, not during the operation of the facility.

Converter Station C1 (Site 7)

4.2.8.5 This location is characterised by semi-improved grassland with priority/ notable habitat accounting for a significant proportion of the site area. Presence of notable flora, terrestrial invertebrates, breeding birds (Sch.1, e.g. Stone Curlew), reptiles, great crested newt (waterbodies within 250m);

4.2.8.6 Located within Suffolk and Essex Coast and Heaths National Landscape. Proximity to sensitive visual receptors (settlements/ residences): Some existing screening from Leiston, located 500m to west; small group of properties at 250m north;

4.2.8.7 Located 600m from nearest mineral safeguarding sites (HWRC7, N1/WER4, and N2/WER5);

4.2.8.8 Converter station site located 800m from Sizewell power station and adjacent to operational substation, therefore potential for historic contamination; and

4.2.8.9 Adjacent land subject to Sizewell C DCO application.

4.2.8.10 Converter Station C1 was not taken forward to non-statutory consultation on the basis that it was within the Suffolk and Essex Coast and Heaths National Landscape and its distance from the proposed substation.

Converter Station C2 (Site CSA9)

4.2.8.11 Location within arable fields. Pond present in the centre of the site indicating potential for priority/ notable habitat and potential for great crested newt. Also potential for badger.

4.2.8.12 Proximity to sensitive visual receptors (settlements/ residences): Aldringham located 300m west, Leiston located 600m north, and scattered individual/ cluster properties within 1km. No significant infrastructure developments within 2km; and

4.2.8.13 Public footpath No. 14A located 40m to the north, and No. 3 located 50m to the east.

4.2.8.14 Traffic routeing is challenged at the end of the route by passing through Aldringham, where there are tight corners and residential properties (streetlights, street furniture etc). There is no asphalt track to the site therefore installation of access would be required

4.2.8.15 Converter Station C2 was not taken forward to non-statutory consultation on the basis that it was within the Suffolk and Essex Coast and Heaths National Landscape and its distance from the proposed substation.

Converter Station C3 (Site CSA9)

4.2.8.16 Converter Station 3 (shaded red, **Figure 4-2**) was discounted as it directly overlaps with the proposed cable routes for the EA1N and EA2 OWFs export cables proposed by SPR. This is considered a technical constraint should EA1N and EA2 projects progress to construction therefore this site has not been taken forward for further assessment.

Converter Station C4 (Site CSA9)

4.2.8.17 Converter Station 4 (shaded red, **Figure 4-2**) was discounted as it directly overlaps with the proposed cable routes for the EA1N and EA2 export cables proposed by SPR. This is considered a technical constraint should EA1N and EA2 projects progress to construction therefore this site has not been taken forward for further assessment.

Converter Station C5 (Site CSA10)

4.2.8.18 Location within an arable field bounded by broad-leaved woodland and waterbodies (ditches) to west and south. Potential for priority/ notable habitat supporting breeding birds, bats, badger, and great crest newt adjacent to converter station site;

4.2.8.19 Proximity to sensitive visual receptors (settlements/ residences): Located within Suffolk and Essex Coast and Heaths National Landscape. Scattered individual/ cluster of residential properties (closest 145m). No significant development within 2km; and

4.2.8.20 Watercourses (Ham Creek and unnamed ditches) are within 45m to the south of the site.

4.2.8.21 Soilscape is regarded as fen peat soils and freely draining slightly acid sandy soils. Peat if present on site would not be suited for shallow construction as it has no structural strength.

4.2.8.22 The site is crossed by a gentle ridge in the landscape with slopes either side of around 1:30. There could be -6m to +5m of cut and fill required on this site which is the most extensive of all available options.

4.2.8.23 Although access and site distance from the proposed substation are favourable, the extent of cut and fill required will see a significant increase to the ground works cost. A ground investigation could suggest if reuse of site won material is possible by confirming the soil characteristics, if not then lime or cementitious additions may be added to improve soil strength up to a certain level. There is risk that the excavated soil is not suitable for reuse and that engineering fill materials would need to be imported at cost to budget and programme.

4.2.8.24 Converter Station C5 was not taken forward for further consideration due to the geology of the site being unsuitable for the installation of converter station foundations. Extensive groundworks would be required to level the site and make ground conditions suitable.

Converter Station C6 (Site 5 in Non-Statutory Consultation)

4.2.8.25 Located on arable fields bordered by drainage ditches and both species poor and species rich hedges. Priority/notable habitat present with potential to support otter and water vole adjacent to converter station site;

4.2.8.26 Proximity to sensitive visual receptors (settlements/ residences): close proximity (230m) to individual/ cluster properties at Knodishall. Other individual/ cluster properties within 1km. Approximately 700m from EA1N/ EA2 application/ proposed Leiston substation;

4.2.8.27 Land is considered Grade 2 (very good quality) agricultural land; and

4.2.8.28 Public footpath No. 16 crosses converter station site; diversions will be required. Site located in “very good” quality agricultural land (Grade 2)

4.2.8.29 Converter Station CS6 was not taken forward because of its interaction with EA1N and EA2 DCO limits that were not previously identified. However, the wider Site 5 area (**Figure 4-2**) was still included in the non-statutory consultation.

Converter Station C7 (Site 5 in Non-Statutory Consultation)

4.2.8.30 Location within arable field bordered by drainage ditches and (species poor) hedges; mixed plantation woodland to south west and east. Potential to support otter and water vole adjacent to converter station site. No priority/ notable habitats identified within the site;

4.2.8.31 Proximity to sensitive visual receptors (settlements/ residences): close proximity (320m) to individual/ cluster properties at Knodishall. Other individual cluster properties within 1km. Approximately 1.2km from EA1N/ EA2 application/ proposed Leiston substation;

4.2.8.32 Public footpath No. 14 lies 35m to the west. Land is considered Grade 2 (very good quality) agricultural land; and

4.2.8.33 Eastern site boundary lies adjacent to the Hundred River (within 15m). Site edge located within Flood Zone 3.

4.2.8.34 Converter Station C7 (within the Site 5 search area) was located some distance from the national landscape area and presented opportunities for screening. As a result, this site was taken forwards for further consideration.

Converter Station C8 (Site 3 in Non-Statutory Consultation)

4.2.8.35 Located in an arable field bordered by broad-leaved woodland to the west. Priority/ notable habitat identified at the site area (pond) and potential to support bats and badger adjacent to site;

4.2.8.36 Proximity to sensitive visual receptors (settlements/ residences): Wood Farm is located 250m northwest of the converter station site. Hill Farm located 240m to south. Other individual/ cluster properties within 1km. Location is approximately 1.5km from EA1N/ EA2 application/ proposed Leiston substation; and

4.2.8.37 Public footpath No. 5 crosses the converter station site, and No. 6 lies 50m to the north; diversions will be required.

4.2.8.38 Relatively close to the proposed substation location and existing infrastructure (potential for co-location with existing projects).

4.2.8.39 Converter Station C8 (within the Site 3 search area) was taken forwards for further consideration due to the proximity of the substation and infrastructure.

Converter Station C9 (Site 4 in Non-Statutory Consultation)

4.2.8.40 Located on an arable field with ponds to north and east. Priority/ notable habitat present and potential for great crested newt;

4.2.8.41 Located 3.5km from Minsmere to Walberswick Heaths and Marshes SAC and Minsmere-Walberswick SPA, and 3km from Minsmere-Walberswick Heaths and Marshes SSSI; and

4.2.8.42 Proximity to sensitive visual receptors (settlements/ residences): Peak Hill Cottage located 200m to the west. Other individual/ cluster properties within 1km. No significant development within 2km.

4.2.8.43 The proposed site is close to existing overhead 400kV lines.

4.2.8.44 Due to its proximity to existing OHLs and that it was located outside the National Landscape, the Site C9 (within the Site 4 search area) was taken forwards for further consideration.

Converter Station C10

4.2.8.45 Located within arable fields with broad-leaved woodland and waterbodies (ponds) to west. Potential for priority/notable habitat and potential to support Great Crested Newt, bats, and badger adjacent to the site. Located approximately 100m from ancient woodland.

4.2.8.46 Directly adjacent to ancient woodland, with associated root protection aera impacts, and Grove Wood CWS.

4.2.8.47 The site is in proximity to sensitive visual receptors (settlements/ residences): Manor Farm located 140m to north (limited screening). Approximately 450m from EA1N/ EA2 application/ proposed Leiston substation

4.2.8.48 Land is considered Grade 2 (very good quality) agricultural land.

4.2.8.49 Converter Station C10 was the closest to the Kiln Lane Substation. However, the proximity of the EA1N and EA2 DCO boundary, ancient woodland and the rural setting meant that this site was not considered further.

Converter Station C11

4.2.8.50 Converter Station 11 (shaded red, **Figure 4-2**) was discounted as it directly overlaps with the proposed cable routes for the EA1N and EA2 export cables proposed by SPR. This is considered a technical constraint should EA1N and EA2 projects progress to construction therefore this site has not been taken forward for further assessment.

Converter Station C12 (Site 2)

4.2.8.51 Located in an arable field with broad-leaved woodland and waterbodies (ponds) to the west and broad-leaved woodland to east. Potential to support Great Crested Newt, bats, and badger adjacent to converter station site;

4.2.8.52 Proximity to sensitive visual receptors (settlements/ residences): Friston Hall Cottages located 180m to the south; potentially orientated oblique to site. Other individual/ cluster properties within 1km. Approximately 1.2km from EA1N/ EA2 application/ proposed Leiston substation; and

4.2.8.53 Land is considered Grade 2 (very good quality) agricultural land.

4.2.8.54 Converter Station C12 was outperformed on environmental and technical criteria by other potential sites and was not taken forwards for further consideration.

Converter Station C13 (Site CSA7)

4.2.8.55 The site straddles several arable fields with bordering hedges (undefined quality) and broad-leaved woodland to north. Potential to support bats and badger in adjacent areas.

4.2.8.56 Proximity to sensitive visual receptors (settlements/ residences): Pond House located 200m west, Moor Farm located 350m southwest, and Fristonmoor located 340m northwest. Other individual/ cluster properties within 1km. Located approximately 300m from EA1N/ EA2 application/ proposed Leiston substation;

4.2.8.57 Public footpath No. 17 crosses the converter station site; diversions will be required.

4.2.8.58 The proposed site overlaps with EA1N and EA2 DCO order limits (but no direct overlap with infrastructure layout). This is considered a technical constraint should EA1N and EA2 projects progress to construction therefore this site has not been taken forward for further assessment.

Converter Station C14 (Site 1 in Non-Statutory Consultation)

4.2.8.59 Generally rural setting (although could also be considered less favourable due to lack of existing built infrastructure in the area), with no immediately adjacent settlements. Coldfair Green approximately 780m north and Friston 1km to the west.

4.2.8.60 Located over 1km from the Suffolk Heritage Coast and located 750m away from Suffolk and Essex Coast and Heaths National Landscape.

4.2.8.61 Site located in “good to moderate” quality agricultural land (grade 3) and “poor quality” agricultural land (grade 4).

4.2.8.62 Ancient Woodland is located beyond C14 to the east of Site 1. This forms part of Great Wood which is designated as a CWS.

4.2.8.63 Closer in proximity to statutory ecological designations, than other sites, including:

- 2km from Alde-Ore and Butley Estuaries SAC and Alde-Ore Estuary SPA and SSSI
- 2.3km to Leiston - Aldeburgh SSSI and Sandlings SPA.

4.2.8.64 Grade II listed building, Billeaford Hall, approximately 400m to the north, others at least 1.5km away.

4.2.8.65 Small number of isolated residential receptors in proximity, including Bulls Hull Cottages located immediately adjacent.

4.2.8.66 Located within Flood Zone 1. A reservoir/waterbody lays immediately to the south, adjacent to Hazlewood Hall Farm. Located within SPZ 3.

4.2.8.67 Potential for co-location with other projects in the area.

4.2.8.68 As the site was located outside the National Landscape and was relatively close to the proposed substation location, Converter Site C14 was taken forwards for consideration in the 2022 non-statutory consultation.

Site 6: Converter Station C15

4.2.8.69 Relatively significant distances from statutory ecological designations, with those in closest proximity including - 4.7km from Alde-Ore and Butley Estuaries SAC - 2.8km from Sandlings SPA and Leiston - Aldeburgh SSSI - 4km from Minsmere-Walberswick Ramsar

4.2.8.70 Located over 1km from Suffolk and Essex Coast and Heaths National Landscape, and 4km from the Suffolk Heritage Coast

4.2.8.71 Site located in “very good” quality agricultural land (grade 2).

4.2.8.72 Small number of heritage assets in proximity, including Grade II/II* listed buildings around 300m away. Around 1.2km from the conservation area within Leiston. Small number of isolated residential receptors in proximity at the edge of Knodishall within 250m. Adjacent to the settlement of Leiston approximately 630m to the east and the village of Knodishall approximately 130m to the southwest.

4.2.8.73 Located within SPZ 3 and within Flood Zone 1.

4.2.8.74 This Converter Station did not perform better against environmental or technical criteria than other options and was not taken forward for further consideration.

Converter Station Site Summary

4.2.8.75 The following wider converter station site options were taken forward for further consideration at the non-statutory consultation in 2022.

- Site 1 (contains Converter Station C14): The Site 1 area identified good potential for co-location with other projects, including Sea Link and Nautilus. Existing infrastructure near to site, including 400kV OHLs, as well as the proximity to Kiln Lane Substation were identified as benefits to Site 1. Several residential receptors are in proximity to the site, as well as Site 1 being located on the border of the Suffolk and Essex Coast and Heaths National Landscape.
- Site 3 (contains Converter Station C8): The wider Site 3 area 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 to minimise the cumulative impacts of major infrastructure projects in the area. The site benefits from some existing screening from existing woodland and field boundaries.
- Site 4 (contains Converter Station C9): The Site 4 area was similar to the Site 3 area in that it is close to the existing 400kV OHLs and outside the National Landscape boundary, and scored positively for geotechnics and topography.
- Site 5 (contains Converter Site C6 (discounted) and C7): The Site 5 area 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.

4.3 Onshore Cable route options

4.3.1 Routeing considerations

4.3.1.1 This section provides information on the onshore cable route options which were undertaken alongside the shortlisting of landfall and converter station site options.

4.3.1.2 The Onshore Cable Corridors presented at the 2022 and 2023 non-statutory consultations were developed on the core design requirements, as outlined in **Table 3-1** and underground cable routes, these were located east of the A12, avoiding key settlements and environmentally sensitive sites in the coastal area. The cable corridors were subsequently refined between the shortlisted landfall sites and the shortlisted converter station site options, and between the shortlisted converter station site options and the proposed Kiln Lane Substation.

4.3.1.3 The onshore cable route options were reviewed to determine what environmental and socio-economic features were located within or immediately adjacent to the potential route sections. In addition to the extent of environmental features (**Table 4-2**), the criteria listed in **Table 4-3** were used to help identify and qualify the potential risks to environmental and socio-economic features associated with each route section and facilitate the comparison between the underground cable route corridors.

Table 4-3: Routeing criteria

Component	Considerations
General	Length of route within environmental features, as described in **Section 3.5** and **Table 4-2**
	Approximate HVDC cable length (landfall to converter)
	Approximate HVAC cable length (converter to proposed Kiln Lane substation)
	Approximate total maximum cable length
Community and land use	Number of PRoW crossings/ diversions
	Number of National trail crossings/ diversions
	Number of National Cycle Routes crossings/ diversions
	UXO risk
Planning	General conformity with Planning policy
	Current planning applications or potential for other development use.
	Tree Preservation Orders
	Minerals Safeguarding Areas (defined within Suffolk Minerals and Waste Local Plan
Hydrology	Watercourse crossings

4.3.1.4 Due to the volume of route options, comparing values within a criterion (identified and scored based on measurable factors) through mini matrices is not feasible; therefore, an approach based on the Analytic Hierarchy Process (AHP) Methodology was used.

4.3.2 Provisional HVDC Cable Corridors from Leiston North Cable Landfalls

General information on onshore Cable Routes

4.3.2.1 As a result of the data gathering and site research, it became apparent that many of the cable routes within the corridors shared certain common features. These are outlined below:

- There is nothing to suggest that generally local ground conditions have a high thermal resistivity, with the exception of localised regions of peat in sections A3, A4 and A6 (see **Figure 4-3**).
- Nearly all cable route options fall under agricultural land. While it is not anticipated that underground cables will have a lasting impact on agricultural land, they can pose a constructability challenge such as adding seasonal constraints to the programme.
- Nothing suggests that the water table depth will be shallower than the cable trench (approximately 1.5m). Therefore, this information was not considered in the comparison.
- Abrupt elevation changes can pose a challenge for cable installation, especially during cable pulling. The topography of the land in the region gradually varies by up to 11.3m over any given 300m distance and no steep slopes were identified. As the gradients across each of the sites are similar, land elevation was not considered in the comparison

Cable Section Descriptions

4.3.2.2 The potential cable route options are aiming to link landfall locations via HVDC cable routes to a potential Converter Site location as well as linking the potential Converter Site to the Kiln Lane substation via an HVAC cable route.

4.3.2.3 **Figure 4-3** shows a schematic of the proposed cable corridor sections from the converter sites to the Leiston North Landfalls. Landfalls at Pakefield A (LN A), Pakefield B (LN B) and Kessingland (LN C) have been discounted (**Section 4.2.5**). As a result, Cable Route Area C (which links to these landfalls) is not considered further at this stage.

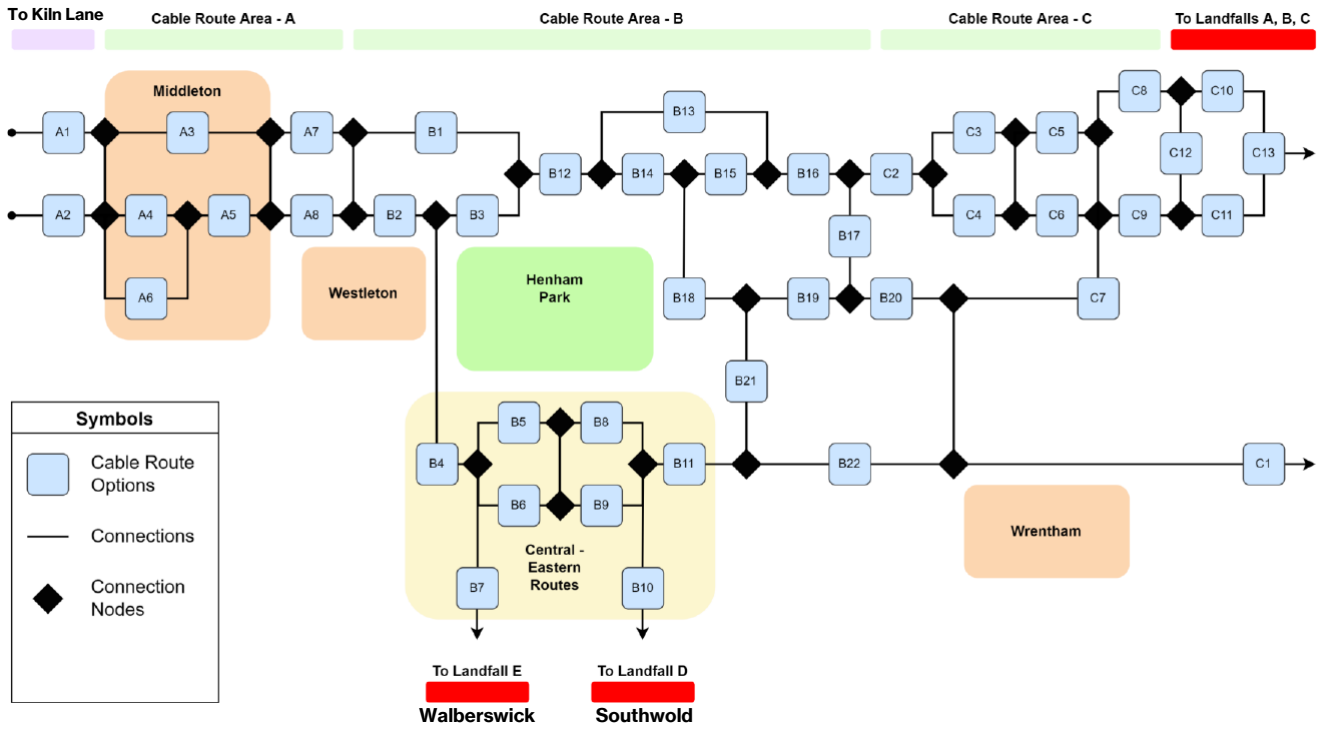

Figure 4-3: Schematic of onshore cable sections to Leiston North landfalls

Cable Route Area A

4.3.2.4 Routeing studies identified that cable route options coming from Leiston (A1 to A6) need to avoid areas to their east, due to their environmental designations (SSSI, Ramsar, National Landscape), while also avoiding populated areas to the west such as Middleton Moor, Darsham, and Yoxford. This creates a narrow corridor that passes through or around the borders of Middleton, that all cable route options need to route through.

4.3.2.5 Neither of Routes A1 nor A2 were found to provide significant challenges. Route A2 was considered to have notable advantages, namely its shorter length and lack of a woodland crossing. These two factors made A2 the more favourable option.

4.3.2.6 A3 would route around Middleton altogether, avoiding populated areas and travelling through agricultural land, while crossing the river Minsmere and surrounding wooded areas at a narrow bottleneck. The Minsmere River crossing would be significantly shorter compared to other options,

4.3.2.7 A4 and A5 were the shortest of the cable route combination options and would travel directly through Middleton. The route faces the highest number of challenges however, as there is a narrow pinch point between houses and mature trees, as well as a river crossing further along the road.

4.3.2.8 A6 and A5 generally skirt the edges and often overlap Ramsar Sites, SSSI, National Landscapes, and SACs. This option is considered least favourable, as it would increase the number of wooded area crossings, bringing the route closer to populated areas in Middleton and near environmental designations.

4.3.2.9 A7 and A8 were considered relatively similar, although A8 was slightly more preferable due to its shorter length and lack of a woodland HDD requirement. A7 follows an existing road and crosses fewer land boundaries.

Cable Route Area B

4.3.2.10 Cable Route Area B contains sub-sections B1 to B22 and extended up towards the Leiston North landfalls. Comparisons between route options were undertaken where necessary to consider if options performed better against environmental and technical criteria.

4.3.2.11 Route B1, and Routes B2 and B3 were relatively similar. Routes B2 and B3 were slightly more preferable due to their avoidance of Ancient Woodlands. It should be noted however, that Routes B2 and B3 were closer to populated areas (Blythburgh), increasing risk of noise and vibration impact. Subject to micro-siting route B2 may result in routeing close proximity to several operational farms.

4.3.2.12 Routes B5 and B6 were also relatively similar, the trade-off is between crossing existing structures or Sites of Special Scientific Interest (SSSI) and IBAs and Biodiversity Areas. Since both would require HDD, it is recommended that environmental designations are avoided as this could cause significant delays. Therefore, B5 is more favourable.

4.3.2.13 Routes B8 and B9 were compared. Since route option B8 avoids a SAC, while being significantly shorter in length, it was found to be more favourable. It should be noted that accessibility for both options is relatively poor however, this was not envisaged to be a significant issue due to adequate access on route options at either side.

4.3.2.14 Route B13 was compared against Routes B14 and B15. Since route option B13 avoids Areas with Peat while being shorter, it is more favourable over options B14 and B15.

4.3.2.15 Route sections B15, B16 and B17 were compared against route sections B18 and B19. Route sections B15, B16, and B17 would be more preferable than the combination of B18 and B19, due to fewer crossings (wooded areas and a waterbody). However both options include sections with peat (B15 and B18).

4.3.2.16 Assessments were conducted for B19 and B20 against B21 and B22. However, neither of these sections were associated with the Southwold Landfall (LN D) and Walberswick landfall (LN E) and are not considered further in this report.

Cable Section Summary

4.3.2.17 Based on the comparisons, certain route options were found to be less favourable. Due to the high volume of similar alternatives, considering all possible route options would not be practical as there would be too many options, with nearly no variations between them. As such, the more favourable route options to each landfall site were progressed to the final stages of the analysis.

4.3.2.18 Only underground HVDC and underground HVAC cable corridors between shortlisted sites and landfalls were considered for further assessment. Discounted landfalls and converter site stations with associated underground HVDC and underground HVAC cable corridors were not progressed further.

Figure 4-4: Overview of route alternatives based on comparisons

4.3.3 Provisional HVDC Cable Corridors from Leiston South Cable Landfalls

4.3.3.1 Subject to landfall and converter station site selection, potential HVDC cable route corridors range from 7 to 12km in length. The following key routeing considerations and constraints were identified for the HVDC cable routes from the Leiston South Cable Landfalls:

- All HVDC routes will require installation through the Suffolk and Essex Coast and Heaths National Landscape, which extends throughout the coastline within the search area and cannot be avoided when routeing from the shortlisted landfall locations. It is noted that the shortlisted landfall locations are also within the Suffolk Heritage Coast and underground cable routes therefore also extend through part of this area;
- Suffolk Sandlings SPA and IBA, North Warren RSPB Reserve, Leiston – Aldeburgh SSSI, and one CWS (The Walks) cover the same spatial extent within section 19 which is common to all underground cable route corridors. The area of designated land extends across the route section and cannot be avoided. At its greatest width it is approximately 330m wide;
- The majority of each of the potential underground HVDC cable route corridors is arable farmland, which is likely to pose a low risk ecological constraint. In addition, all routes pass through the following potentially notable habitats: Lowland Heath; Watercourses; Semi-improved grasslands; Broad-leaved Woodland; Hedgerows. All have the potential to support protected and notable flora and fauna;
- Located within either the Leiston Beck, Hundred River, River Fromus, or Suffolk Coastal catchments. The majority of routes are located within Flood Zone 1 (i.e. land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding). All routes except Landfalls B and C to Converter station C9 lie within an outer SPZ (i.e. SPZ 2, defined as having a 400-day travel time of pollutant to source. This has a 250 or 500 metres minimum radius around the source [SPZ1] depending on the amount of water taken);
- The Suffolk Coast Path and the Suffolk Coastal Cycle Route (Regional Cycle Route no. 42) will both need to be crossed regardless, as these extend north-south throughout the search area between the coast and the shortlisted converter station site options;
- All HVDC routes will require the crossing of known Best and Most Versatile (Grade 2) agricultural land;

4.3.3.2 Based on the results of the assessment, the converter sites C7, C8, C9 and C14 were taken forward to non-statutory consultation. Only HVDC cable routes from these converter sites to potential landfall sites (**Section 4.2.5**) are discussed in the following section.

4.3.3.3 The overall proposed routes from the potential converter sites to the Leiston South landfalls are shown in **Figure 4-5**.

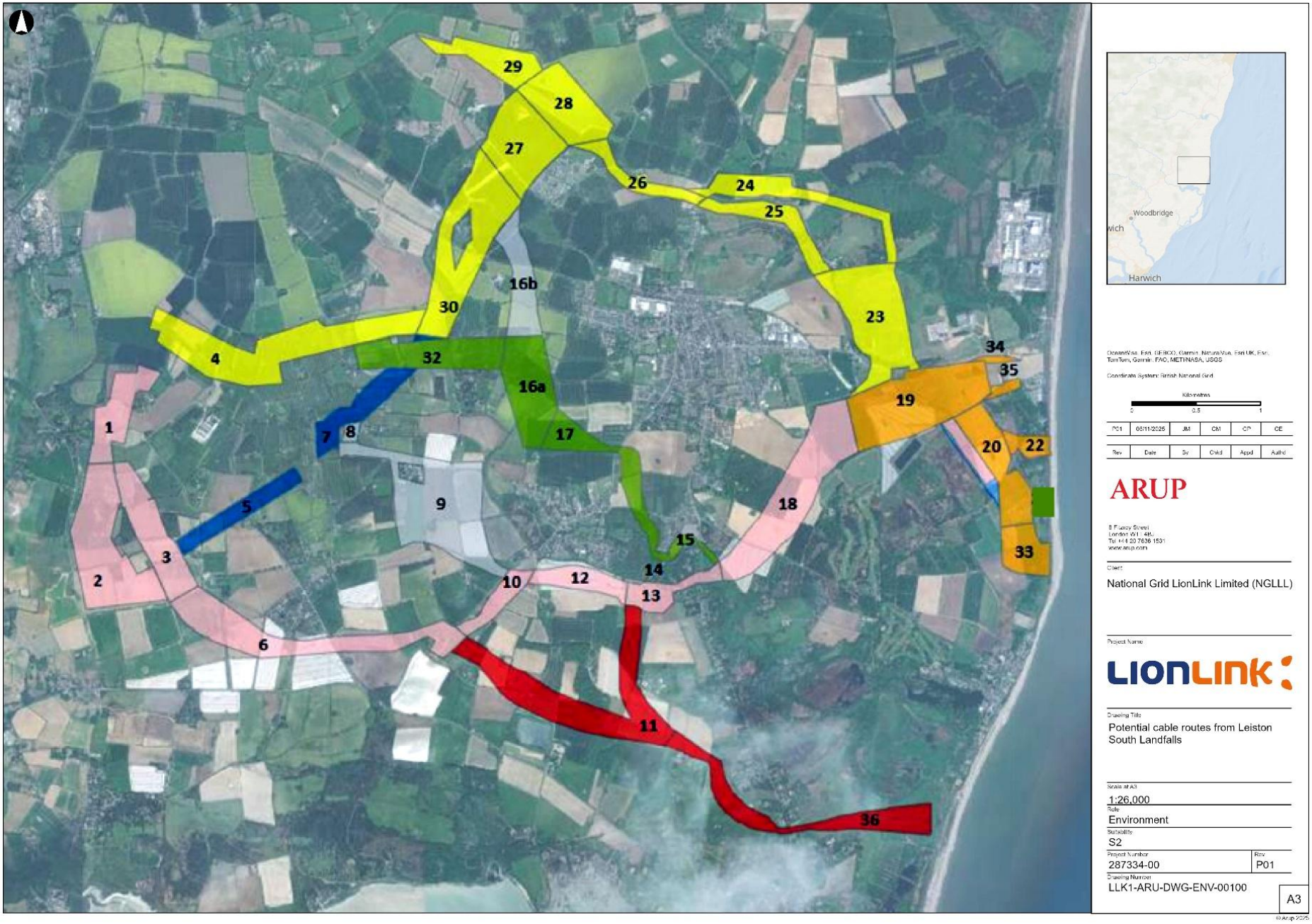

Figure 4-5: Potential Cable Route Corridors from Leiston South Landfalls

Rejected onshore route sections (Leiston South)

4.3.3.4 Some of the potential route options were deemed too insurmountable due to engineering challenges or being a significantly poor alternative to other options; therefore, they were rejected from the cable route assessment.

Green Route sections 14, 15, 16a, 17 and 32

4.3.3.5 These cable route options all potentially offer the benefit of interconnecting converter station C7, and C8 from a junction near Aldeburgh Road in Leiston.

4.3.3.6 Route option 16a was considered to be relatively free from challenges, however it relied on the cable route being accessible from options 15 and 17, as shown on **Figure 4-5**. Access from cable route option 17 faced multiple engineering challenges:

- Aldeburgh Road Crossing
- The Hundred River Crossing
- Being Near a Ground Water Source and within a Flood Zone
- Being adjacent to residential Buildings
- Densely Wooded Areas with Preservation orders

4.3.3.7 While none of the challenges individually ruled out option 17, their combination around a sharp U bend as part of Section 15, did. The minimum widths for spatial availability being as low as 38m in the area. The area is also densely forested.

4.3.3.8 Any HDD in the area would be sandwiched from either side by residential buildings and trees with preservation orders, as well as the Hundred River, going around a full U bend with a 100m radius. Due to modern HDD techniques not allowing for wide bends with a radius of approximately 100m, the only other option to circumvent the bend would be to go beneath residential buildings.

4.3.3.9 These sections were not deemed practical and therefore these route options were ruled out.

Yellow Route Sections 24 and 25

4.3.3.10 While cable route option 24 does not face insurmountable technical challenges, it was rejected within the context of consideration of cable route option 25, since they both serve as alternatives for one another (**Figure 4-5**).

4.3.3.11 Cable route option 24 includes multiple unique challenges, namely:

- Presence of Schedule 9 Species;
- A SSSI;
- Wildlife Sites;
- River;
- Densely Wooded Areas;
- Veteran Trees;
- Being approximately 504m longer (1,110m against 606m);

4.3.3.12 While most of these challenges would extend the programme and add costs, the presence of Veteran Trees around a sharp bend adds a significant technical

challenge. It would be difficult to manoeuvre for HDD in the area, with clearings between wooded areas being as low as 32m.

4.3.3.13 Site option 24 was within a SSSI and contains densely wooded areas. These two features required a majority of the cable route to be HDD which would have greatly exacerbated the costs, on top of being nearly double the length of cable route option 25.

4.3.3.14 Therefore, due to the significant challenges of route option 24 was rejected from the routeing options.

Cable Section Descriptions

4.3.3.15 The onshore routes were divided into separate sections. The sections were then compiled to identify preliminary routes. Wider search areas were then based on these preliminary routes so that opportunities to reduce environmental and social impacts could be considered.

Leiston South: Red Section (sections 11 and 36)

4.3.3.16 The red route option is adjacent to a densely wooded area located at Leiston Road crossing and crosses large amounts of agricultural land. The connection to the landfall crosses Leiston – Aldeburgh SSSI, the Aldringham to Aldeburgh Disused Railway Line CWS, Alde - Ore Estuary IBA and Suffolk Sandlings IBA and North Warren RSPB. The sections are within the Suffolk Heritage Coast and Suffolk and Essex Coast and Heaths National Landscape. The Haven, Aldeburgh Local Nature reserve is adjacent to the south, as well as Aldeburgh Golf Course CWS. There is a section of ancient woodland immediately adjacent to the corridor which is part of Great Wood CWS. Thorpeness Conservation area is 650m to the north.

4.3.3.17 The red section of the proposed connection to Aldeburgh landfall is within Flood Zones 2 and 3.

4.3.3.18 There are limited heritage constraints, there is one grade 2 listed building closest to the east, on Leiston Road.

Leiston South: Pink Section (sections 1, 2, 3, 6, 10, 12, 13 and 18)

4.3.3.19 The pink cable route option travelled west towards and around Aldringham, and south of Coldfair Green and Friston on towards Sternfield. As a result, this route passed through or near several residential and populated areas.

4.3.3.20 The start of the route is on the edge of the Suffolk Coast and Heaths National Landscapes. It also runs adjacent to and partially within the Suffolk Sandlings IBA and North Warren RSPB reserve, Leiston – Aldeburgh SSSI, Sandlings SPA, and Knodishall Whin CWS.

4.3.3.21 There were three Scheduled Monuments within proximity to the route.

4.3.3.22 The route crossed the Hundred River twice, and its associated Flood Zones 2/3, and a watercourse south of Friston. A portion of the route passed over a waterbody/reservoir and farm.

Leiston South: Grey Section (sections 8, 9 and 16b)

4.3.3.23 The southerly route sections (section 8 and 9) were adjacent to ancient woodland, which was also Grove Wood CWS and enveloped a farm building, isolating it in the centre. It also lay on the edge of Flood Zone 2/3 of the Hundred River. Knodishall Common CWS was 175m to the west. Section 16b ran adjacent to ancient woodland which formed part of the Buckles Wood CWS.

4.3.3.24 There were no ecological designations adjacent to or within the route, and it was outside of the Suffolk and Essex Coast and Heaths National Landscape and Suffolk Heritage Coast.

Leiston South: Blue Section (Sections 5 and 7)

4.3.3.25 These sections were predominantly proposed for HVAC cables connecting into the substation.

4.3.3.26 Routes in this section were largely within open agricultural fields.

4.3.3.27 There was a section of ancient woodland immediately adjacent to the corridor which was part of Great Wood CWS. Ecological designations were further from this section of the route approximately 3km south and 4.2km east.

4.3.3.28 The section was more than 1km from the Suffolk and Essex Coast and Heaths National Landscape and Suffolk Heritage Coast.

Leiston South: Green Section (sections 14, 15, 16a, 17 and 32)

4.3.3.29 The green route option acts as a connector between wider route options. However, Sections, 14, 15, 16a and 17 were rejected (see **Figure 4-5**). Only Section 32 was not rejected.

4.3.3.30 The route option crossed the Hundred River and its associated Flood Zone 2/3. The route avoided crossing ecological designations directly, the closest 890m east of the Leiston - Aldeburgh SSSI and Sandlings SPA.

4.3.3.31 This section was within the Suffolk and Essex Coast and Heaths National Landscape and Suffolk Heritage Coast. There was a Scheduled Monument adjacent to the route.

4.3.3.32 Sections of this proposed route (Sections 14, 15 and 17) also interacted with the EA1N and EA2 DCO limits

Leiston South: Yellow Section (sections 4, 23, 25, 26, 27, 28, 29 and 30)

4.3.3.33 The yellow cable route option was the furthest away from populated areas, reducing impact on local communities. This route crossed north of Leiston. There were some close receptors at Leiston Common, Abbey Road, Cakes and Ale Holiday Park, and it also passed near several isolated residential receptors. It was one of the routes most isolated from larger residential areas.

4.3.3.34 The route did cross several environmental designations including Sizewell Marshes SSSI, Sizewell Levels and Associated Areas CWS, Leiston Beck watercourse and its associated flood zones, and wooded areas with veteran trees. It also ran adjacent to ancient woodland which is also Buckles Wood CWS.

4.3.3.35 The Scheduled Monument at Leiston Abbey was in proximity.

4.3.3.36 The route option was partially within the Suffolk and Essex Coast and Heaths National Landscape.

4.3.3.37 The most southern section of this route interacted with the EA1 and EA2 DCO limits as it approached the Leiston substation. Most of the route avoided the EA1/2 area by travelling much further north around Leiston. The eastern section crossed areas identified as part of Sizewell C area.

Cable Section Summary

4.3.3.38 Discounted landfalls and converter site stations with associated underground HVDC and underground HVAC cable corridors were not progressed further. There were no major constraints identified for the shortlisted sites or project components (i.e. converter site, HVDC corridor, HVAC corridor and landfall) and these were then taken forward for further assessment.

4.3.4 Onshore Underground HVDC Cable Options from Converter Sites to Landfall

Converter site areas to Aldeburgh Landfall

4.3.4.1 Potential underground cable options were considered from the various Leiston South landfalls to the converter station taken forward for further consideration (C7, C8, C9 and C14)

4.3.4.2 Converter station C7 (Site 5): A preliminary route from Aldeburgh (LS E) Landfall to converter site C7 was identified that utilised two potential route options across the following sections: 36 and 11 (red section); 13, 12 and 10 (pink section); 9 and 8 (grey section); 7 (blue section) and 30 (yellow section). Further details on each part of the route corridor are provided in **Section 4.3.3**.

4.3.4.3 Converter station C8 (Site 3): Converter site 8 was the westernmost site, which put it at a significant disadvantage as the cable routes were some of the longest compared to the other cable route options. There were two cable route options:

- The first was a southerly option that used sections 36 and 11 (red section); 13, 12, 6 and 10 (pink section); 9 and 8 (grey section); 7 (blue section), 32 (green section) and 4 (yellow section). Further details on each part of the route corridor are provided in **Section 4.3.3**.
- The second option was a northerly option that used sections 36 and 11 (red section); 13, and 18 (pink section); 19 (orange section); and 23, 25, 26, 28, 27, 30 and 4 (yellow section). Further details on each part of the route corridor are provided in **Section 4.3.3**.

4.3.4.4 Converter station C9 (Site 4): Converter site 9 was the northernmost option. Two preliminary routes from Aldeburgh (LS E) Landfall to converter site C9 were identified with various route options.

- The first was a southerly option that used sections 36 and 11 (red section); 13, 12, 6 and 10 (pink section); 9 and 8 (grey section); 7 (blue section), 32 (green section) and 4, 30, 27, 28 and 29 (yellow section). Further details on each part of the route corridor are provided in **Section 4.3.3**.

- The second option was a northerly option that used sections 36 and 11 (red section); 13, and 18 (pink section); 19 (orange section); and 23, 25, 26, 28 and 29 (yellow section). Further details on each part of the route corridor are provided in **Section 4.3.3**.

4.3.4.5 Converter station C14 (Site 1): No specific assessment was conducted for Converter Site 14 from Aldeburgh (LS E) Landfall as it was included following the initial routeing assessment. However, Site 1 lies along Route Section 11 (red section) and it is expected that route sections 36 and 11 would be required to link the site to the landfall.

Converter site areas to Leiston North Landfalls at Southwold (LN D), Walberswick (LN E) and Dunwich (LN F)

4.3.4.6 Onshore routeing of cable corridors shared a common alignment from the Middleton area (**Figure 4-3**) to the proposed converter sites. Due to the common alignment, the differences in potential cable routeing apply to the different landfalls (rather than the converter station). As such only routeing from the Middleton area to the Southwold, Walberswick and Dunwich landfalls are discussed below.

4.3.4.7 Southwold Landfall (LN D): Routes from the converter site areas to Southwold Landfall would utilise route sections: A2, A3, A8, B2, B4, B5, B8 and B10 (**Figure 4-4**).

4.3.4.8 Walberswick Landfall (LN E): Routes from the converter site areas to Walberswick Landfall would utilise route sections: A2, A3, A8, B2, B4, and B7 (**Figure 4-4**).

4.3.4.9 Dunwich Landfall (LN F): Dunwich Landfall was reintroduced following the initial siting and routeing assessment. As a result, a generic cable corridor to the landfall at Dunwich was prepared based on the existing Cable Route Area A route sections.

4.3.5 Onshore HVAC Cable corridors (converter station to sub-station)

4.3.5.1 The cable corridors discussed in **Section 4.3.3** cover both onshore HVDC and HVAC cables, this section discusses the cable route options (**Figure 4-5**) utilised to carry electricity from the converter station to the Kiln Lane substation (HVAC). Only the onshore HVAC cable corridors from the converter stations taken forward for further consideration are discussed further. Routes between the down-selected converter station sites and the proposed Kiln Lane substation are not considered further.

4.3.5.2 HVAC corridors associated with the following converter station sites are discussed further: are:

- Converter Station C7 (Site 5);
- Converter Station C8 (Site 3);
- Converter Station C9 (Site 4); and
- Converter Station C14 (Site 1).

Converter Station C7 (Site 5)

4.3.5.3 Converter station 7 was within route option 30 (yellow section), which enabled it to be the most efficient Converter Site option in terms of route length. Due to the converter station's proximity to the substation, a single AC route was identified.

4.3.5.4 This utilises Route Sections 4 (yellow section), 32 (green section) and 7 (blue section) (**Figure 4-5**). The route is approximately 6.7km in length and crossed a single 400kv OHL, three gas pipelines (and two easements), a railway. The route also crossed a road (B1119) and two rivers and water courses. There were constructability challenges associated with the route passing through a flood zone and crossing agricultural land. The route also had a medium UXO risk and crossed a national cycle route.

4.3.5.5 There is potential for the underground cable routes to be installed adjacent run parallel with EA1N and EA2 as the DCO planning application overlaps across the proposed cable routes. Whilst the finalised technical details of the project are currently unknown, it can be presumed that the cable route can pass alongside the asset whilst adopting an open cut construction methodology for the majority of the route.

Converter Station C8 (Site 3)

4.3.5.6 Converter station option 8 is the westernmost converter station, which puts it at a significant disadvantage as the cable routes are some of the longest compared to the other cable route options. Due to the Converter station's location between the Yellow and Pink route options two routes were examined to cover both perspectives between Converter Station C8 to the Kiln Lane Substation.

4.3.5.7 Option 1 utilised route sections 4 (yellow section), 32 (green section) and 7 (blue section) (**Figure 4-5**). The route is approximately 5.3km in length, and crossed a single 400kv OHL, two gas pipelines (and one easement) and rivers and water courses. There were constructability challenges associated with the route passing through a flood zone, agricultural land and having a medium UXO risk. The route also crossed a national cycle route.

4.3.5.8 Option 2 utilised route sections 1, 2 and 3 (pink section) and 6 (blue section). The route is approximately 5km in length and crossed two 400kv OHLs and a road (B1121). There were additional constructability challenges associated with residential buildings and agricultural land.

4.3.5.9 There is potential for the underground cable system to run parallel with SPR EA1N and EA2 as the DCO planning application overlaps across the proposed cable routes. Whilst the finalised technical details of the project are currently unknown, it can be presumed that the cable route can pass alongside the asset whilst adopting an open cut construction methodology for the majority of the route.

Converter Station C9 (Site 4)

4.3.5.10 Converter station 9 is northernmost option, with significant distances away from all route options. A single AC route corridor was considered. The route utilised sections 29, 28, 27, 30 and 4 (yellow section), 32 (green section) and 7 (blue section (**Figure 4-5**).

4.3.5.11 This route option is approximately 9km long. The route crossed a 400kv OHL, three gas pipelines (and one easement) and a railway crossing. The route also crossed a road (B1119), two rivers and other water courses. There were constructability challenges associated with the route passes through a flood zone, crossing agricultural land and a national cycle route. There was also a medium UXO risk on the route.

Converter Station C14 (Site 1)

4.3.5.12 No specific assessment was conducted for HVAC routeing between Converter Station C14 and the Kiln Lane substation. There are two potential route options to link Converter Station C14 based on the corridor options presented in **Figure 4-5**.

4.3.5.13 Route option 1 is more direct and would utilise route sections 10 (pink section), 9 (grey section) and 7 (blue section). Route option 2 is longer and would utilise sections 10, 6, 3 (pink section) and 5 (blue section).

Summary

4.3.5.14 All HVAC route options linking the potential converter station locations and the Kiln Lane substation were considered technically viable. All route options were taken forward for further consideration.

4.4 Offshore HVDC Cable Route Options

4.4.1 Introduction

4.4.1.1 A total of nine preliminary routes (**Figure 4-6**) were developed based on the potential EEZ crossing points (**Section 3.3**), the siting and routeing considerations outlined in **Section 3.5**, the offshore baseline environment (**Section 3.7**) and the potential landfall sites (**Section 4.2.5**).

4.4.2 Route Descriptions

4.4.2.1 A summary of each route is provided below and whether it was carried forwards to the 2022 non statutory consultation. Potential offshore routes A to H were developed and linked to potential EEZ crossing points A, B, C, D and X and connected to the longlist of landfalls locations (**Section 4.2.5**).

4.4.2.2 It is not possible to get to shore without crossing environmental designations (e.g. Southern North Sea SAC or Outer Thames Estuary SPA). However, the following environmental designations were intentionally avoided wherever possible; MCZs, annex I reefs and sandbanks. Although the reefs and sandbanks have not all been designated as protected habitats, it was considered likely that they would present significant consenting challenges.

4.4.2.3 All potential offshore routes do not cross through (or avoid):

- Coralline crag;
- Oil and gas wells or rigs;
- Oil and gas production and exploration areas;
- Aggregate areas;
- MCZs;
- Annex I Reefs and sandbanks;
- Known wreck sites or protected archaeological areas.

4.4.2.4 It is noted all potential offshore routes have minimised:

- Number of cable and pipeline crossings

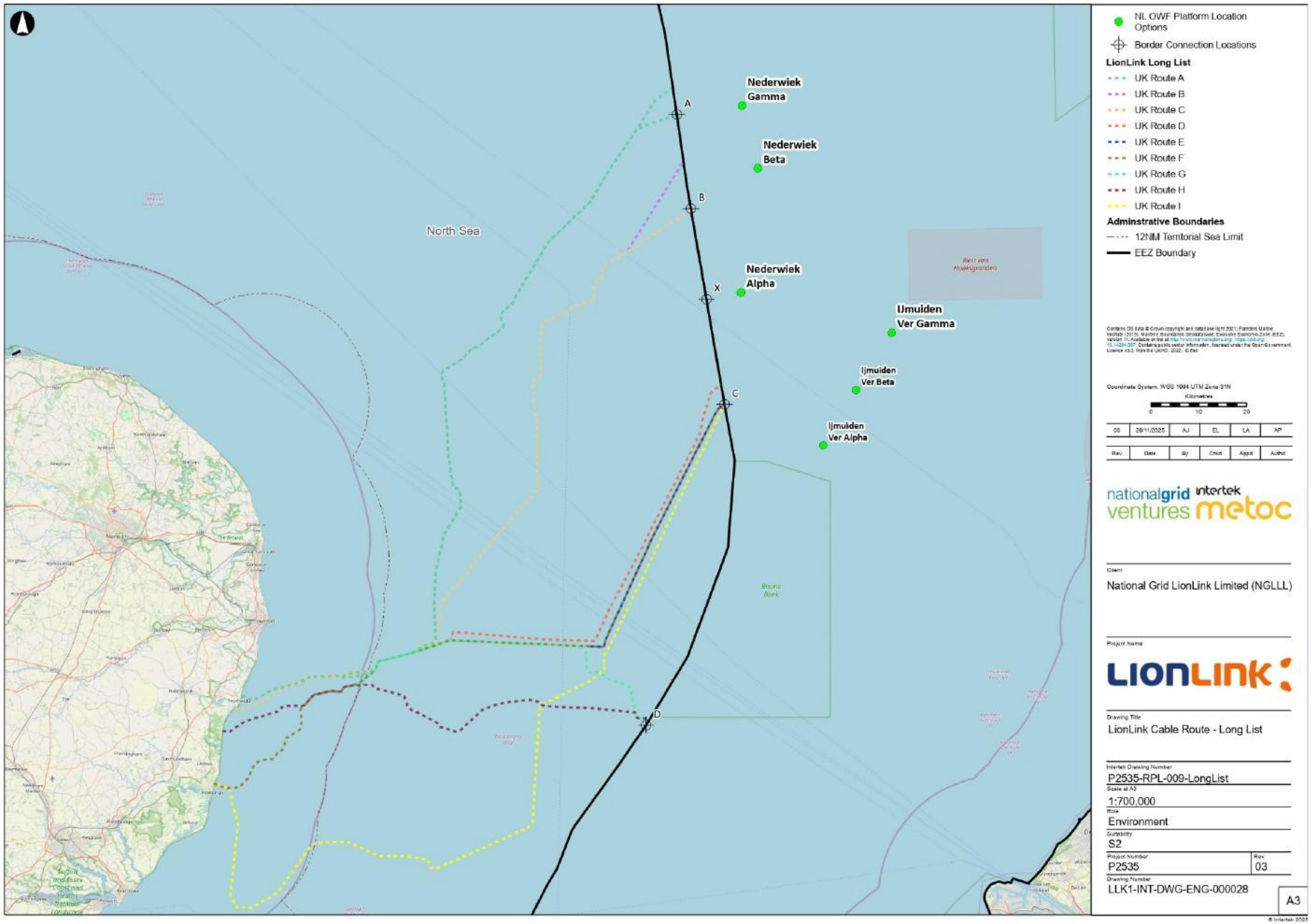

Figure 4-6: Offshore Routes – Long List

UK Route A

4.4.2.5 This was the longest and northern-most iteration of the proposed Offshore HVDC cable route options, and leaves from Landfall LN F (Southwold) to EEZ crossing Point A. Route A transects an Annex I Protected Sandbank by avoiding multiple oil and gas infrastructure navigating around Norfolk Vanguard West planned windfarm. The route option avoided shipping lanes wherever possible and primary UXO areas. The route did enter the corner of one dredge spoil dumping ground. The northern route did start to encroach on areas of increased oil and gas activity in the southern North Sea. However, it avoided all the proposed windfarm areas in UK waters.

4.4.2.6 This option was retained for the short list as Route A.

UK Route B

4.4.2.7 This offshore HVDC route option leaves from Landfall G (Walberswick) and heads to EEZ Crossing Point B. The route was neither the longest nor shortest option considered. Route B did not appear to cross any known Annex I habitats, although it did pass through environmentally designated sites (Southern North Sea SAC and Outer Thames Estuary SPA). As the route was more southerly than Route A, it crossed less oil and gas infrastructure. The route avoided UXO areas and shipping constraints wherever possible.

4.4.2.8 This option was retained for the short list and merged with UK Route C to provide optionality at the EEZ border crossing point. This route was referred to as Route B during siting and routeing assessments.

UK Route C

4.4.2.9 This offshore HVDC route option shared a common alignment and landfall with UK Route B and only varied at the EEZ where it aligned with a different potential border crossing (crossing point A). This option was retained for the short list and merged with UK Route B to provide optionality at the EEZ crossing point. This route was referred to as Route B during siting and routeing assessments.

UK Route D

4.4.2.10 This option heads from Landfall H (Dunwich) to EEZ Crossing Point C. The route diverges offshore and heads on a more easterly course before turning northwards to the EEZ border in order to avoid the Dogger Bank windfarm. The route crossed an area of higher fishing effort than other routes. As it kept to a more southerly course, there were no oil and gas infrastructure crossings, however it shadowed the proposed NeuConnect cable route. The proposed route kept to the south and then the east of the Norfolk Boreas, Norfolk Vanguard and East Anglia Three (EA3) windfarms before it reached the EEZ at Crossing Point C.

4.4.2.11 This option was retained for the short list and merged with UK Route E to provide optionality with regard to the crossing of the NeuConnect cable. This route was referred to as Route C during siting and routeing assessments.

UK Route E

4.4.2.12 This option also heads from Landfall H (Dunwich) to EEZ Crossing Point C. This option follows a very similar route to UK Route D and allows for optionality on the location of the crossing of the proposed NeuConnect cable route.

4.4.2.13 This option was retained for the short list and merged with UK Route D to provide optionality with regard to the crossing of the NeuConnect cable. This route was referred to as Route C during siting and routeing assessments.

UK Route F

4.4.2.14 This offshore HVDC route option leaves Landfall E (Aldeburgh) and heads north-east to share a common alignment with UK Routes D and E.

4.4.2.15 This option was retained for the short list and merged with UK Route D to provide optionality with regard to the crossing of the NeuConnect cable. This route was referred to as Route C during siting and routeing assessments.

UK Route G

4.4.2.16 Route G leaves Landfall H (Dunwich) and leaves UK waters at EEZ Crossing Point D. The route is predominantly eastwards from landfall whilst avoiding oil and gas production areas and the EA1 North offshore windfarm. The route also passes through an area of UXO primary constraint.

4.4.2.17 This option was excluded from the shortlist as border crossing D was discounted (**Section 5.16**).

UK Route H

4.4.2.18 Route H leaves Landfall H (Dunwich) and leaves UK waters at EEZ Crossing Point D. The route is predominantly eastwards from landfall whilst avoiding oil and gas production areas and the EA1 North offshore windfarm. The route also passes through an area of UXO primary constraint

4.4.2.19 This option was excluded from the shortlist as border crossing D was discounted (**Section 3.3**).

UK Route I

4.4.2.20 Route I leaves Landfall E (Aldeburgh) and leaves UK waters at EEZ Crossing Point C. This was the longest route as it heads southwards from Aldeburgh to avoid an offshore MCZ before trending east and northwards towards the EEZ. As a result of the southwards start to the route, it encroaches on an offshore TSS and has a substantially longer route within an aggregate disposal site. There are more cable and other infrastructure crossings due to the longer route.

4.4.2.21 Due to the length of the offshore route, the number of infrastructure crossings and the greater distance of the cable route within environmentally designated sites this route option was not taken forwards to the shortlist.

4.4.3 Offshore HVDC Route Summary

4.4.3.1 Following the down-selection of EEZ crossing point D (**Section 3.3**) routes to that crossing point were down-selected from the list of routes taken forward to a shortlist.

4.4.3.2 Where there were common offshore HVDC cable route alignments, these were merged to simplify the options as the variations between routes were limited to potential changes in asset crossing locations or potential changes to EEZ crossing points.

4.4.3.3 The final shortlisted routes are shown in **Figure 4-7** and comprise:

- Route Option A
- Route Option B; and
- Route Option C

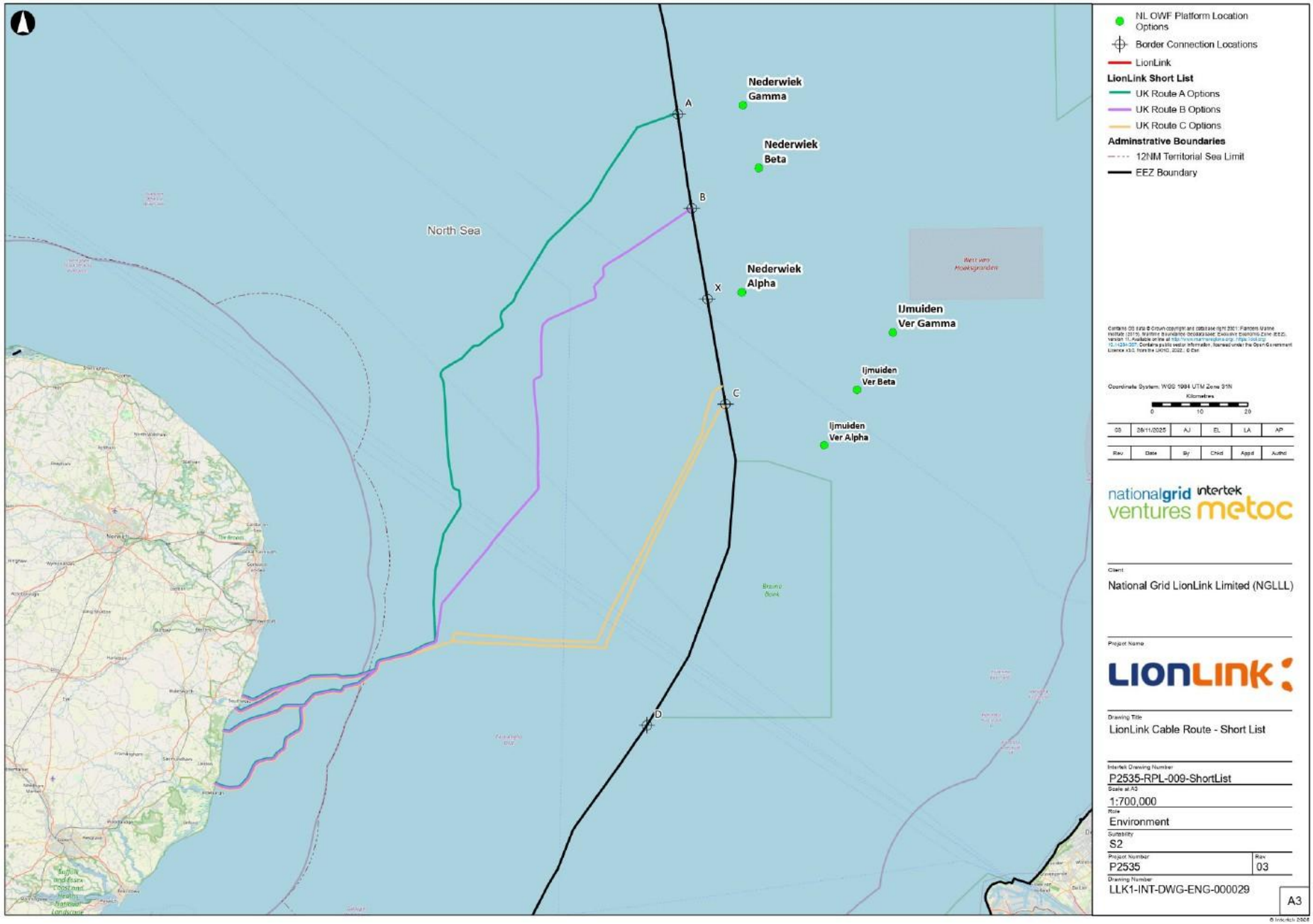

Figure 4-7: Short list routes

5 Stage 3: Shortlist to Preferred options

5.1 Introduction

5.1.1.1 The detailed options, siting and routeing work covered in **Section 4** culminated in the development of a short list of options that was presented in the 8-week non-statutory consultation that took place between 24 October and 18 December 2022 (**Figure 5-1**).

5.1.1.2 The purpose of this non-statutory consultation included the opportunity for local communities and stakeholders to comment on the development of the work on the Proposed Scheme options carried out to date.

5.1.1.3 The components of the Proposed Scheme presented at the 2022 Non-Statutory Consultation were:

- Proposed Converter Station site options
- Proposed Underground Cable Corridor
  - Underground HVDC cables between the Landfall sites and the Converter Station site options; and
  - Underground HVAC cables between the Converter Station site options and the proposed Kiln Lane Substation
- Proposed Landfall Site options

5.1.1.4 General offshore information including constraints mapping were presented during the non-statutory consultation.

5.2 Initial short-list of Converter Station sites

5.2.1.1 The initial short-list comprised of four Converter Station site options:

- Site 1: Converter station search area located north of Aldeburgh Road;
- Site 3 Converter station search area located east of Saxmundham;
- Site 4 Converter station search area located northwest of Leiston OHL; and
- Site 5 Converter station search area option located west of Leiston.

5.3 Initial Proposed Underground onshore HVDC and HVAC Cable Corridors

5.3.1.1 An Onshore Cable Corridor area of search was presented which comprised:

- Proposed underground HVDC cable search area between the Landfall sites and the Converter Station site options
- Proposed underground HVAC cable search area between the Converter Station site options and proposed Kiln Lane Substation

5.4 Initial short-list of Landfall sites

5.4.1.1 The initial short-list of Landfall sites included four options which were considered in conjunction with the onshore cable corridors and offshore cable corridors they were:

- Landfall E: Landfall search area site located in Aldeburgh.
- Landfall F: Landfall search area site located in Reydon and Southwold.
- Landfall G: Landfall search area site located in Walberswick.
- Landfall H: Landfall search area site located in Dunwich.

5.5 Non-statutory Consultation (2022) Feedback

5.5.1.1 The non-statutory consultation feedback underwent extensive analysis to understand the key concerns and inform further refinement of the potential options. This analysis highlighted the following key issues that included:

- Cumulative impacts and need for coordination
- Archaeology and local heritage
- Traffic and access
- Tourism and local economy
- Land quality and climate change and policy

5.5.1.2 Further concerns included impacts on the local ecology and wildlife, particularly protected/designated areas, quality of the land at the Dunwich and Walberswick Landfall sites (focussed on erosion and flood risk).

5.5.1.3 There was in-principle support for the technology being used and the journey to net zero, but significant concern around the negative impacts of LionLink and other projects that would render national benefits unconvincing to local communities.

5.6 Additional Options presented at the Supplementary Non-Statutory Consultation (2023)

5.6.1.1 The 2022 non-statutory consultation provided valuable feedback from the local community and statutory consultees who commented on our initial siting and routeing options. This feedback was considered as part of the appraisal of the initial short-listed options alongside a number of technical and environmental assessments. This appraisal resulted in some refinements to our proposals including the identification of an alternative landfall site at Walberswick and an alternative Underground HVDC Cable Corridor at Southwold which were then presented at the 2023 supplementary non-statutory consultation. Further detail on the reasons these alternative options were identified is provided below

5.6.1.2 The naming convention of the landfalls referred to in the supplementary non statutory consultation has changed from the initial assessment (**Figure 4-5**) to that displayed in **Figure 5-1**. This change is summarised in **Table 5-1.**

Table 5-1: Landfall naming convention

Initial Landfall (Figure 4-5)	Supplementary non-statutory consultation (Figure 5-1)
LN D / Southwold	Southwold (Landfall F)
LN E / Walberswick	Walberswick (Landfall G)
Not part of initial assessment	Walberswick (Landfall G2)
LN F / Dunwich	Dunwich (Landfall H)
LS E / Aldeburgh	Aldeburgh (Landfall E)

5.6.2 Alternative Walberswick Landfall Site

5.6.2.1 The alternative site was identified to avoid the temporary loss of access to the Walberswick beach carpark and beach huts during construction, reduce the impact of construction traffic on the settlement of Walberswick, avoid the restricted bridge crossing over the Dunwich River to the beach car park, and where possible reduce the potential impacts on designated sites. This alternative Landfall site was identified as Walberswick Site G2.

5.6.2.2 It is considered that the Walberswick G2 option is better aligned to policy as it is shorter in length with reduced environmental impact and the Landfall Site is not within an area at risk of flooding.

5.6.3 Alternative Onshore HVDC Underground Cable Corridor north of Southwold.

5.6.3.1 To address concerns around the potential impact that the Underground HVDC Cable Corridor may have on designated sites of ecological importance, the Applicant identified an alternative route to the north of Southwold which avoided direct impacts on European designated sites, avoided crossing the River Blyth close to the coast in the large floodplain and associated habitat was considered to have the potential to reduce impacts on designated sites of ecological importance. This alternative cable corridor was identified as the Alternative Underground Cable Northern Search Area.

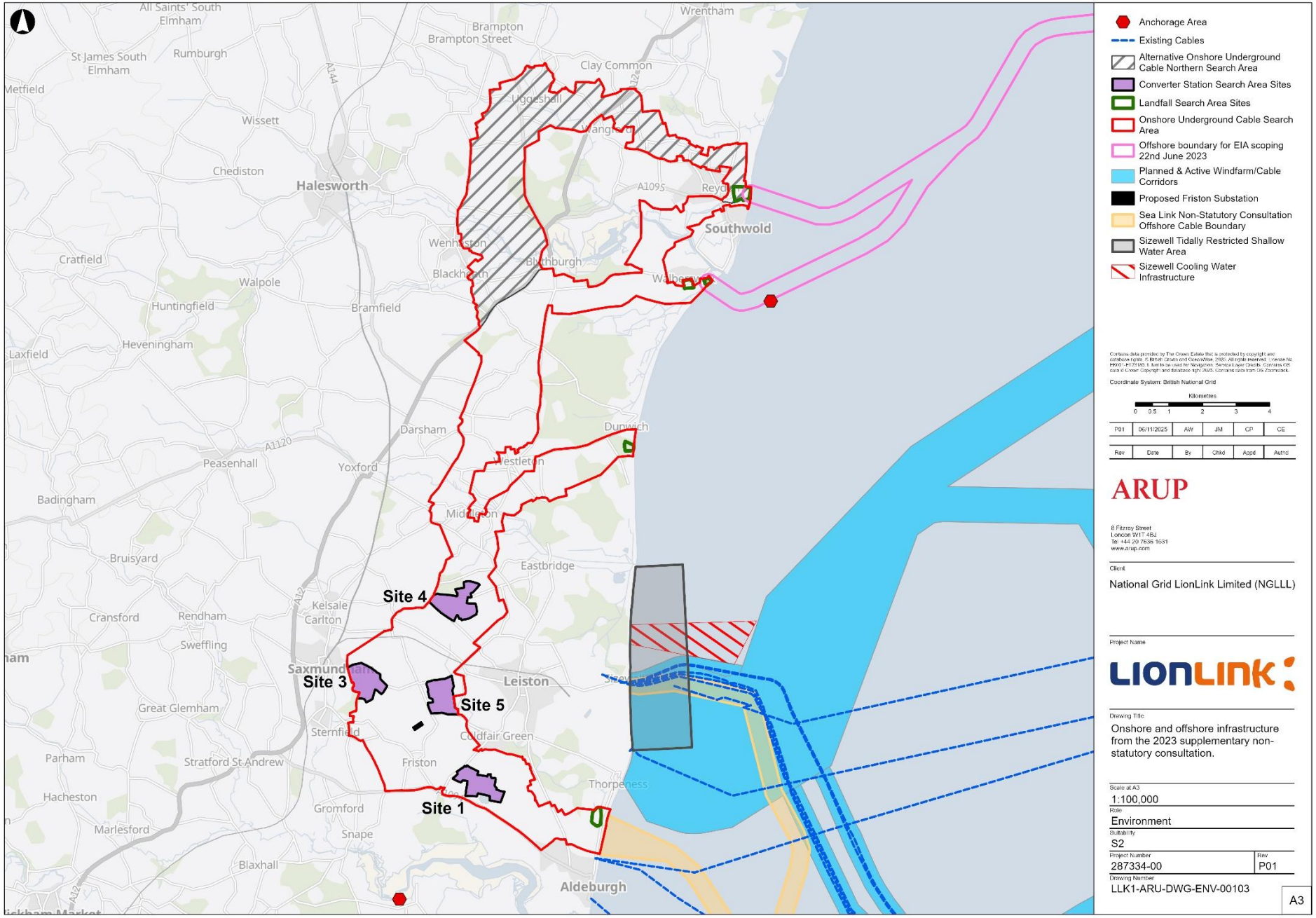

Figure 5-1: 2023 Non-Statutory Consultation options

5.7 Non-statutory Consultation (2023) Feedback

5.7.1.1 The 2023 supplementary non-statutory consultation provided the opportunity for stakeholders and the local community to comment on the options presented in the 2022 non-statutory consultation and the new options of the 'alternative Walberswick' Landfall and the 'alternative Underground Cable Northern Search Area'. As part of the supplementary non-statutory consultation, we received over 1,300 pieces of feedback with a number of key themes across the two non-statutory consultations.

5.7.1.2 In March 2024 the Applicant published the supplementary non-statutory consultation report[10] which identified the emerging preferences for the Proposed Scheme. These were:

- Landfall F: (Southwold), and Landfall G2 (alternative Walberswick);
- Site 3 Converter station search area located east of Saxmundham;
- Alternative underground onshore HVDC cable corridor from Landfall F (Southwold) to Converter Station Site 3, and underground onshore HVDC cable corridor from Landfall G2 (alternative Walberswick) to Converter Station Site 3.

5.8 Preferred Options

5.8.1.1 To identify the emerging preferred options, workshops were held to assess the options for each technical component presented at the supplementary non-statutory consultation against the Project Objectives. A concluding workshop considered the Proposed scheme as a whole. The following factors were considered as part of the appraisals:

- Environmental and socio-economic factors;
- Technical considerations;
- Planning policy;
- Land use/classifications;
- Stakeholder engagement;
- Non-statutory consultation feedback (from the 2022 and 2023 non-statutory consultations);
- Strategic fit with UK Project Objectives; and
- Cost.

5.8.1.2 The development of the Proposed Scheme has been an iterative approach, which has been the subject of periodic design reviews and validation exercises to ensure the decisions made through the options appraisal process remain valid (backcheck). The design has been refined as further information has become available through surveys and stakeholder feedback.

5.8.1.3 As part of the assessment of the proposed Landfall sites and onshore HVDC cables corridors and the concerns raised in the non-statutory consultation feedback

[10] See item 8 and 9 in References at the end of this document

regarding the potential negative onshore and offshore environmental impacts the Applicant undertook a backcheck of previously discounted landfall sites.

5.8.1.4 This identified that the three landfalls in the vicinity of Kessingland, and their associated underground HVDC cable corridors, had no impact on onshore European designated sites, and should be reassessed. All offshore cable route options to the Kessingland landfalls pass through European designated sites similar to the more southerly landfall locations.

5.8.1.5 The reassessment confirmed that landfalls at Kessingland were considered to be technically feasible. The routes were however the longest onshore underground cable routes, and it was considered that given the potential for an alternative route at Southwold, that Southwold would be preferable to the Kessingland options given the additional underground HVDC cable length (approximately and additional 9.5km from Southwold), associated construction costs and disturbance. As such the Kessingland landfall options were discounted.

5.8.1.6 Only the underground HVDC and underground HVAC cable corridors between preferred sites and landfalls were considered for further assessment. Discounted landfalls and converter site stations with associated underground HVDC and underground HVAC cable corridors were not progressed further.

5.9 Converter Station Site and associated onshore underground Cable Corridors

5.9.1.1 The initial assessment of the Converter Station Sites (**Figure 4-2**) resulted in the assessment outcomes below. Underground HVDC cable corridor lengths from landfall to converter site areas were considered as part of **Section 4.2.6**.

- Site 1 Converter station search area: located north of Aldeburgh Road 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 1. Several residential receptors are in proximity to the site, as well as Site 1 located on the border of the Suffolk and Essex Coast and Heaths National Landscape.
  - Site 1 was the southernmost Converter Station Site and aligned most closely with a connection to the Aldeburgh Landfall site. To route to this site from any of the other Landfall options would have resulted in the HVDC cables needing to route beyond the Kiln Lane Substation, before the HVAC cables returned, resulting in an overall longer onshore Cable Route option than the other Converter Station Sites.
- Site 3 Converter station search area: located east of Saxmundham benefited from being in proximity to the Kiln Lane Substation and existing infrastructure factors, as well as an opportunity for colocation alongside Sea Link, 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 4 Converter station search area: This option was located northwest of Leiston was similar to Site 3 in that it is close to the existing 400kV OHLs and outside the National Landscape boundary, and scored positively for geotechnics and topography.

- Site 5 Converter station search area: This option was located west of Leiston 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.

5.9.1.2 Following the discounting of the Aldeburgh landfall (**Section 4.2.5**), Site 1 was identified as the least preferred option given the additional HVDC cable route length associated with the site's location when routed to the emerging landfall preferences of Southwold or Walberswick. Site 1 also had the second longest HVAC cable route to the proposed Substation. Site 1 was therefore discounted from further consideration.

5.9.1.3 The three remaining Converter Station sites were all evaluated following the supplementary non statutory consultation, with key differentiators being landscape impacts, and technical challenges (e.g. length and construction impacts of the proposed Underground HVAC Cable Corridor to the Kiln Lane Substation and the proposed Underground HVDC Cable Corridor to the common point where the corridors separate to the remaining landfall locations). The assessments considered the parameters as set out in **Table 3-1** with the HVAC cables having a greater construction width than the HVDC cables.

5.9.1.4 The landscape assessment identified Site 3 as the better performing as it was considered that the Converter Station Site would benefit from screening from existing woodland and field boundaries as well as the sites proximity to the proposed Substation location and existing infrastructure.

5.9.1.5 Site 5 and the surrounding landscape have a rural character, there was anticipated impact to landscape baseline and likely visibility from vehicular routes and the surrounding network of public footpaths. Site 5 is also located in the proximity of the historic village of Knodishall. Site 5, whilst having the shortest HVAC cable corridor was down-selected due to the site and cable corridors potential impacts on the setting and potential heritage and archaeological impacts to Knodishall.

5.9.1.6 From a technical perspective, Site 3 was closer to the Kiln Lane Substation than Site 4. Site 4 was less preferred as the Converter Station location as the site resulted in the need for the a longer HVAC cable route and included a HVAC crossing of the existing mainline railway and had additional HVAC cable crossings of other assets (highways and utilities). Given HVAC cables comprise a greater number of cables/ducts that the HVDC cables, resulting in a larger construction area for installation, these aspects weigh negatively in the landscape assessment and other environmental considerations. The western part of the site has the greatest potential to enclose and screen the CS structure but this would likely require removal of existing mature trees and the loss of historic field patterns and a high level of mitigation. Site 4 had screening from substantial planting, but the site location resulted in the greatest impact for views from within and to the Suffolk and Essex Coast and Heaths National Landscape.

5.9.1.7 As such Converter Station Site 4 was subsequently discounted.

5.9.1.8 In considering both the landscape and technical impacts, a preference was identified for Converter Station Site 3, with this site also providing an opportunity for co-location with the Sea Link converter station.

5.10 Onshore Underground HVAC Cable Corridors from Converter Station Site 3 to Kiln Lane Substation – Initial assessment

5.10.1.1 Following the selected preference for Converter Station Site 3, an appraisal of Underground HVAC Cable routeing was undertaken between the site and the Kiln Lane Substation.

5.10.1.2 The initial work comprised the production of a "heat map" of constraints and avoidance criteria within the Schemes Scoping Boundary which included:

- Identification of known technical and environmental constraints, overlaid to produce a combined picture of known constraints – showing areas of lowest to highest constraint;
- Addition of environmental and technical avoidance/offset criteria to be compiled and represented spatially.

5.10.1.3 Alongside the "heat map" the cable corridor routeing considered flexibility with regards to the siting of the Converter Station within Converter Station Site 3, routeing into the Kiln Lane Substation, and consideration alongside the latest substation layout and mitigation proposed by the EA1N and EA2 projects.

5.10.1.4 This resulted in the identification of three 400m wide corridors identified between Converter Station Site and Kiln Lane Substation. These three corridors were then appraised against each other, which resulted in two corridors (Options 1 and 2) being taken forward for further review.

5.10.1.5 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. It also enabled coordination with Sea Link and Nautilus.

5.10.1.6 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 provide an alternative siting option, in addition to Option 2, for the Proposed Scheme to be constructed as a standalone project. being progressed.

5.10.1.7 Option 3 traversed more fields than either of the other options, although it was approximately the same length as Option 1. The corridor alignment was closer to Grade II listed buildings than Option 1. As there were better performing options, Option 3 was not taken forward for further assessment.

5.11 Landfall Site Refinement

5.11.1.1 The analysis of the Landfall sites included consideration of the Onshore and Offshore HVDC Cable Corridors approaches to each Landfall. The background to landfall names is provided in **Table 5-1**.

5.11.2 Dunwich

5.11.2.1 Dunwich (Landfall H) was identified as the least preferred Landfall and was subsequently discounted. The key reasons for discounting Dunwich were:

- The likely adverse impacts on offshore heritage (submerged medieval settlement), with stakeholder feedback advising that the nearshore/coastal Cable Corridor option could not be designed to avoid the heritage asset, and that it would be challenging to identify suitable mitigation to reduce significant impacts.
- Technical constraints associated with construction via HDD due to the high offset of the cliff from the sea level.
- Coastal erosion risk, with short-term erosion (up to 2025) estimated at 15-20m, and long-term erosion (up to 2105) is estimated at 50-100m.

5.11.2.2 As this landfall was discounted, HVDC cable corridors to this landfall were not considered further.

5.11.3 Aldeburgh

5.11.3.1 The Aldeburgh landfall (Landfall E) was retained for the 2023 supplementary non-statutory consultation due to the potential for co-location with other projects. The landfall was not considered favourable due to the challenges recognised at this stage which included the coralline crag formation identified ahead of the 2022 non-statutory consultation, the remaining challenges were:

- Up to seven additional cable crossings (three crossings of Greater Gabbard, two crossings of Galloper, and one of Concerto South and Concerto North) occur within the first 10km of the cable route in shallow waters (20-25m) – this is an additional seven to the other routes to Southwold (LN D) and Walberswick (LN E).
- The route crosses a sensitive fishing ground, a drift net area, with multiple cable crossings within it. Drift nets are very sensitive to objects on the seabed and any crossing construction in this area would not sit favourably within the fishing community
- The cable routes between an Annex I sandbank and EA1 and EA2 export cable corridor, encroaching on the 250m safety avoidance zones of both constraints
- The cable route has some of the longest cable route options as it is the most southern of the landfalls
- The cable route joins up with the other routes from more favourable landfalls that yield shorter, less constrained route options
- Crosses a significant amount more primary and secondary UXO avoidance areas (in addition to the route joining with the others) which will likely increase survey time and cost.

5.11.3.2 Whilst this landfall was favoured from an onshore technical perspective, the onshore environmental team identified concerns given the number of environmental designations including its location within a SSSI and the close proximity to other IBAs. Both the offshore technical and environmental teams identified significant risks associated with the nearshore approach to the Aldeburgh landfall, which from an offshore perspective is the longest offshore route, has a substantially greater

number of crossings, the locations of which are all within European designated sites and assessed as having a likely detrimental impact on the Outer Thames Estuary SPA of Protection due to the concentration of these crossings in the nearshore area adjacent to an Annex 1 sandbank (considered supporting habitat for the Southern North Sea SAC and Outer Thames Estuary SPA).

5.11.3.3 The Landfall Site at Aldeburgh was also concluded to be a less preferred Landfall option and discounted on the basis of the offshore environmental impacts (adverse effects offshore on the Outer Thames Estuary SPA). It was concluded that adverse effects on the Outer Thames Estuary SPA could not be ruled out given the number of crossings and the associated loss of habitat, and that this loss could not be compensated for. The Habitat Regulations, reinforced by the EIA regulations and national policy, require that significant harm to habitat sites must be avoided wherever possible, i.e. through siting and routing it should provide a clear demonstration of avoiding designated sites. The potential for co-ordination at landfall was not considered to outweigh this adverse effect given the strong protection afforded to the SPA as a European site. For this reason and the availability of alternative solutions meant that the landfall at Aldeburgh was discounted (**Section 5.14**).

5.11.3.4 As this landfall was discounted, HVDC cable corridors to this landfall were not considered further.

5.11.4 Walberswick and Southwold

5.11.4.1 The original Walberswick Landfall Site (G) was discounted in preference of alternative Walberswick Landfall Site (G2) consulted upon in the 2023 Supplementary non-statutory consultation.

5.11.4.2 The landfall at Southwold and alternative landfall at Walberswick were both considered to be feasible options (with the Southwold Landfall and the Alternative onshore cable corridor) and it was concluded that 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 and the associated onshore cable corridor to the common point where both routes joined.

5.11.4.3 Both Southwold and Walberswick landfalls were taken forward for further consideration. The key considerations associated with the Walberswick and Southwold Landfalls are considered in **Section 5.12** below.

5.12 Landfall Preferred Options Appraisal

5.12.1.1 The appraisal to identify a preferred Landfall site was undertaken and considered the following aspects.

5.12.2 Onshore Technical

5.12.2.1 From an onshore technical perspective, the Landfall at Walberswick (Site G2, **Figure 5-1**) and the Walberswick Underground HVDC Cable Corridor was identified as the preferred option. 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 would require fewer trenchless crossings, presents no discernible flood risk or watercourse crossings and the topography associated with the Walberswick Underground HVDC Cable Corridor is generally smooth with no gradients. This presents a reduced risk to the construction programme and phasing of construction works.

5.12.2.2 In comparison, the Landfall at Southwold (Site F) is largely located within Flood Zone 3 and is subject to an increased risk of flooding during construction due to its low-lying nature, below mean high water springs. NGLLL has considered the sequential test as part of its optioneering process. The Landfall at this location has challenging ground conditions due to shallow groundwater levels and is located at the end of the seawall where erosion rates are high. The transition joint bay would be located on a slope and would require additional earthworks. The technical complexity associated with this location, including the needs for a raised platform to mitigate flood risk, would also increase health and safety risks. The Landfall at Southwold (Site F) has an increased risk of encountering UXOs as it includes an area that was historically used as a rifle range during WWI and WWII.

5.12.2.3 The Southwold Underground HVDC Cable Corridor would require an increased number of trenchless crossings, require longer more challenging trenchless crossings including more 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.

5.12.3 Offshore Technical

5.12.3.1 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. A longer cable length would marginally increase programme risk due to increased construction time and may also result in additional vessels being required for a cable float due to inaccessible depths for the cable lay vessel. The landfall at Walberswick (Site G2) would also likely require a longer section of HDD offshore however it remains viable from a construction perspective.

5.12.4 Onshore Environment

5.12.4.1 From an onshore environmental perspective, the Landfall at Walberswick (Site G2) and the Walberswick Underground HVDC Cable Corridor was identified as the preferred option. This would avoid development of permanent above ground infrastructure within Flood Zone 3, and NGLLL has considered the application of the sequential test in its decision making. 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.

5.12.4.2 The Walberswick Underground HVDC Onshore Cable Corridor, as well as the Landfall to the Offshore section, would need to cross the Minsmere-Walberswick designations. NGLLL will commit to delivering this via a trenchless crossing to avoid the impacts that a trenched solution could give rise to. Likely construction parameters and potential mitigation measures were considered through further specialist work in order 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 Minsmere-Walberswick designations leading to the need for a Habitats Regulations Assessment derogation case. This concluded that adverse effects on the integrity of the Minsmere-Walberswick designations would be avoided through measures implemented into the design (e.g. trenchless crossings) and specific control measures (monitoring of equipment and spill kits). This would mean that no works on the surface of the ground would occur within the Minsmere-Walberswick designations, because the cable installation in this area would be exclusively undertaken by trenchless techniques. There is still a potential for the habitat to 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 the impact, if a frac-out were to occur, would be temporary and negligible.

5.12.4.3 Further to the consideration of designated sites as described above, overall, the Walberswick Underground HVDC Onshore Cable Corridor is shorter than the Southwold Underground HVDC Cable Corridor and therefore has a lesser extent of habitat loss. 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.

5.12.4.4 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 and Essex Coast and 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 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 and would impact fewer visual receptors.

5.12.4.5 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 requirements. The Landfall at Southwold (Site F) borders a geologically designated 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.

5.12.4.6 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.

5.12.4.7 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.

5.12.5 Offshore Environment

5.12.5.1 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.

5.12.5.2 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). There are a number of mitigations such as defining transit routes through the SPA and seasonal restrictions on high-risk construction activities which could be implemented to ensure that the Proposed Offshore Scheme would not have an adverse effect on the red-throated diver feature of the Outer Thames Estuary SPA. Therefore, whilst the distinction is important to note between the Landfalls, on the balance with other constraints (and in particular the flood risk and application of the sequential test as well as the impact on the landscape) it was not a deciding factor. The Proposed Offshore HVDC Cable Corridor common to both options passes through the Southern North Sea SAC designated for Harbour porpoise.

5.12.6 Lands

5.12.6.1 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 and is shorter in length.

5.12.6.2 In comparison, the Southwold Underground HVDC Cable Corridor has a greater number of landowners and titles, and also crosses a single parcel of Crown Estate

land which forms the River Blythe with both of these aspects posing a risk to compulsory acquisition powers.

Both the Walberswick Underground HVDC Cable Corridor and Southwold Underground HVDC Cable Corridor cross a parcel of Special Category Land (Open Space), which has the potential to be impacted. At the intertidal range there are areas of Special Category Land (Crown Estate Land) within the Landfall at Walberswick (Site G2) and Landfall at Southwold (Site F).

5.12.7 Planning Policy

5.12.7.1 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 aligned to policy 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.

5.12.8 Stakeholder Engagement

5.12.8.1 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, the findings of which are yet to be agreed with Natural England concluded:

- There is no risk of permanent habitat loss within the Minsmere-Walberswick designations;
- 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 Minsmere-Walberswick designations. 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 required to quantify the area of habitat that would be impacted by a frac out occurrence; and
- Negligible risk of noise or visual disturbance impacts from construction upon qualifying bird species that could result in a significant adverse effect upon the Minsmere-Walberswick designations.

5.12.8.2 NGLLL has had regard to information provided through the consultation process including information provided by Walberswick Against LionLink via correspondence outside of the formal consultation process. This information comprised breeding bird surveys, bat surveys, reptile surveys and footfall surveys considering public footpaths in proximity to the Walberswick landfall site. This information was reviewed as part of the ongoing refinement and did not give rise to materially new information or lead NGLLL to a different conclusion in respect of the Preferred Option. This information was taken into account and aligned with NGLLL's assessment of environmental matters relevant to the landfall decision making process. In taking this information into account, NGLLL is confident that its assessment is, and remains robust.

5.12.9 Strategic Fit

5.12.9.1 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.

5.12.10 Cost

5.12.10.1 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.

5.12.11 Preferred Landfall Site Conclusion

5.12.11.1 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.

5.12.11.2 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. The local community were informed of the decision in March 2025 via the project newsletter, the newsletter was followed up with drop-in events at Saxmundham and Walberswick.

5.12.11.3 The preferred landfall selection was based on data available up to late 2024. Further surveys and assessments have since been conducted which confirmed the proposed construction methodologies for Walberswick and the associated risks. Information which has arisen since that initial decision has been considered as part of a back-check and review exercise, and this process has not changed the outcome of any previous assessment, therefore the Applicant is confident that the landfall decision taken in early 2025 is robust.

5.13 Backcheck of Kessingland Landfall Sites

5.13.1.1 The landfalls at Kessingland and Pakefield (**Section 4.2.6** and **Figure 4-1**) were considered to be technically feasible and had no impact on European designated sites, with a preference for Kessingland Landfall A. The associated cable routes were however the longest onshore cable routes, and it was considered that given the potential for an alternative landfall at Southwold, that Southwold would be preferable to the Kessingland options given the additional HVDC cable length

(approximately an additional 9.5km from Southwold), associated construction costs and disturbance. In assessing the costs, the differential between a longer onshore, and shorter offshore route from Kessingland against a shorter onshore and longer offshore route from Southwold was negligible. Given the increased disturbance and the greater interaction with the National Landscape associated with the onshore cable installation the Kessingland options were discounted.

5.14 Onshore HVDC Cable Corridors

5.14.1.1 The onshore HVDC corridor appraisals were based on a starting point of a converter station within Site 3 (**Section 5.9**) and an endpoint at the two preferred landfall locations (Walberswick and Southwold, **Section 5.11**).

5.14.1.2 Onshore HVDC route sections were renumbered following the initial feasibility study in 2021 (**Section 4.3**). The latest route section numbering is shown in **Figure 5-2**.

5.14.1.3 The onshore HVDC cable corridors share a common alignment up to Section C.3 at which point they diverge. In Section C.3, one branch aligns to Walberswick (Section D), and another branch heads north and then east towards Southwold (Sections E and F).

5.14.1.4 The initial work comprised the production of a "heat map" of constraints and avoidance criteria within the Schemes Scoping Boundary which included:

- Identification of known technical and environmental constraints, overlaid to produce a combined picture of known constraints – showing areas of lowest to highest constraint.
- Addition of environmental and technical avoidance/offset criteria to be compiled and represented spatially.

5.14.1.5 This resulted in the identification of a number of 400m wide corridors, with the options in each corridor appraised against each other.

5.14.1.6 Further details on the key decision making for each cable section option can be found in **Table 5-2** below.

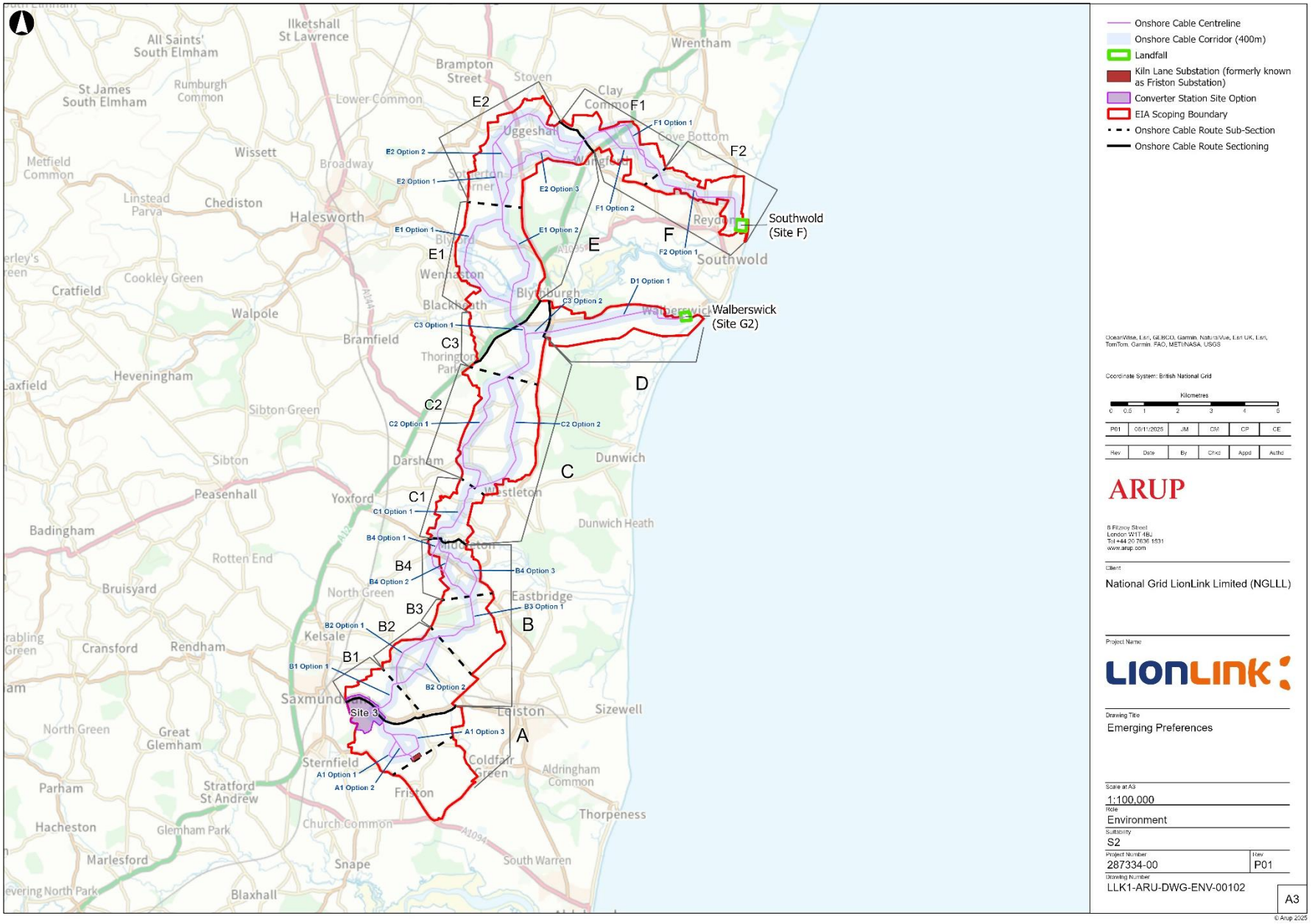

Figure 5-2: Onshore underground HVAC and HVDC cable corridors

Table 5-2: Appraisal Outcome of Proposed Onshore Underground HVDC Cable Corridors

Section of Onshore Cable Corridor	Preferred 400m corridor	Key decision making
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 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

Section of Onshore Cable Corridor	Preferred 400m corridor	Key decision making
		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 range of associated floodplain priority habitats.
Section C2	Option 3	Following a review of two initial options (Options 1 and 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 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

Section of Onshore Cable Corridor	Preferred 400m corridor	Key decision making
		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 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 and Essex Coast and 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 technical due to the shorter route, shorter programme and reduced length of trenchless crossings in comparison to Option 2.
Section F2	Option 1	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

Section of Onshore Cable Corridor	Preferred 400m corridor	Key decision making
		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 and Essex Coast and Heaths National Landscape and partly within the Suffolk Heritage Coast.

5.14.2 Summary

5.14.2.1 The Southwold landfall was not taken forward for further assessment as a proposed landfall site (**Section 5.11.4**). Consequently, the underground HVDC cable corridor to this landfall from Site 3 was similarly not taken forward for further assessment.

5.14.2.2 Due to the shorter route length, and associated lower impacts on the National Landscape area, the emerging preference for the proposed HVDC cable corridor to landfall was Site 3 to Walberswick landfall (Landfall G2).

5.15 Offshore HVDC Cable Routes – nearshore approach to Aldeburgh Landfall

5.15.1.1 Following the review of co-located options, the offshore environmental and technical teams supported a series of appraisals to review the offshore cable route to the landfall at Aldeburgh. The objective was to assess if a co-ordinated landfall was feasible. The review also considered why the Sea Link project reached a different conclusion regarding landfall, identifying a landfall at Aldeburgh as their emerging preference.

5.15.1.2 In terms of the differing conclusions between the projects, the key difference is that the Sea Link offshore cable route approaches the landfall from the south, whereas the LionLink project approaches Aldeburgh from the north. The northerly approach requires a significant number of additional offshore cable crossings, which are not required when approaching from the south. The habitat loss through cable installation and protection from crossing these subsea assets, and subsequent impact on the designated sites, is less for Sea Link.

5.15.1.3 A number of alternative offshore cable routes were considered, however irrespective of the offshore route from the proposed EEZ crossing to the northeast the nearshore approach to Aldeburgh is located within the Outer Thames Estuary SPA and will require a significant number of cable crossings and subsequent protection measures, which are considered to result in an adverse impact on the Outer Thames Estuary SPA which cannot be mitigated and which cannot be compensated. **Figure 5-3** illustrates the nearshore crossing associated with two

routes around the Annex 1 sandbank feature and the crossings of active, proposed and out of service cables.

5.15.1.4 The adverse effects on the Outer Thames Estuary SPA could not be avoided and the potential for co-ordination at landfall was not considered to outweigh this adverse effect given the strong legal protection afforded to the SPA as a European site. There remain alternative landfalls which do not give rise to such adverse effects. Natural England also expressed a preference for Southwold over Aldeburgh during a meeting in January 2024.

Table 5-3: Comparison of nearshore constraints at Aldeburgh and Southwold

Constraint	Aldeburgh	Southwold
Crossings within SPA (from convergence)	7	1
Crossings within SAC (from convergence)	7	1
Adverse impact on European Sites	Risk of permanent loss of supporting habitat (red-throated diver) and risk to integrity of Outer Thames Estuary SPA. No adverse impact identified on Southern North Sea SAC. This is exacerbated by number and proximity of crossings in a short distance in proximity to the Sizewell sandbank as a supporting habitat.	No adverse impact identified on Outer Thames Estuary SPA or Southern North Sea SAC
Habitat regulation assessment – derogation risk	Anticipated to be likely due to risk / loss of supporting habitat	No
Other Constraints		
	Coralline crag crossing (this feature provides protection to the Sizewell nuclear power plant)	No constraint
	Non-ferrous UXO identified which will increase cost to survey, identification and disposal	Lower UXO constraint
	High risk to fisheries (located within an area of high activity within the drift net area)	Low risk to fisheries (located within an area of lower activity within the drift net area)
Opportunities		
	Marine and landfall co-location	No marine and landfall co-location

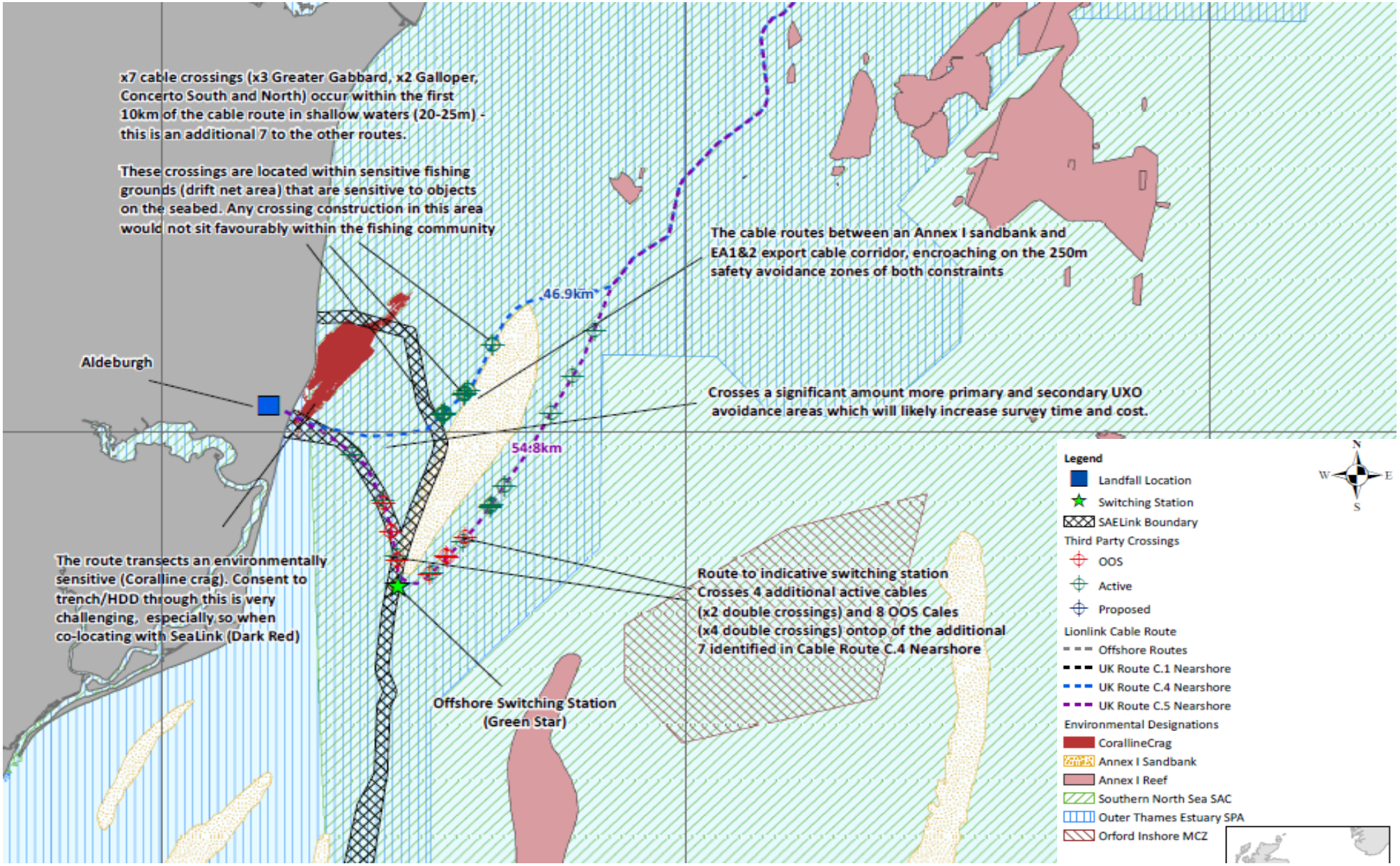

Figure 5-3: Aldeburgh Offshore HVDC Cable Routeing alternatives and constraints

5.16 Cable Route and EEZ crossing location

5.16.1 EEZ Crossing Locations

Background

5.16.1.1 Cross border connection points A, B and C were identified as the crossing points on the EEZ boundary where cable routes from the UK and NL can connect with each other. An additional point X on the EEZ boundary was identified in the event a connection could be utilised there (**Section 5.16**). Routeing along the EEZ boundary was included to maintain the option of connecting to any of the cross border connection points and proposed Nederwiek windfarms.

5.16.1.2 By late 2023 it was confirmed that Nederwiek 3 OWF platform had been chosen as the connection point in NL. Based on the selection of this platform, a review of potential EEZ crossing points was undertaken in conjunction with TenneT who supported the assessment from the Dutch side of the border.

Crossing Assessment

5.16.1.3 Crossing A: This EEZ crossing point was taken forward for further assessment for the following reasons:

- The crossing point was located in close proximity to the proposed windfarm
- It allowed for the shortest cable length on the Dutch side of the boarder.
- The route options from a westerly direction would avoid an interface with the TSS shipping lane bordering the Nederwiek wind energy plots.

5.16.1.4 Crossing B: This crossing point was found to be least favourable due to the potential impact on future developments near to, or crossing, the EEZ. As a result, the crossing point was discounted for the following reasons:

- The arrangement and alignment of the converter platform on the Dutch side excludes an approach from the south. This crossing point would force LionLink to approach the converter platform from the east making the connection technically unfeasible.
- There are two other 2 other existing HVDC cables proposed along the route on the Dutch side of the EEZ. Lying all cables in close proximity would make the route heavily constrained, in terms of space for safe placement of the cable.
- Potential impact on future developments.

5.16.1.5 Crossing X: This EEZ crossing point was discounted from further assessment for the following reasons:

- Cable would have to run parallel to the EEZ border between two OWFs. This includes the Norfolk Boreas windfarm in the UK sector, and the Gebied Zuid windfarm in Dutch sector.
- A cable route running adjacent to the EEZ potentially constrains future developments near to, or crossing, the EEZ boundary such as oil and gas infrastructure as well as other cable (power and telecom) projects. This routeing approach would be challenged as there are alternative options available which have less of an overall impact.

- It was further away from the planned connection point at Nederwiek 3 windfarm.

5.16.1.6 Crossing C: This EEZ crossing point was taken forward for further assessments for the following reasons:

- The offshore route options linked to EEZ crossing point C presented the shortest cable length in UK waters.
- The proposed route also had fewer infrastructure crossings.
- Lower potential environmental impacts compared to the cable routes utilising the more northerly EEZ crossing points.

5.16.1.7 Therefore, the Applicant retained both the northern and southern route corridor options, along with cross border connection points A and C

Final EEZ Crossing Point Selection

5.16.1.8 Two EEZ crossing points were taken forward for further consideration. These are EEZ crossing point A and C.

5.16.1.9 However, consultation with TenneT identified that a submarine cable route through Dutch waters from EEZ crossing point C to Nederwiek Gamma OWF was highly constrained for the following reasons:

- On the Dutch side of the connection point several existing cables would need to be crossed in close proximity to a shipping lane.
- Feedback from the Rijkswaterstaat (NL regulatory authority), who were consulted on the Dutch route only, confirmed that a 1km buffer from the shipping lane should be maintained, making these infrastructure crossings technically challenging.
- The submarine cable route 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 LionLink.
- It was also considered that the presence of LionLink would constrain future wind energy grid connections.

5.16.1.10 As a result, EEZ crossing point C was discounted from the project. EEZ crossing point A was taken forwards as the preferred option.

5.16.2 Offshore Route

5.16.2.1 Three offshore routes were developed and revised based on the decisions taken during the long list (**Section 4.4; Figure 4-7**). These are Routes A, B and C, which are summarised in more detail below.

UK Route A

5.16.2.2 Submarine cable route A is the longest of the three options appraised. It was routed through the Southern North Sea SAC (for ~86km) and Outer Thames Estuary SPA (for ~8km), the route also crosses through the south-eastern corner of the North Norfolk Sandbanks and Saturn Reef SAC (for ~1.2km). Consideration was given as to whether the route could avoid the designated European site, but the position of the planned Norfolk Vanguard OWF, and multiple oil and gas infrastructure assets including an export trunk pipeline meant this was not feasible.

5.16.2.3 Other constraints noted along the route was the crossing of a dredge spoil ground (for ~11km), the routeing through a deepwater shipping channel (~28km) and the proximity to potential Annex I reef habitat for ~26km. Although the route avoids the potential reef feature, as apparent in the UKHO high-resolution bathymetry data, there is the risk that the extent of the reef will have changed since the data was released.

5.16.2.4 In addition to being the longest route, it would require a significantly higher number of infrastructure crossings than the other submarine cable route options appraised, many of which would be within a designated European site. Initial appraisal identified 6 infrastructure crossings in the Outer Thames Estuary SPA and 15 in the Southern North Sea SAC. UK Route A would also cross significantly more oil and gas infrastructure compared to the other routes.

5.16.2.5 The appraisal concluded that due to the additional interaction with a designated European site, which could be avoided if an alternative route was selected, and the number of infrastructure crossings within designated European sites, the option should be discounted. Furthermore, it could be demonstrated that there were feasible alternatives that have a lower environmental impact on designated European sites.

5.16.2.6 UK Route A was down selected at this point and not taken forwards for further consideration as the emerging preference.

UK Route B

5.16.2.7 Submarine cable route B was the second shortest of the three route options appraised. The route crosses the Southern North Sea SAC (for ~98km) and Outer Thames Estuary SPA (for ~16km).

5.16.2.8 Consultation with the Joint Nature Conservation Committee (JNCC) resulted in the alignment of the submarine cable route through the Outer Thames Estuary SPA being re-assessed and moved 1km to the east. This shortened the distance through the site and moved five infrastructure crossings out of the site boundary; although it should be noted that the infrastructure crossings are still within the Southern North Sea SAC. In total submarine cable route B crosses 1 pipeline within the Outer Thames Estuary SPA and 10 pipelines and 11 in service or planned cables within the Southern North Sea SAC.

5.16.2.9 Other constraints noted along the submarine cable route included a dredged spoil ground (interaction for ~11km), proximity to mapped potential Annex I reef habitat (for ~8km) and the proximity of deepwater shipping channel. The route runs parallel to the deepwater shipping channel for ~47km and lies within the channel for ~10.5km.

5.16.2.10 Submarine cable route B offered connection to UK/NL border point B, but with an additional spur could also connect to UK/NL border point A, providing more optionality at the UK/NL border. As EEZ crossing point B was discounted (**Section 5.16.1**), UK Route B was amended to cross the EEZ at crossing point A.

5.16.2.11 UK Route B was initially identified as less preferential than UK Route C as it required more infrastructure crossings within a designated European Site and would

therefore have a greater environmental impact. UK Route B was the preferred route option.

UK Route C

5.16.2.12 Initially submarine cable route C was designed as two options. One option crossed the Rembrandt 1 telecommunications cable and then routed parallel to the cable to the north before turning in a north-easterly direction and running parallel to the west of the NeuConnect interconnector (in construction) adjacent to the eastern boundaries of the planned East Anglia Three and Norfolk Vanguard East OWFs. The other option stayed to the south of the Rembrandt 1 telecommunications cable before crossing the cable and turning north-east to run parallel and to the east of the NeuConnect interconnector.

5.16.2.13 Discussions with EA3 OWF allowed a decision to be made regarding the options and the second option to the east of the NeuConnect interconnector was identified as the preferred option.

5.16.2.14 Submarine cable route C is the shortest route option within UK waters, although longer overall to the platform in NL waters. Although it is a similar route length in the Southern North Sea SAC (~97km to connection point C) it requires less infrastructure crossings than the other route options. In total submarine cable route C crosses 1 pipeline within the Outer Thames Estuary SPA and 2 pipelines and 10 in service or planned cables within the Southern North Sea SAC. Due to the lower number of infrastructure crossings in designated European sites, it would have a lower environmental impact in comparison to the other route options appraised.

5.16.2.15 An option was also considered for a spur from submarine cable route C along the EEZ boundary up to connection point X or even as far as connection point B, however this was discounted as the route would be within a relatively narrow gap of seabed between several UK and NL OWF and would in effect sterilise the seabed for future development. EEZ crossing point X was discounted due to potential impacts on infrastructure.

5.16.2.16 Other constraints identified along the route included interaction with a dredged spoil ground (~36km) and interaction with a deepwater shipping channel. The route runs parallel to the deepwater shipping channel for ~56km and lies within it for ~9km.

5.16.2.17 From an environmental and technical perspective, submarine cable route C was selected as the initial emerging preference in the UK due to shorter distances inside environmental designated sites. However, there were significant constraints on the Dutch side of the EEZ at crossing point C (**Section 5.16.1**).

5.16.2.18 As a result of the constraints, and the down-selection of EEZ crossing point C, UK Route C was discounted and not considered for further assessment.

Offshore HVDC Route Summary

5.16.2.19 UK Route B was the preferred option (Figure 5-4) for the following reasons:

- UK Route B and UK Route C both impact the same environmental designations with UK Route B having a slightly greater impact, however this is not deemed to

be significant enough to alter the recommendation of Route B as the preferred option overall.

- UK Route B is shorter than UK Route C and therefore had a reduced cost.
- UK Route B has fewer active infrastructure assets to cross.
- UK Route B presents less of a risk in obtaining consents in both the UK and NL
  - In accordance with the Marine and Coastal Access Act 2009; the UK Administrations, including the UK Government, have adopted the Marine Policy Statement (MPS) which includes commitments to the co-ordination of marine planning with other countries sharing the same regional seas, including NL. Route B aligns with the commitments in the MPS as the route does not constrain proposed developments in Dutch waters.
  - TenneT's preference, based on consenting challenges and spatial planning, is for a cable route which avoids impacting proposed developments in the Dutch jurisdiction. Of the two options available TenneT's preference is for Route B as it navigates to the west of the Nederwiek wind energy plots thereby avoiding interactions with proposed developments and the shipping lane. Securing consents for Route C is deemed challenging in the Dutch jurisdiction as an alternative route option (Route B) is available which would be less impactful overall
- Consultation on the route has taken place with the UK statutory bodies, however no strong preference was given for either route option.

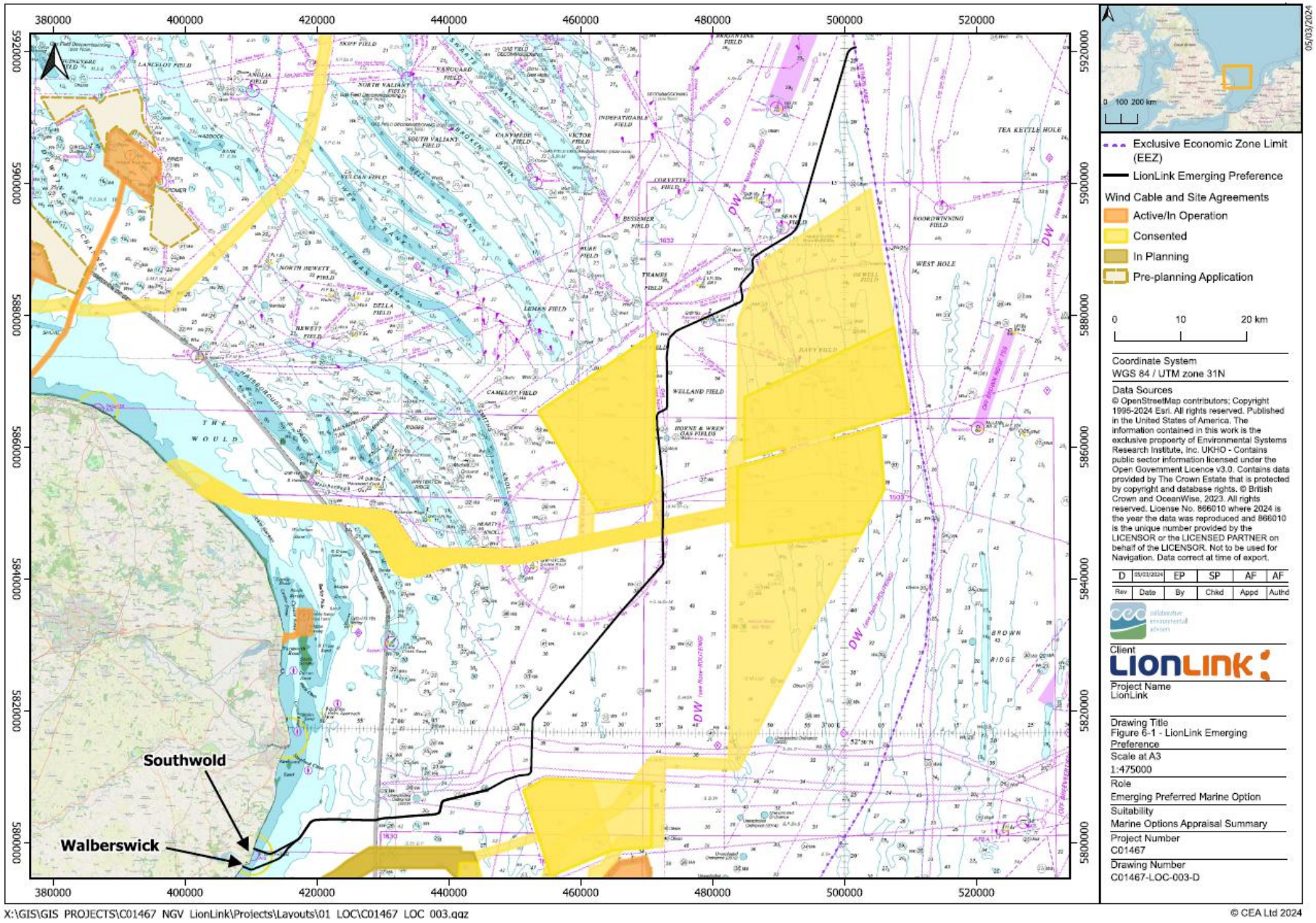

Figure 5-4: LionLink emerging preference

6 Ongoing Scheme Refinement

6.1 The Proposed Scheme

6.1.1.1 The key infrastructure components of the Proposed Scheme taken forward as the preferred options are:

- Kiln Lane Substation;
- Proposed Underground HVAC Cables between Kiln Lane Substation and the proposed Converter Station at Site 3;
- Proposed 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 Cables between the proposed Converter Station at Site 3 east of Saxmundham, and a proposed Landfall Site at Walberswick;
- Proposed Landfall Site at Walberswick; and
- Proposed Offshore HVDC Cables from the proposed Landfall Site at Walberswick at the UK coast, along UK Route B to the edge of the UK EEZ.

6.1.1.2 The Applicant continues to review and refine the design of the Proposed Scheme where appropriate, including consenting scenarios and optionality reported in the PEIR **Chapter 2: Description of the Proposed Scheme.** This will include consideration of further survey work and analysis, advice and feedback received from engagement with statutory environmental bodies, persons with an interest in land, the local community and other energy projects in the locality.

6.1.1.3 Coordination opportunities to date have involved the sharing of site survey information and data, co-locating infrastructure and exploring the potential for coordination of the physical delivery of infrastructure. The feasibility and deliverability of coordination is still being explored, based on current known information about other proposed projects, and the Applicant will continue to engage with other developers to ensure that the benefits of coordination can be realised where possible. The Statutory Consultation feedback will be used to inform further scheme design and development.

6.1.1.4 The onshore surveys have informed the route refinement and onshore technical micro-siting work with the intention of minimising *adverse* environmental effects. Extensive surveys and stakeholder engagement has been conducted to identify and understand the local wildlife and habitats.

6.1.1.5 In 2024 an offshore and nearshore seabed survey was undertaken for the Proposed Scheme to assess the preferred route from a technical and environmental perspective. This included the physico-chemical and biological environment, including identifying any Annex I EC Habitats Directive habitats. Sediment samples, underwater photos, multibeam echosounder side scan sonar, magnetometry and sub-bottom profiler data were collected.

6.2 Positioning of Converter Station within Converter Station Site 3

6.2.1.1 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 extent of Converter Station Site 3.

6.2.1.2 Due to the size and scale of the permanent above ground structures of the proposed Converter Station the landscape impact of the Converter Station and cumulative impact when considered alongside the Sea Link converter station was central to the appraisal.

6.2.1.3 Four converter station options were identified within Site 3 (**Figure 6-1**). All four options were able to accommodate a single Converter Station **Table 3-1** and were appraised independently of each other firstly as a standalone Project and secondly with the opportunity to co-locate with the Sea Link project.

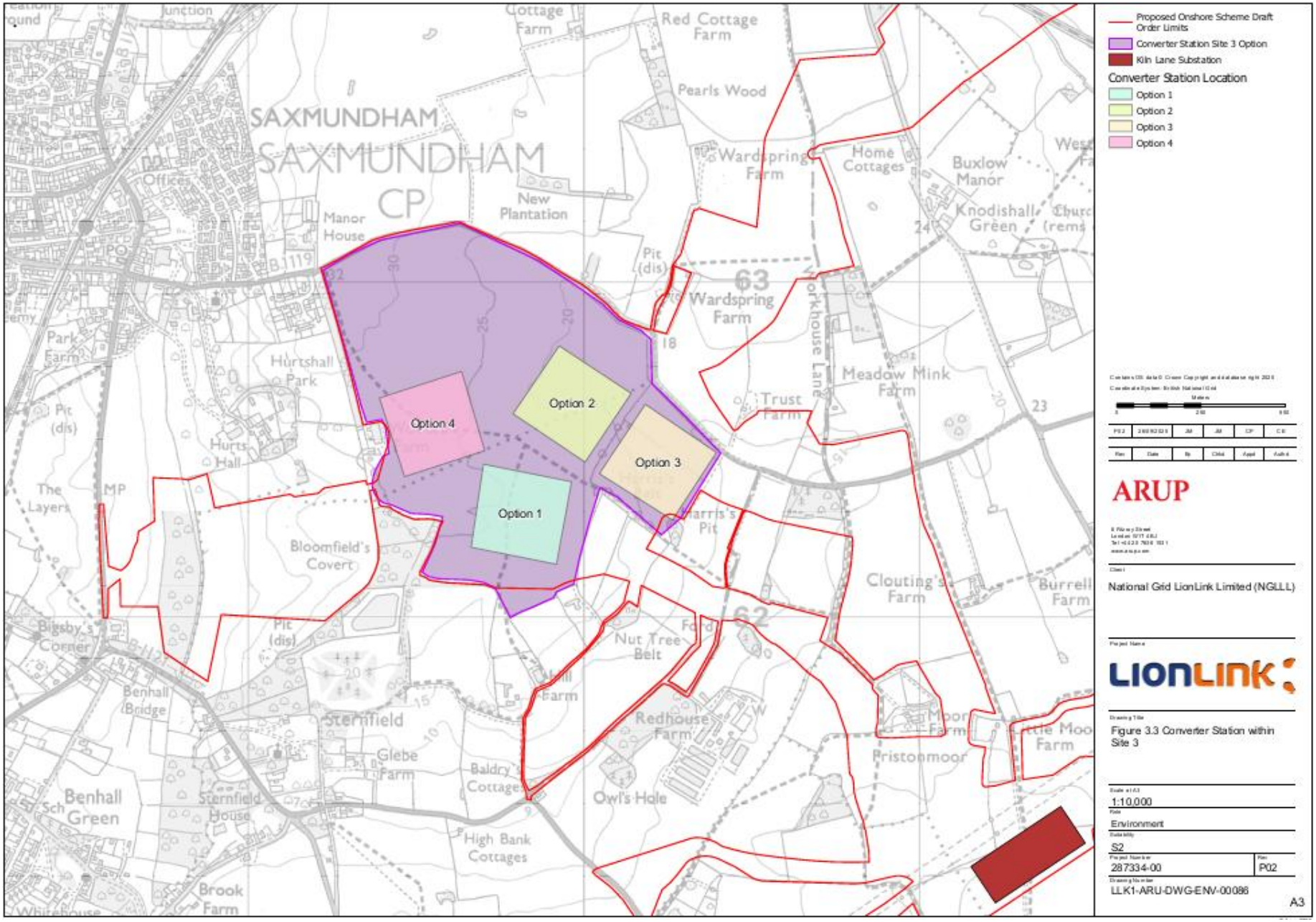

Figure 6-1: Converter Station locations within site 3

6.2.1.4 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.

6.2.1.5 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, as each option is only able to host a single Converter Station. Option 1 is bounded by woodland to the south and west and includes mature field boundaries to the east. 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.

6.2.1.6 Option 2 was considered to be the preferred option when appraised independently and compared to the outcomes of Option 3 and Option 4. 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 visual effects on residents of Wood Farm and it identified an opportunity to reduce landscape effects through landform reprofiling and planting. Option 2 is also preferred from a noise perspective, located away from residential receptors during both construction and operation and provides the opportunity for effective coordination with Sea Link from a technical and master planning perspective.

6.2.1.7 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.

6.2.1.8 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.

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

6.2.1.10 Prior to February 2025 when the Nautilus project rescinded its connection agreement in Suffolk, the assessment considered the option and implications of a third Converter Station within the site. At this time there was a slight preference for Option 4 as the most suitable option for a third Converter Station. Following the Nautilus decision not to connect in Suffolk, the Applicant considered that this provided the opportunity to revisit the Converter Station orientation within Option 2

to improve constructability and reduce the visual (and cumulative) impact of the Converter Station considered below in **Section 6.3**.

6.3 Converter Station orientation

6.3.1.1 Following the decision by the Nautilus project to connect to the Isle of Grain, the Applicant reviewed the preferred location for the siting of the LionLink Converter Station within Converter Station Site 3 and identified two alternative orientations. The alternatives are:

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

6.3.1.2 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.

6.3.1.3 Further optimisation of the Converter Station orientation is possible within the Limits of Deviation set by the Proposed Scheme and will be considered throughout the design development and ongoing masterplanning work.

6.4 Converter Station Access

6.4.1.1 Alternative vehicular access routes to the proposed Converter Station location were assessed to consider coordination with Sea Link and address feedback received from Suffolk County Council as part of the Applicant's regular engagement on Sea Link's preferred access (via a new bridge over the River Fromus). The following alternatives were considered:

- Option 1 - an access road that utilises the proposed Sizewell Link Road, forming part of another third-party DCO in the area (consented, but not yet under construction). This option was suggested by Suffolk County Council in the review of the Sea Link project; and
- Option 2 - access to the proposed Converter Station Site via the proposed Fromus Bridge crossing (identified as the preferred access by the Sea Link project).

6.4.1.2 The Applicant undertook an options appraisal that considered the criteria outlined in the options appraisal process (see **Section 3.5.2**), The appraisal identified that

Option 1 was the preferred access route from an Environmental and Planning perspective due to the reduced permanent impacts on the landscape setting, listed parkland and mature woodland. In comparison Option 2 was the preferred access route on technical grounds as it was considered to avoid the need for significant highway improvement works that would be needed for Option 1 to cross the B1119.

6.4.1.3 Option 2 was also concluded to provide the most direct route to the proposed Converter Station Site, avoid interference with OHLs and would not be dependent on third party consents. Option 2 (having also been identified as the Sea Link projects preferred Converter Station Site access) 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, reducing the footprint and associated environmental impacts of the two uncoordinated projects.

6.5 HVDC Cable Corridor interface with Sizewell Link Road

6.5.1.1 Further consideration has been given to the Proposed Scheme's Underground HVDC Cable Corridor options in the vicinity of and crossing the Sizewell Link Road (SLR) which is consented under the Sizewell C Development Consent Order granted in 2022.

6.5.1.2 This component of the Sizewell C proposals is a new road (referred to as the SLR) connecting the A12 near Yoxford with the B1122 approximately 5.5km to the east, and bypassing the villages of Yoxford, Middleton Moor and Theberton.

6.5.1.3 As part of the iterative design development the Applicant identified a potential coordination opportunity 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. The alternative co-ordination options considered include:

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

6.5.1.4 Following consideration of the five alternatives, the Proposed Scheme has taken forward both Option 1 and Option 3 for further consideration and consultation.

6.5.1.5 Option 1, the Western route option described in **PEIR 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 alternative options. Further technical discussions are needed on the interface between the two projects in order to confirm the feasibility of this option, however this option has been taken forward for further assessment.

6.5.1.6 Option 2 was discounted on technical, environmental and social constraints. The option was in close proximity to social receptors. The option would necessitate the removal of five lengths of hedgerow, compared to two sections for Option 1 in the same area. During construction this option would directly impact known buried archaeological remains recorded on geophysical survey undertaken in the area, and result in physical impacts on historic landscape features.

6.5.1.7 Option 3, the Eastern Route option described in **PEIR 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. Option 3 would present challenges during construction and operation given the interfaces between the Proposed Scheme and other utilities and services within the road verge and ensuring continued operation of the SLR during maintenance or repair of the Proposed Scheme. On the basis that the Proposed Scheme would be constructed following completion of the SLR traffic disruption and likely impacts to installed landscaping and environmental mitigations need to be further explored. As such further technical discussions needed on the interface between the two projects; this option has been taken forward for further assessment.

6.5.1.8 Option 4 was discounted on technical, environmental and social constraints. Option 4 was the longest cable route option of the five options. The first segment of Options 4 and 5 are similar and in very close proximity to social receptors on Yoxford Road and Mill Street and to Gardenhouse Farm. Option 4 is also in close proximity to several additional social receptors off Hawthorn Road. During construction this option would directly impact known buried archaeological remains recorded on geophysical survey undertaken in the area, and result in physical impacts on historic landscape features. Option 4 introduces a large number of new boundary crossings, including through areas with mature trees.

6.5.1.9 Option 5 was discounted on technical, environmental and social constraints. The first segment of Options 4 and 5 are similar and in very close proximity to social receptors on Yoxford Road and Mill Street and to Gardenhouse Farm. During construction this option would directly impact known buried archaeological remains recorded on geophysical survey undertaken in the area, and result in physical impacts on historic landscape features. Option 5 would result in the loss of woodland priority habitat and several mature boundary features including mature trees. Although trenchless crossing are proposed for most interfaces with roads and field boundaries, some crossings would require additional vegetation removal.

6.6 HVAC Cable Corridor Coordination

6.6.1.1 Following the identification of the two 400m HVAC Cable Corridors (**Section 5.10**) further design refinement was undertaken focussed on three differing scenarios these included:

- Scenario A - Proposed Scheme (HVAC) as a standalone project;
- Scenario B - Proposed Scheme (HVAC) with Sea Link (HVAC and HVDC); and

- Scenario C - Proposed Scheme (HVAC) with Sea Link (HVAC and HVDC) and Nautilus (HVAC and HVDC) - to assume a shared corridor with Sea Link and Nautilus

6.6.1.2 Further design development was undertaken through a holistic design review including technical, environmental, lands and landowners, planning and stakeholder engagement to identify route options within the Underground HVAC Cable Corridor. 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 within Flood Zones 2 and 3, avoidance of identified committed developments, business impacts and the consideration of the use of trenchless construction techniques for crossing points.

6.6.1.3 This resulted in the identification of seven HVAC Cable Route options, for which five of which considered Scenario A, followed by two options that considered Scenarios B and C.

6.6.1.4 Following the decision on Ofgem's Initial Project Assessment, a decision was made by a decision the Nautilus project to utilise an existing connection agreement and connect to a substation on the Isle of Grain in Kent. As such, no onshore works for Nautilus are proposed in Suffolk and Scenario C was subsequently discounted.

6.6.1.5 Continued engagement with NGET has further highlighted the opportunity to coordinate the delivery of the Proposed Scheme Underground HVAC Cable Corridor within the Sea Link proposed underground HVAC and HVDC 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.

6.6.1.6 Following consideration of the seven HVAC cable route options, and the two Scenarios, the Proposed Scheme has taken forward:

- Scenario A (Proposed Scheme only) and Route Option 6 - The Proposed Onshore Scheme would consent and install Underground HVAC Cables for this Proposed Scheme only (Referred to as the Northern Route Option).
- Scenario B (Proposed Scheme in coordination with Sea Link) and (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 between the Kiln Lane Substation and the Converter Station. This would allow for coordination and colocation of the Proposed Onshore Scheme with Sea Link project (referred to as the Southern Route Option).

6.6.1.7 More detailed assessment on the opportunity for both projects to install cables within the route is ongoing.

6.7 Converter Station Site Design Development

6.7.1.1 The Applicant has commissioned design and landscaping development work within the preferred Converter Station location (Site 3) and is considering opportunities that are compatible with the proposed Sea Link Converter Station design and layout. This is currently work that is under development but will build upon the siting and routeing analysis carried out to date.

6.7.1.2 The Applicant recognises that there are opportunities to demonstrate good design in terms of siting relative to existing landscape features.

6.7.1.3 The Design Background Document (available as part of this Statutory Consultation) presents a number of concepts for design layouts. This will be developed further and will be subject to stakeholder engagement to inform the DCO submission.

6.8 Ongoing engagement

6.8.1.1 The Applicant is continuing to engage with local stakeholders, including local communities and their representatives concerning options to consider alternatives to our Proposed Scheme, presented as part of this Statutory Consultation.

6.8.1.2 The Applicant is of the view that the Proposed Scheme, as presented as part of this Statutory Consultation, and its consideration of reasonable alternatives has been carried out in a proportionate manner and meet the objectives of the project.

6.8.1.3 The Applicant will continue to monitor feedback as the Scheme progresses through statutory consultation and beyond, towards the submission of an application for Development Consent.

6.9 Offshore Route

6.9.1.1 Two variations have been made to the offshore HVDC cable route following the identification of the preferred route. A summary of these variations is provided in the following sections.

6.9.2 Proposed Offshore HVDC Cable Corridor development (sandwave area)

6.9.2.1 During the marine survey completed by Next Geo Solutions (NGS) in 2024, large sandwaves were identified between Kilometre Point (KP) 52 and KP60 (**Figure 6-2**) along with seabed ridge features that were potential *Sabellaria spinulosa* reef.

6.9.2.2 Sabellaria reef is comprised of dense subtidal aggregations of a small, tube-building polychaete worms (Ross worm), of which were identified as 'Reefs' is protected under the Habitats Directive as an Annex I habitat and is also an Oslo and Paris convention for the Protection of the Marine environment of the North-East Atlantic better known as OSPAR and Biodiversity Action Plan habitat.

6.9.2.3 Data from the JNCC of potential presence of Sabellaria reef polygons and points, were identified in close proximity to the survey corridor (approx. 170 m) and the identified seabed features.

6.9.2.4 The vessel was instructed to acquire additional data across a potentially more favourable corridor (referred to as the Route Development Corridor (RDC)) adjacent to the existing route between KP52 to KP60 (approx. 8.5km x 200m). As the preliminary survey data was inconclusive and further investigation / ground truthing was completed to determine sensitivity of these areas.

6.9.2.5 The following seabed features were considered

- Number of Boulders (Survey Corridor)
- Number of Boulder fields (Survey Corridor)
- Number of Outcrops (Survey Corridor)

- Superficial Material percentage of Trenchable soil

Boulders

6.9.2.6 The RDC has substantially fewer boulders and boulder fields, a lower percentage of clay and glacial till outcrops and has higher percentage of Sand along the route. Despite having a higher percentage of glacial till outcrops (3% on the RDC compared to 1% on the current route corridor), the amount of glacial moraine outcrop is minimal in terms of overall route length. Therefore the RDC is preferred.

Sediment mobility

6.9.2.7 Mobile features are of critical importance to route engineering. If large areas of mobile features are present, pre sweeping works would be needed before cable installation. Areas of mobile features may expose the cable in segments post burial, if not buried deep enough below the Vertical Reference Level . Furthermore, mobile sediment may increase difficult with installation.

6.9.2.8 The original corridor has 9 fewer sandwaves and a lower maximum height of 10m (compared to 11.3m seen along the RDC). The RDC has more sandwaves, however they are generally of a lower height / smaller than as those found on the original corridor.

6.9.2.9 The estimated volume of pre-sweeping required for each route was 37,800m^3 higher along the original corridor than the RDC. Therefore the RDC is preferred.

Benthic

6.9.2.10 Four potential Sabellaria aggregations with a 'low Resemblance' to Annex I Sabellaria Reefs were identified within the original corridor, whereas no Sabellaria or reefs were identified on the RDC. Therefore the RDC is preferred.

Geotechnical

6.9.2.11 Analysis of the Cone Penetration Tests has shown that the RDC has a higher percentage of easily trenchable soils when compared to the original corridor. Both routes share some areas of difficult trenching conditions, however, the original corridor is likely to contain more high to very high strength clay along its route, whereas the RDC contains more Dense Sands. Therefore the RDC is preferred

Summary

6.9.2.12 The RDC (as outlined in red in **Figure 6-2**) presents substantial advantages over the original route corridor. This includes:

- Increased ease of cable installation and likelihood of burial;
- Lower pre-sweeping volumes;
- Reduced environmental impacts; and
- Lower likelihood of requiring remedial rock protection due to successful burial during installation

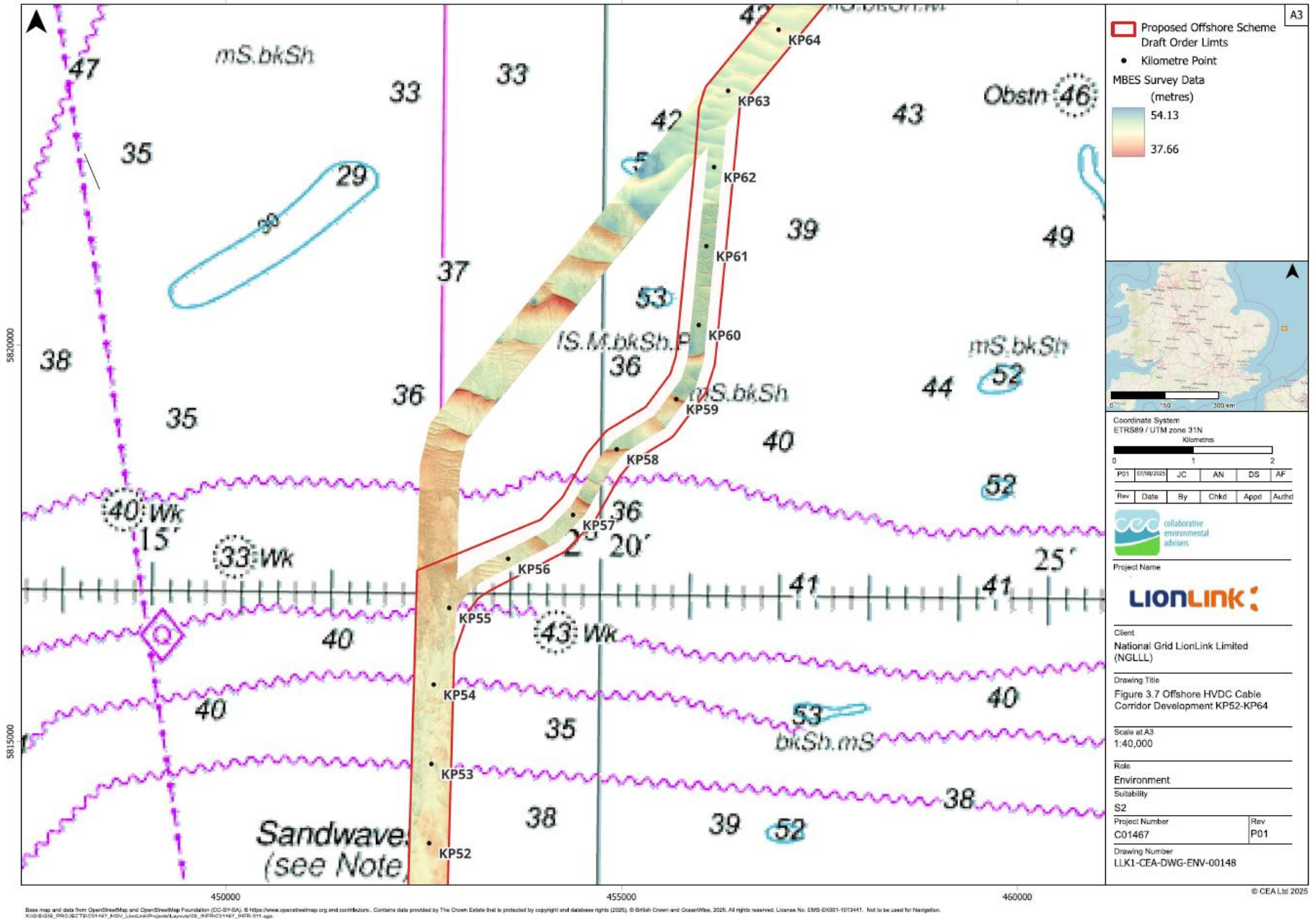

Figure 6-2: Alternative route alignment around sandwave area

6.9.3 Proposed Offshore HVDC Cable Corridor development (Aggregate area 2109)

6.9.3.1 TCE awarded an aggregate extraction area (Area 2109 (Indefatigable East)) in November 2024 to Dredging, Environmental and Marine Engineering better known as DEME Building Materials Ltd. The licence holder was awarded an initial Exploration and Option Licence for five years.

6.9.3.2 LionLink identified the new constraint in January 2025 and the proposed Offshore HVDC Cable Corridor was identified as intersecting with the western boundary of the licensed area.

6.9.3.3 Aggregate extraction is considered a primary constraint to cable installation (**Section 3.5.3**). The offshore HVDC route corridor was amended to include a variation to avoid this area, while still retaining the original alignment (**Figure 6-3**).

6.9.3.4 The cable corridor was amended to avoid the boundary of Aggregate Area 2109 by routeing westwards of the area and leaving a separation of 500m between the cable corridor and the aggregate area. This is an industry standard exclusion zone that is used for most constraints when undertaking marine spatial planning.

6.9.3.5 DEME Building Materials Ltd. had not (as of November 2025) relinquished the licence area. The variation in order limits provides sufficient flexibility for either potential outcome and allows the offshore PEIR and Environmental Statement Chapters to be progressed while the discussions are ongoing.

6.10 River Blyth

6.10.1.1 In mid 2025 East Suffolk Council requested that the Applicant consider a potential landfall through the River Blyth and Southwold Harbour. A preliminary, high level desktop assessment of the scope of works and potential risk and environmental impacts was conducted.

6.10.1.2 There are additional technical, environmental and social constraints and risks associated with the proposed route above those considered for the Walberswick landfall. These include potential impacts on the functioning on Southwold harbour, the surrounding habitats at the top of the estuary, increased number of HDD works and increased risk of damage to the cable due to the relatively narrow river.

6.10.1.3 The result of the assessment is that cable installation via the River Blyth and Southwold Harbour did not present any technical, environmental or social benefits above those assessed for the preferred landfall at Walberswick.

6.10.1.4 Based on the preliminary assessment the River Blyth was discounted and not taken forward for further consideration.

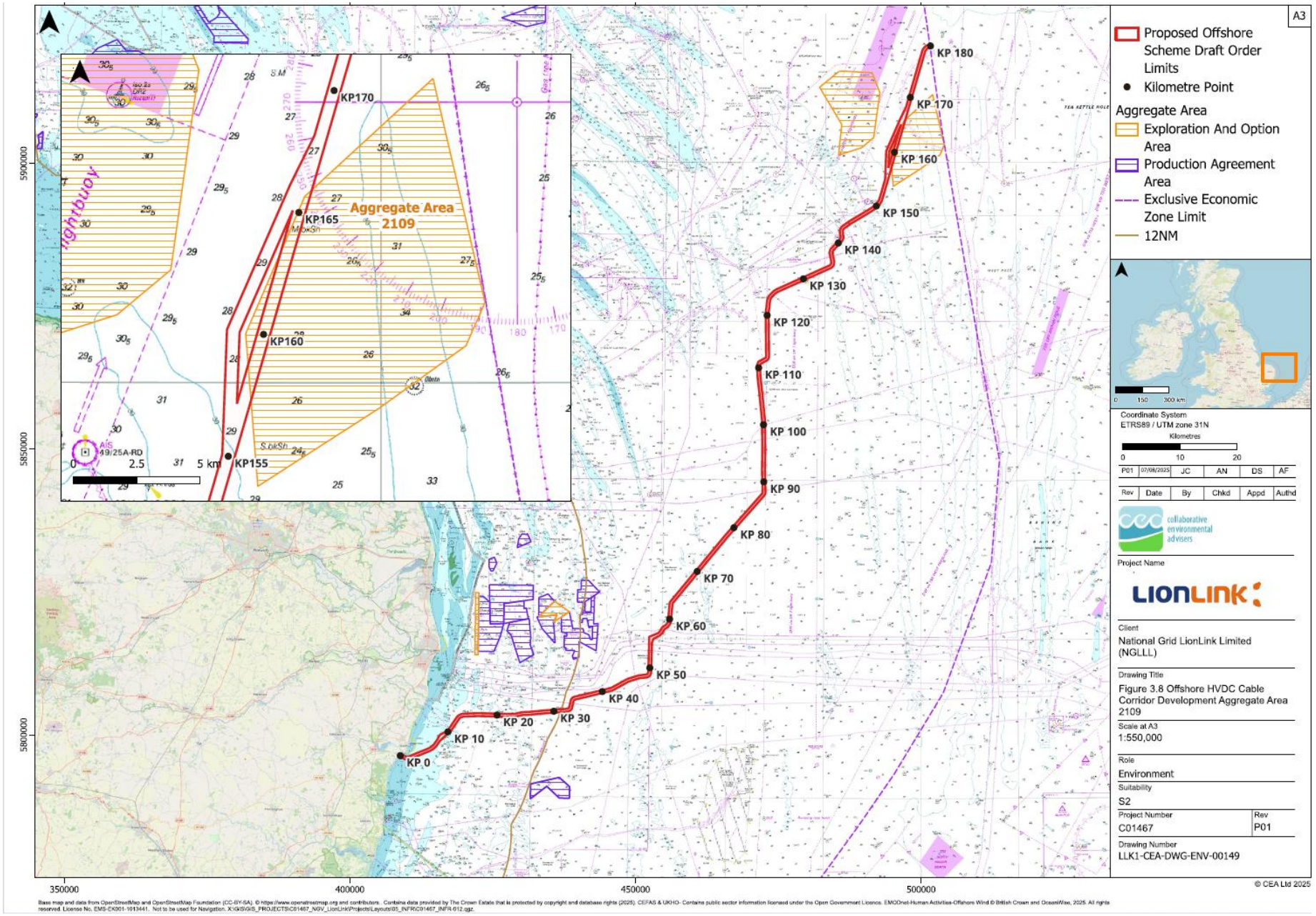

Figure 6-3: Offshore HVDC route amendment around aggregate area 2109

7 Next Steps

7.1 Next steps for implementation

7.1.1.1 The feedback from the 2022 non-statutory consultation and 2023 supplementary non-statutory consultation, as well as detailed assessments have culminated in the development of the preferred siting and routeing options for the Proposed Scheme.

7.1.1.2 The consultation responses received during statutory consultation on the information provided within this report, and other statutory consultation documentation 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.**

7.1.1.3 The Proposed Scheme will be subject to further environmental impact assessment in line with the adopted Scoping Report, alongside ongoing consultation with stakeholders, interested parties, and members of the public.

7.1.1.4 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 Outstanding Natural Beauty (now National Landscapes)
BNG	Biodiversity Net Gain
AHP	Analytic Hierarchy Process
AIL	Abnormal Indivisible Load
AIS	Automatic Identification System
AONB	Area of Outstanding Natural Beauty (now National Landscapes)
CION	Connection and Infrastructure Options Note
CWS	Country Wildlife Site
DCO	Development Consent Order
DEME	Dredging, Environmental and Marine Engineering
EA1	East Anglia One
EA1N	East Anglia One North
EA2	East Anglia Two
EA3	East Anglia Three
EDF	Électricité de France
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
HVDC	High Voltage Direct Current
IBA	Important Bird Area
ICPC	International Cable Protection Committee
JNCC	Joint Nature Conservation Committee
KP	Kilometre Point
LAT	Lowest Astronomical Tide
MCZs	Marine Conservation Zones
MCZs	Marine Policy Statement
NCERM	National Coastal Erosion Risk Mapping
NCN	National Cycle Network
NESO	National Electricity System Operator('s)
NETS	National Electricity Transmission System

Term	Definition
NGESO	National Grid Electricity System Operator
NGET	National Grid Electricity Transmission
NGLLL	National Grid Lion Link Limited
NL	Netherlands
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Projects
NTS	National Transmission System
Ofgem	Office of Gas and Electricity Markets
OHA	Offshore Hybrid Asset
OHL	Overhead Line(s)
OWF	Offshore Wind Farm
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PEIR	Preliminary Environmental Information Report
PRoW	Public Right of Way
RSPB	Royal Society for the Protection of Birds
SAC(s)	Special Area(s) of Conservation
SLA	Special Landscape Areas
SLR	Sizewell Link Road
SPA	Special Protection Area
SPR	Scottish Power Renewables
SSSI	Site of Special Scientific Interest
TCE	The Crown Estate
TJB	Transition Joint Bay
TSS	Traffic Separation Scheme
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UXO	Unexploded Ordnance
WWI	World War One
WWII	World War Two

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Appendix A: Legislation and Policy Influences on siting and routeing

Overview

The relevant legislation and national policy that apply to the options appraisal work is set out below. **Chapter 4 Legislation and Policy Overview of the PEIR** also provides an overview of the legislative, national, regional, local and marine planning policy relevant to the Proposed Scheme and is not repeated in full here.

This section covers our Statutory duty under the Electricity Act 1989 when formulating new proposals and the primary basis for decision-making, as set out in the National Policy Statements (NPS). Other important and relevant considerations to our Proposed Scheme are considered throughout the PEIR chapters.

Chapter 3 Alternatives and Design Evolution of the PEIR describes the reasonable alternatives that have been considered, as required under The Infrastructure Planning (Environmental Impact Assessment (EIA) Regulations 2017. The chapter considers the options appraisal work relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the preferred options, including a comparison of the environmental effects. There is no requirement in the EIA Regulations to assess all potential options, only to provide a description of those that have been considered. The relevant sections of these chapters should be read alongside this report.

Our statutory duty – Electricity Act, 1989

Section 38 and Schedule 9 of the Electricity Act 1989 require an electricity licence holder (including an interconnector licence holder) when formulating proposals for new lines and other works, to:

> "*have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and shall do what it reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects*."

NGLLL, the Applicant holds an electricity interconnector licence granted pursuant to Section 6(1)(e) of the Electricity Act 1989, meaning that the Applicant is classed as a statutory undertaker for certain purposes.

National Policy Statements (NPS), 2025

The NPS' set out the government's objectives for the development of NSIPs. This appendix reflects the updated NPS' however the PEIR was finalised in advance of this, this is documented in PEIR: Chapter 4 Legislation and Policy Overview – Addendum Note. The following include paragraphs from the NPSs that are considered to be relevant to options appraisal for interconnector projects:

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

NPS EN-1 sets out the Government's overarching national policy with regards to energy development that are nationally significant under the Planning Act 2008.

Section 3.3 of NPS EN-1 sets out the need for new nationally significant electricity infrastructure which includes different types of electricity infrastructure, including the role of interconnectors in delivering a secure, low carbon electricity system at low cost.

Section 4.3 of NPS EN-1 sets out that an applicant should identify the impacts of a proposal and these impacts, together with proposals for their avoidance or mitigation wherever possible, should be set out in an Environmental Statement (ES) that should accompany each project application.

Paragraph 4.3.9 states that as in any planning case, the relevance or otherwise to the decision making process of the existence (or alleged existence) of alternatives to the proposed development is, in the first instance, a matter of law. EN-1 does not contain any general requirement to consider alternatives or to establish whether the proposed project represents the best option from a policy perspective. Although there are specific requirements in relation to compulsory acquisition and habitats sites, EN-1 does not change requirements in relation to compulsory acquisition and habitats sites.

Paragraph 4.3.15 states that applicants are obliged to include in their ES, information about the reasonable alternatives they have studied. This should include an indication of the main reasons for the applicant's choice, taking into account the environmental, social and economic effects and including, where relevant, technical and commercial feasibility.

Paragraph 4.3.22 states that given the level and urgency of need for new energy infrastructure, the Secretary of State should, subject to any relevant legal requirements (e.g. under the Habitats Regulations) which indicate otherwise, be guided by the following principles when deciding what weight should be given to alternatives:

- the consideration of alternatives in order to comply with policy requirements should be carried out in a proportionate manner; and
- only alternatives that can meet the objectives of the proposed development need to be considered

Section 4.7 of NPS EN-1 also sets out the criteria for 'good design' for energy projects, and that taking this approach can help meet many policy objectives. Paragraph 4.7.6 states that whilst the applicant may not have any or very limited choice in the physical appearance of some energy infrastructure, there may be opportunities for the applicant to demonstrate good design in terms of siting relative to existing landscape character, land form and vegetation. Furthermore, the design and sensitive use of materials in any associated development such as electricity substations will assist in ensuring that such development contributes to the quality of the area. Applicants should also, so far as is possible, seek to embed opportunities for nature inclusive design within the design process.

- National Policy Statement for Renewable Energy Infrastructure (EN-3) (NPS EN3);

NPS EN-3 relates to renewable energy infrastructure, and Part 2 of the document provides general assessment principles and technology-specific policies relating to matters including climate change adaptation, consideration of good design for energy infrastructure, and offshore and onshore wind.

Section 2.3 covers factors influencing site selection and design, it recognises that the special criteria and the weight given to them will vary from project to project.

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

NPS EN-5 relates to electricity networks and provides general assessment principles and technology-specific policies relating to matters including climate change adaptation, consideration of good design, biodiversity and geological conservation, landscape and visual and noise and vibration.

Section 2.2 refers to factors influencing site selection and design, including the requirement to adopt a holistic approach to onshore and offshore network planning and impact mitigation. It states that the Secretary of State should bear in mind that the initiating and terminating points – or development – zone – of new electricity networks infrastructure is not substantially within the control of the applicant (subject to an exception).

Paragraph 2.2.2 states that siting is determined by the location of new generating stations or other infrastructure requiring connection to the network, and/or system capacity and resilience requirements determined by the National Electricity System Operator (NESO).

Paragraph 2.2.10 of EN-5 reiterates the duties under Section 9 of the Electricity Act 1989, both in relation to developing and maintaining an economical and efficient network, and, in formulating proposals for new electricity network infrastructure. It states applicants must take into account Schedule 9 to the Electricity Act 1989, which places a duty on all transmission and distribution licence holders, in formulating proposals for new electricity networks infrastructure, to "have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and ...do what [they] reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects."

Paragraph 2.10.1 states that the applicant should consider and address routing and avoidance/minimisation of environmental impacts both onshore and offshore at an early stage in the development process.

The Holford Rules and Horlock Rules

The Holford Rules and Horlock Rules form guidelines in relation to electricity infrastructure included in the existing (and draft) NPS EN-5. In decision-making this means that Secretary of State should be satisfied that a development, so far as is reasonably possible, complies with the Holford and Horlock Rules or any updates to them. Whilst both sets of rules are primarily aimed at transmission infrastructure, the general principles are relevant to options selection, routeing and siting for interconnectors.

Section 2.9 Landscape and Visual, paragraph 2.9.16 sets out that the Holford Rules are guidelines for the routeing of new OHLs and are intended as a common-sense approach to design. Paragraph 2.9.18-2.9.19 of NPS EN-5 sets out that the Horlock Rules are guidelines for the design and siting of substations, which were established by National Grid in 2009 in pursuance of its duties under Schedule 9 of the Electricity Act 1989.

These sets of rules form part of principles set out in Sections 2.8.5-2.8.7 of the NPS that direct applicants where at all possible to ensure that such requirements are embodied in the design of any proposed OHL route and its associated infrastructure.

UK Marine Policy Statement, 2011

The UK Marine Policy Statement underpins all Marine Plans and sets the decision making framework for all decisions that affect the marine environment. It states that:

> "As a general principle, development should aim to avoid harm to marine ecology, biodiversity and geological conservation interests (including geological and morphological features), including through location, mitigation and consideration of reasonable alternatives".

Local Development Plan

The options, siting and routeing work is located within the administrative boundary of East Suffolk Council, within the area that formerly comprised the Suffolk Coastal District (East Suffolk Council was formed following the merger of Suffolk Coastal and Waveney District Councils in 2019). The Development Plan for the Suffolk Coastal area of East Suffolk Council includes:

- East Suffolk Council - Suffolk Coastal Local Plan (2020)
- East Suffolk Council - Waveney Local Plan (March 2019)
- Suffolk County Council – Minerals and Waste Plan (July 2020)

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