Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Environmental Statement

Volume 1

Chapter 3 - Site Selection & Assessment of Alternatives

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Title**:**	
Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects Environmental Statement **Chapter 3: Site Selection and Assessment of Alternatives**	
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Glossary of Acronyms

AA	Appropriate Assessment
AfL	Agreement for Lease
AIS	Automatic Identification System
AoI	Areas of Interest
AONB	Area of Outstanding Natural Beauty
BEIS	Department for Business Energy and Industrial Strategy
BRAG	Black/Red/Amber/Green
CION	Connection and Infrastructure Options Note
CSCB	Cromer Shoal Chalk Beds
CSIMP	Cable Specification Installation and Monitoring Plan
CWS	County Wildlife Service
DAS	Design and Access Statement
DCO	Development Consent Order
DEP	Dudgeon Wind Farm Extension Project
EC	European Commission
EIA	Environmental Impact Assessment
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Topic Group
EU	European Union
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
IEMA	Institute of Environmental Management and Assessment
km	Kilometre
MCZ	Marine Conservation Zone
MEEB	Measures of Equivalent Environmental Benefit
MPA	Marine Protected Area
MW	Megawatts
NNDC	North Norfolk District Council
NNR	National Nature Reserve
NPPF	National Planning Policy Framework
NPS	National Policy Statement

NSIP	Nationally Significant Infrastructure Project
OSP	Offshore Substation Platform
OTNR	Offshore Transmission Network Review
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
RAF	Royal Airforce
RIAA	Report to Inform Appropriate Assessment
SAC	Special Area of Conservation
SEP	Sheringham Shoal Wind Farm Extension Project
SNS	Southern North Sea
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
TCE	The Crown Estate
TWT	The Wildlife Trust
UK	United Kingdom

Glossary of Terms

Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
DEP offshore site	The Dudgeon Offshore Wind Farm Extension consisting of the DEP wind farm site, interlink cable corridors and offshore export cable corridor (up to mean high water springs).
DEP onshore site	The Dudgeon Offshore Wind Farm Extension onshore area consisting of the DEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
DEP North array area	The wind farm site area of the DEP offshore site located to the north of the existing Dudgeon Offshore Wind Farm
DEP South array area	The wind farm site area of the DEP offshore site located to the south of the existing Dudgeon Offshore Wind Farm
DEP wind farm site	The offshore area of DEP within which wind turbines, infield cables and offshore substation platform/s will be located and the adjacent Offshore Temporary Works Area. This is also the collective term for the DEP North and South array areas.
European Site	Sites designated for nature conservation under the Habitats Directive and Birds Directive. This includes candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation and Special Protection Areas, and is defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the EIA and HRA for certain topics.
Expert Topic Group (ETG)	A forum for targeted engagement with regulators and interested stakeholders through the EPP.
Grid option	Mechanism by which SEP and DEP will connect to the existing electricity network. This may either be an integrated grid option providing transmission infrastructure which serves both of the wind farms, or a separated grid option, which allows SEP and DEP to transmit electricity entirely separately.
Horizontal directional drilling (HDD)	Trenchless technique used to install cables – in this case referring to the installation of the export cables at the landfall.

HDD zones	The areas within the onshore cable route which would house HDD entry or exit points.
Infield cables	Cables which link the wind turbine generators to the offshore substation platform(s).
Interlink cables	Cables linking two separate project areas. This can be cables linking: 1) DEP South array area and DEP North array area 2) DEP South array area and SEP 3) DEP North array area and SEP 1 is relevant if DEP is constructed in isolation or first in a phased development. 2 and 3 are relevant where both SEP and DEP are built.
Interlink cable corridor	This is the area which will contain the interlink cables between offshore substation platform/s and the adjacent Offshore Temporary Works Area.
Integrated Grid Option	Transmission infrastructure which serves both extension projects.
Jointing bays	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water.
Offshore cable corridors	This is the area which will contain the offshore export cables or interlink cables, including the adjacent Offshore Temporary Works Area.
Offshore export cable corridor	This is the area which will contain the offshore export cables between offshore substation platform/s and landfall, including the adjacent Offshore Temporary Works Area.
Offshore export cables	The cables which would bring electricity from the offshore substation platform(s) to the landfall. 220 – 230kV.
Offshore scoping area	An area presented at Scoping stage that encompassed all planned offshore infrastructure, including landfall options at both Weybourne and Bacton, allowing sufficient room for receptor identification and environmental surveys. This has been refined following further site selection and consultation for the PEIR and ES.

Offshore substation platform (OSP)	A fixed structure located within the wind farm site/s, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
Offshore Temporary Works Area	An Offshore Temporary Works Area within the offshore Order Limits in which vessels are permitted to carry out activities during construction, operation and decommissioning encompassing a 200m buffer around the wind farm sites and a 750m buffer around the offshore cable corridors. No permanent infrastructure would be installed within the Offshore Temporary Works Area.
Onshore cable corridor	The area between the landfall and the onshore substation sites, within which the onshore cable circuits will be installed along with other temporary works for construction.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substation. 220 – 230kV.
Onshore Substation	Compound containing electrical equipment to enable connection to the National Grid.
Order Limits	The area subject to the application for development consent, including all permanent and temporary works for SEP and DEP.
Preliminary Environmental Information Report (PEIR) boundary	The area subject to survey and preliminary impact assessment to inform the PEIR.
Separated Grid Option	Transmission infrastructure which allows each project to transmit electricity entirely separately.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
SEP offshore site	Sheringham Shoal Offshore Wind Farm Extension consisting of the SEP wind farm site and offshore export cable corridor (up to mean high water springs).
SEP onshore site	The Sheringham Shoal Wind Farm Extension onshore area consisting of the SEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
SEP wind farm site	The offshore area of SEP within which wind turbines, infield cables and offshore substation platform/s will be located and the adjacent Offshore Temporary Works Area.

Study area	Area where potential impacts from the project could occur, as defined for each individual Environmental Impact Assessment (EIA) topic.
The Applicant	Equinor New Energy Limited

3 SITE SELECTION AND ASSESSMENT OF ALTERNATIVES

3.1 Introduction

1. This chapter of the Environmental Statement (ES) describes the site selection process and the approach undertaken by the Applicant to define the Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and Dudgeon Offshore Wind Farm Extension Project (DEP).
2. The process includes consideration of both the offshore and onshore infrastructure, and the assessment of reasonable alternatives as the proposals for SEP and DEP have developed through the pre-application process. There is a requirement as part of the Environmental Impact Assessment (EIA) process to describe the reasonable alternatives considered during the evolution of the project (such as development design, technology, location, size, and scale) and to set out the main reasons for selecting the chosen option/s.
3. The chapter outlines the site selection process and consideration of alternatives for SEP and DEP, which has been undertaken with specific reference to the relevant legislation and guidance (see **Section 3.2**).

3.1.1 Integrated Approach to Development

4. The Applicant is seeking to coordinate the development of SEP and DEP as far as possible. The preferred option is a development scenario with an integrated transmission system[1], providing transmission infrastructure which serves both of the wind farms, where both Projects are built concurrently. The integrated grid option was a key consideration in the site selection process and could include the following:
   - one integrated onshore substation which serves both Projects; or
   - both an integrated onshore substation and an integrated offshore substation that serve both Projects.
5. As described in **Chapter 4 Project Description**, the strategic approach reflected by the integrated grid option particularly benefits the planning and construction of the electrical infrastructure system, is likely to reduce the overall environmental impact and disruption, and helps to respond to concerns regarding the lack of a holistic approach to offshore wind development in general.
6. As such, the site selection process, specifically the selection of the location of the offshore substation platform/s (OSP/s), offshore export cable corridor and all onshore infrastructure, has been driven by the consideration of co-locating infrastructure for both projects. By taking this approach the Applicant has demonstrably sought to reduce the overall levels of disruption during construction, thereby minimising the extent of potential environmental impacts.

[1] The DCO application will seek consent for alternative grid solutions in the same overall corridors to allow for both the integrated grid option and, in the case that SEP and DEP are constructed in a phased approach, a separated grid option (i.e. transmission infrastructure which allows each project to transmit electricity entirely separately).

3.2 Legislation, Policy and Guidance

7. The site selection process for offshore wind farms (OWFs) in the UK is governed by the existing legislative, policy and guidance framework for the development of electrical infrastructure and for environmental assessment within the UK (see **Chapter 2 Policy and Legislative Context** for more information). The key pieces of legislation, policy and best practice guidance which set the framework for site selection and the assessment of alternatives for OWFs in the UK, and upon which this methodology has been based, are summarised in **Table 3-1**.

1. The Planning Act 2008 makes provision for National Policy Statements (NPSs). NPSs are designed to set the policy framework for determination of nationally significant infrastructure project applications. The three which are relevant to SEP and DEP are:

- The Overarching NPS for Energy (NPS EN-1) (DECC, 2011a);
- The NPS for Renewable Energy Infrastructure (NPS EN-3) (DECC, 2011b), which covers nationally significant renewable energy infrastructure (including offshore generating stations in excess of 100 MW); and
- The NPS for Electricity Networks Infrastructure (NPS EN-5) (DECC, 2011c), which covers the electrical infrastructure associated with an Nationally Significant Infrastructure Project (NSIP).

8. It is noted that the NPS for Energy (EN-1), the NPS for Renewable Energy Infrastructure (EN-3) and the NPS for Electricity Networks Infrastructure (EN-5) are in the process of being revised. A draft version of each NPS was published for consultation in September 2021 (Department for Business Energy and Industrial Strategy (BEIS), (2021a), BEIS, (2021b) and BEIS (2021c), respectively). Although the new NPSs are in draft form they are considered to be important and relevant for the purpose of decision-making and as such a review of these draft versions has also been undertaken in the context of this ES chapter.

Table 3-1: Legislation, Policy and Guidance Relevant to the Site Selection and Assessment of Alternatives Process

Legislation, Policy & Guidance	Details
Legislation	
The Planning Act 2008	The Planning Act 2008 is the primary legislation that established the legal framework for applying for, examining and determining applications for Nationally Significant Infrastructure Projects (NSIPs) taking into account the guidance in the relevant NPS (see below).

Legislation, Policy & Guidance	Details
Infrastructure Planning (Environmental Impact Assessment Regulations 2017	The consideration of alternatives and major design decisions made during the development of a project has been part of EIA since the adoption of the European Union (EU) EIA Directive 85/337/EEC (as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC) (the EIA Directive) into UK law. The Infrastructure Planning (Environmental Impact Assessment)Regulations 2017 (the 2017 Regulations) require an ES to include *"a description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects".*
The Electricity Act 1989	Schedule 9 of The Electricity Act 1989 sets out the obligations for a generation installation to mitigate the effects on the environment, including "*shall have regard to…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*". In addition, Section 9 of the Act sets out the duties of an electricity distributor that are relevant to the site selection process, including that "*It shall be the duty of an electricity distributor to develop and maintain an efficient, co-ordinated and economical system of electricity distribution*".
National Policy	
Overarching NPS for Energy (EN-1) (DECC, 2011a)	The Overarching NPS for Energy (EN-1) is clear that although "*from a policy perspective this NPS EN-1 does not contain any general requirement to consider alternatives or to establish whether the proposed project represents the best option*" (para 4.4.1), in the execution of a competent EIA "*applicants are obliged to include in their ES, as a matter of fact, information about the main alternatives they have studied" (para 4.4.2).*
	Sympathetic siting of the proposal is also set out in para 4.5.2 *"Good design is also a means by which many policy objectives in the NPS can be met, for example the impact sections show how good design, in terms of siting and use of appropriate technologies can help mitigate adverse impacts such as noise". Also at para 4.5.3 "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, landform and vegetation."*
NPS for Renewable Energy (EN-3) (DECC, 2011b)	*Para* 2.4.2 "*Proposals for renewable energy infrastructure should demonstrate good design in respect of landscape and visual amenity, and in the design of the project to mitigate impacts such as noise and effects on ecology*".
NPS for Electricity Networks Infrastructure (EN-5) (DECC, 2011c)	*Para 2.2.3 "Applicants should bear in mind that the connection between the initiating and terminating points of a proposed new electricity line need not go via the most direct route. Indeed, engineering, environmental, and community constraints may make this infeasible or unsuitable.* *There will usually be a degree of flexibility in the location of the development's associated substations, and applicants should consider carefully their placement in the local landscape. In particular, the applicant should consider such characteristics as the local topography and/or the possibilities for screening of the infrastructure.* *As well as having duties under Section 9 of the Electricity Act 1989, (in relation to developing and maintaining an economical and efficient network),*

Legislation, Policy & Guidance	Details
	developers will be influenced by 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"
Marine Policy Statement (HM Government, 2011)	The Marine Policy Statement provides the policy framework for the preparation of marine plans and establishes how decisions affecting the marine area should be made in order to ensure the sustainable development of the UK marine area. The Marine Policy Statement sets out detailed policy considerations in relation to a range of impacts on the marine environment which should be taken into consideration from the start of any project.
The East Inshore and East Offshore Marine Plans (HM Government, 2014)	The objectives of the East Inshore and East Offshore Marine Plans and relevant policies established under them are key to decision making. Those that are of specific relevance to site selection decision making are: *Objective 5 "To conserve heritage assets, nationally protected landscapes and ensure that decisions consider the seascape of the local area." and Objective 7 is: "To protect, conserve and, where appropriate, recover biodiversity that is in or dependent upon the East marine plan areas."*
Guidance	
Planning Inspectorate Advice Note Seven: EIA	The Planning Inspectorate Advice Note Seven suggests the EIA needs to explain *"the reasonable alternatives considered and the reasons for the chosen option considering the effects of the Proposed Development on the environment"* (PINS, 2020).
EIA Guide to Shaping Quality Development (Institute of Environmental Management and Assessment (IEMA))	IEMA's EIA Guide to Shaping Quality Development states that considering the key environmental and consenting risks alongside the engineering requirements of a project can influence design in many ways. The earlier the interaction commences, the more likely it is that cost effective, positive outcomes will be achievable. This can be considered in several ways: The review of site selection of alternative development sites to avoid key sensitive receptors; Alternating the layout to work within a site's existing natural systems; Amending the design of a specific aspect of the development to manage impacts; Specifying construction techniques to avoid effects on receptors; and Changing materials to reduce volume and/or transport impacts.
The Horlock Rules	In order to identify the most appropriate location to site the onshore substation, National Grid's Guidelines on Substation Siting and Design ('The Horlock Rules') (National Grid Company (NGC), 2006) are considered. These guidelines document National Grid's best practice for the consideration of relevant constraints associated with the siting of onshore substations.

3.3 Site Selection Process and Consultation

9. The site selection and project design process is an iterative one, involving early engagement with stakeholders. The Applicant has undertaken pre-application engagement with stakeholders, communities and landowners to seek input to refine the SEP and DEP design, and to communicate key decisions made with regard to both design and location. Further details are provided in:

- **Chapter 4 Project Description** – an overview of the consultation undertaken in the context of project design decisions;
- **Chapter 5 EIA Methodology** – an overview of the consultation undertaken in the context of the wider EIA process; and
- The consultation section within **Chapters 6 to 29** of the ES, which summarise the consultation undertaken to inform and focus the approach to each technical aspect of the EIA. Specific details of how the project has taken account of the comments received are also provided in each chapter of the ES where relevant.
- **Consultation Report** (document reference 5.1) – providing details of all consultation undertaken in the development of SEP and DEP to date.
- **Design and Access Statement (DAS) (Onshore)** (document reference 9.3) – providing details of the design principles that have informed the onshore aspects of SEP and DEP.
- **Offshore Design Statement** (document reference 9.26) – providing details of the design principles that have informed the offshore aspects of SEP and DEP.
- **Project Vision** (document reference 9.27) - providing details of the design principles that have informed the onshore aspects of SEP and DEP.

10. The siting, design and refinement of SEP and DEP have taken account of physical constraints, and environmental, technical, commercial and social considerations . This is with the aim of identifying sites that will be environmentally acceptable, deliverable and able to achieve consent, whilst seeking to pass the lowest energy cost onto the consumer. A multi-disciplinary design team was formed to undertake the site selection process, which included a team of specialists comprising engineers, planners, land advisors, legal advisors and EIA consultants, whose expertise was drawn upon throughout. **Plate 3-1** provides a flow diagram of the main steps followed in the SEP and DEP offshore sites selection process.

11. Consultation on refinements to the SEP and DEP offshore sites selection, layout and configurations have been undertaken through the informal and formal pre-application stages. Feedback received has been taken into consideration throughout, via a range of means including (but not exclusively limited to):

- The Scoping Report (November 2019) sets out the development of the site selection and consideration of alternatives at the scoping stage (see Section 1.4 of the Scoping Report). Consultation feedback was provided by stakeholders through The Planning Inspectorate Scoping Opinion (The Planning Inspectorate, 2019);

- Public Information Day held at Aylsham Town Hall in October 2019;
- Phase 1 community consultation on site selection for the onshore substation and onshore cable corridor from 9th July to 20th August 2020, held online with statutory consultees and the public;
- Phase 2 community consultation and the publication of the Preliminary Environmental Information Report (PEIR) between 29th April and 10th June 2021, including on the Preliminary Environmental Information Report (PEIR) boundary and onshore substation site options;
- Public Information Days held at four locations in March 2022 in order to provide the opportunity for face-to-face engagement with the project team and community stakeholders.
- Parish Council briefings;
- Direct discussions with landowners, including:
    - The Applicant and the Applicant's land agents have met the potentially affected landowners and/or their land agents. Boundary proposals have been put forward by some of those potentially affected by the proposed onshore development area and the Applicant has been able to incorporate a number of those suggestions into the onshore elements of the Order Limits.
    - The Applicant has engaged with landowners regarding survey access through consultation meetings. Letters were sent to all affected parties offering to meet to discuss the SEP and DEP proposals.
- Dedicated project e-mail address and freepost address to assist local communities in contacting the Applicant; and
- Provision of a dedicated consultation website where interested members of the public are able to provide their comments via an interactive digital engagement platform.[2]

12. **Table 3-2** summarises the consultee responses received prior to publishing this ES, as relevant to site selection and assessment of alternatives.

13. The Applicant has also used an Evidence Plan Process (EPP) and has engaged through this process with a number of stakeholders on site selection matters. Several Expert Topic Groups (ETGs) have been established as part of the EPP to enable detailed discussions on particular EIA topics. Details of the technical consultations undertaken are presented in **Chapters 6 to 29** of the ES and the **Consultation Report** (document reference 5.2).

[2] [redacted]

Plate 3-1: Site Selection Process Overview

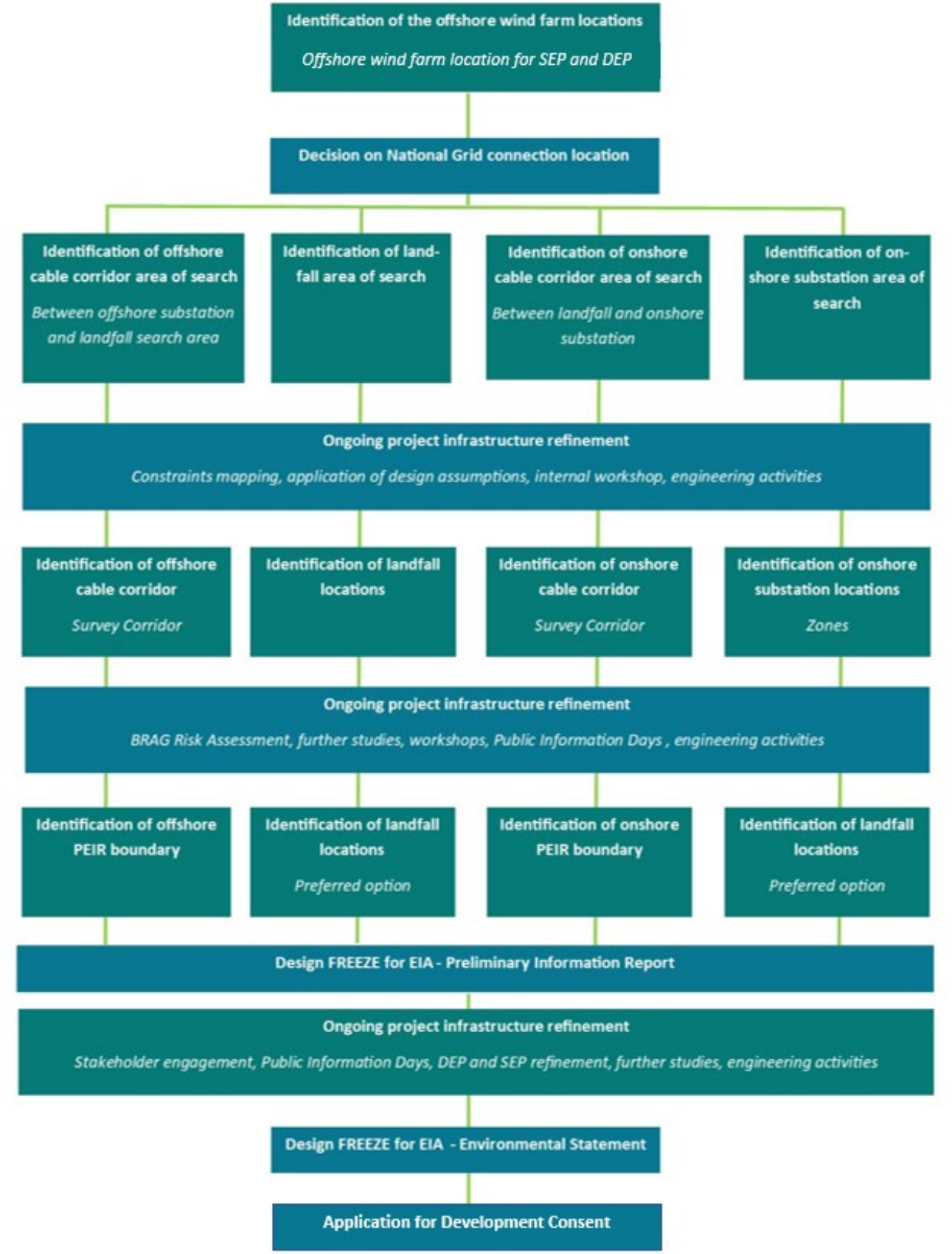

Table 3-2: Summary of Consultation Responses Regarding Site Selection and Assessment of Alternatives

Consultee	Date/ Document	Comment	Project Response
Scoping Responses			
The Planning Inspectorate	November 2019 Scoping Opinion	General The Scoping Report provides an overview on the main site selection activities undertaken to develop the scoping areas and a summary of the alternatives considered to date. References are made to environmental receptors which the Applicant has considered, although these are described at a very high level in relation to onshore site selection (section 1.4.4). The Inspectorate would expect to see a discrete section in the ES that provides details of the reasonable alternatives studied and the reasoning for the selection of the chosen option(s), including a comparison of the environmental effects.	Further detail on the site selection process as it has developed from scoping to PEIR and ES stages has been provided within this chapter. Project alternatives are discussed in **Section 3.4.**
		Landfall The Inspectorate notes that timely refinement of options will support a more robust assessment of likely significant effects and increase certainty for those likely to be affected.	The process undertaken to refine the landfall location is described in **Section 3.7** and resulted in the Weybourne West being taken forward and assessed as the preferred location from the PEIR stage.
		The ES should identify whether new routes, either temporary or permanent, are required to access the onshore cable corridor and/or the temporary compounds. The likely significant effects of all temporary and permanent accesses should be included in the assessment scope. The onshore substation may connect to the existing Norwich Main substation through either an overhead connection or an underground connection, depending on their proximity to one another. The Inspectorate expects the ES to provide greater	All access routes to the cable corridor (both temporary and permanent) and temporary compounds are presented and assessed within the ES. The SEP/DEP onshore substation will have an underground connection to the existing Norwich Main substation. See **Chapter 4 Project Description**.

Consultee	Date/ Document	Comment	Project Response
		clarity as to the necessary connection works in order to inform a meaningful assessment of likely significant effects.	
Baconsthorpe Parish Council	November 2019 Scoping Opinion	Baconsthorpe Parish Council stressed preference for a ring main option to onshore cables to be investigated.	In July 2022 SEP and DEP was officially designated as an Offshore Transmission Network Review (OTNR) 'Pathfinder' project, and as such the Applicant is committed to initiatives to encourage coordination in the sector. Pathfinder projects are those that are developing ways to further offshore wind coordination as part of the OTNR, working closely with BEIS and Ofgem to identify and overcome barriers to coordination. Following the Government initiative to see greater coordination in offshore wind, and reduce disruption to the local community, the Applicant reinforced the strategic decision to develop SEP and DEP together from an early stage of the projects. The strategy is to coordinate the two separately owned projects as far as possible, with the ambition to deliver the two projects with an integrated transmission system if possible. The Applicant's approach to coordination of SEP and DEP in this manner is also reflective of the existing regulatory regime for an offshore transmission network. Further details are provided in the **Scenarios Statement** (document reference 9.28).
Cawston Parish Council	November 2019 Scoping Opinion	Any application should include a full assessment of alternative methods of delivery onshore. In particular, an Offshore Ring Main would avoid the need for a series of cable corridors around Cawston.	
Marine Management Organisation	November 2019 Scoping Opinion	The Applicant has outlined their rationale for the landfall site selection, identifying the geographical exclusion of locations within the North Norfolk Coast Special Area of Conservation (SAC). Exclusion is on the basis that the SAC's condition status is Unfavourable. As such, the Applicant's two proposed landfall options pass through the Cromer Shoal Marine Conservation Zone (MCZ).	As described in **Section 3.7.3.1**, the Applicant was advised by Natural England to route the offshore export cable corridor to avoid The Wash and North Norfolk Coast SAC in order to avoid Annex I habitats within it. The unfavourable condition status of the SAC was a factor in avoiding the SAC, but not the only one. The chosen route presents the shortest cable corridor overall (and so minimises the footprint of cable installation) and has the additional and distinct advantage of being close

Consultee	Date/ Document	Comment	Project Response
		Whilst it is acknowledged that proposals passing through any Marine Protected Area (MPA) may be challenging, the MMO strongly recommends the Applicant investigate landfall options within the North Norfolk Coast SAC as an alternative route outside of Cromer Shoal Chalk Reef MCZ to a landfall site at Weybourne. The condition status of Unfavourable does not preclude cabling through the SAC as an option and could warrant further exploration. Detailed investigation would be required to assess the potential impacts specific to those protected features within the site in consideration of the conservation status of those specific features. This would offer a broader assessment of all landfall choices and support the Applicant's overall evidence base and conclusions for the final cable route selection.	and parallel to the existing Dudgeon Offshore Wind Farm (DOW) export cable corridor, for which Equinor has first-hand experience of undertaking successful cable burial works. The latter is considered in detail in the **Outline Cromer Shoal Chalk Beds (CSCB) Marine Conservation Zone (MCZ) Cable Specification Installation and Monitoring Plan (CSIMP)** (document reference 9.7).
Natural England	November 2019 Scoping Opinion	Natural England prefers the integrated approach to electrical infrastructure option to reduce the overall amount of infrastructure, in particular the impacts caused by two distinct cable routes.	Noted, the Applicant's preferred approach to the development is the integrated grid option, as described in **Chapter 4 Project Description**.
Natural England	November 2019 Scoping Opinion	Natural England would welcome further detail on how environmental constraints have be considered in the site selection process.	Details of how environmental constraints have influenced the site selection process are provided throughout this chapter.
Natural England	November 2019 Scoping Opinion	Natural England asks the Applicant to confirm that the removal of Race Bank Extension from the current leasing round will not open up the possibility that SEP might extend outside the scoping area as currently drawn (i.e. in the direction of the current Race Bank wind farm).	The Applicant can confirm that the boundaries of the proposed SEP wind farm site have not extended from those presented at the scoping stage.
Natural England	November 2019 Scoping Opinion	Natural England notes the decision to avoid routing potential cable corridors through the Wash and North Norfolk Coast SAC in light of its status being changed to unfavourable condition. However, the unfavourable condition of some site features doesn't preclude the cable from going through the SAC. But it does provide context in relation to any risk based judgements that may need to made in relation to the	Noted – the unfavourable condition status of the SAC was only one factor in the selection of the export cable corridor. This is discussed in **Section 3.7.4** below.

Consultee	Date/ Document	Comment	Project Response
		significance of any impacts and thus mitigation measures required.	
Natural England	November 2019 Scoping Opinion	The Greater Wash SPA does not yet have an updated Conservation Advice package. It is therefore possible that before the Applicant applies for consent, a "reduce" target might also be set for the disturbance/displacement attribute within the conservation objectives for the red-throated divers in the Greater Wash SPA.	Noted. The Applicant understands that the conservation advice for this site has not been updated. Potential impacts on red-throated divers are assessed in **Chapter 11 Offshore Ornithology** and the **Report to Inform Appropriate Assessment (RIAA)** (document reference 5.4).
Natural England	November 2019 Scoping Opinion	In seeking to minimise the potential impacts of the installation of the offshore export cables, the density maps of the bird features of the Greater Wash SPA should have been considered – in particular the density map for red-throated divers (Natural England & JNCC 2016). The shortest route, while minimising the footprint within the SPA does not necessarily minimise the potential impact to this feature. It is Natural England's advice that cable protection is a permanent/long lasting impact not just during the lifetime of the project	Densities of red-throated diver in this particular region of the Greater Wash Special Protection Area (SPA) are relatively low, with the highest densities in the SPA (>3 birds per km^2) being found further to the north and west (Lawson et al, 2016). The mean density across the entire SPA is 0.36 birds per km^2. Within the export cable corridor presented at PEIR plus a 2km buffer, the modelled density of red-throated diver within the area of the Greater Wash SPA is between 0.07 birds per km^2 and 0.51 birds per km^2, with an average of 0.24 birds per km^2. Therefore, it can be said that the siting of the export cable corridor minimises the impact on red-throated divers by avoiding areas of the highest density and below the mean density of the SPA.
Natural England	November 2019 Scoping Opinion	Natural England disagrees that the wind farm extensions will not give rise to significant impacts on sea bed features. This is particularly relevant to the Cromer Shoal Chalk Beds MCZ and installing cables through it. The geological features that exist in this area are unique and cannot be reformed once damaged, unlike a mobile sediment dominated area. However, the effect on coastal morphology and sediment transport itself will probably be minimal.	A **Stage 1 Cromer Shoal Chalk Beds (CSCB) Marine Conservation Zone Assessment (MCZA)** (document reference 5.6) has been submitted with the Development Consent Order (DCO) application. The assessment concludes that the conservation objectives of the MCZ will not be hindered. The outcropping chalk feature of the MCZ will be completely avoided through the use of HDD. Impacts on broadscale habitats have been reduced as far as possible, with a commitment to no more than 100m of external cable protection per

Consultee	Date/ Document	Comment	Project Response
			cable in the MCZ and the use of removable cable protection systems i.e. no loose rock.
Phase 1 Consultations			
Community feedback	July – September 2020	General SEP and DEP should consider an Offshore Ring Main concept is fully reviewed. Sheringham residents raise concern with regards to the additional turbines locations and their impact on seascape. Residents stressed that SEP and DEP should avoid built-up areas and access.	The Applicant's response concerning the Offshore Ring Main is provided above. The identification of the wind farm sites is set out in **Section 3.5**. A detailed assessment of the potential seascape impacts is provided in **Chapter 25 Seascape and Visual Impact Assessment**.
		Onshore Substation Residents raised concern that Substation Zone B is far too near Swardeston. Residents stated that onshore substation must be located inland and not located on the coast. Residents stressed that substation site should be close to A140. Substation site selection should consider: Wildlife, building of houses in Colton, A47 dualling. Substation site selection should consider: Road traffic must be considered and access, Cawston is not suitable for HGV. Substation site selection should consider: Aquafers supplying local properties (many have well water supplies in the area), existing small rivers. Substation site selection should consider: Effects on land drainage. Damage to soil structure and fertility.	The proposed location for the onshore substation is within Zone B, but at the furthest point within Zone B from Swardeston – which is approximately 1.5km to the west of the proposed substation location. A key principle was to locate the substation as far as possible from the nearest residential areas. **Section 3.9** contains a summary of the onshore substation site selection process and full details can be found in **Appendix 3.1**.

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		Substation site selection should consider: Measured electromagnetic fields such as those produced by substations have been associated with health effects such as cancer, depression, dementia, infertility, miscarriage, heart problems, etc.	
Oulton Parish Council		**Oulton Parish Council** SEP and DEP should consider an Offshore Ring Main concept is fully reviewed. The possibility of Oulton hosting yet another project's compound and storage areas, as well as a further cable route, would be completely unacceptable to this community. Oulton Parish Council stated that the only cable route acceptable to this community would be an onshore cable trench shared with that of Hornsea Project Three.	The Applicant's response concerning the Offshore Ring Main is provided above. The main construction compound option at Royal Airforce (RAF) Oulton was discounted by the Applicant primarily due to access issues and the potential for cumulative impacts with other developments'. The preferred option is located on the A1067 (Fakenham Road) near Attlebridge.
Section 42 Responses			
Norfolk Coast Partnership	June 2021 PEIR comments	Onshore construction compounds Woodforde Farm is unsuitable - too far from route and substandard access.	Woodforde Farm has not been taken forward as the main construction compound location. **Section 3.9.4** contains a summary of the main compound site selection process. Full details of the main compound site selection process can be found in **Appendix 3.3**.
Cadent Gas Limited	June 2021 PEIR comments	Please note the presence of a high pressure gas pipeline in close proximity to the proposed development. The pipeline has a 3m building proximity distance (BPD). No buildings including footings and overhangs are permitted within 3m of the pipeline. Landscaping 3m either side of the pipeline is also restricted and must have formal written approval from Cadent Gas before commencing. The developer is to engage with plantprotection@cadentgas.com before commencing any works on site. The high pressure pipeline is classed as a 'Major Accident	The Applicant is committed to ongoing engagement with Cadent and has included Protective Provisions within Development Consent Order in order to protect Cadent's apparatus.

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		Hazard High Pressure Pipeline' therefore the application will need to be put through the HSE LUP process to confirm if the proposal is acceptable. lease note there are intermediate pressure gas pipelines in close proximity to the development. No buildings are permitted to be sited within 3m of the pipeline. This includes footings and building overhangs. The developer is to contact Cadent Gas to ensure all setting out on site will conform to this requirement. Trial holes will be required to confirm the location of the pipeline. These are to be carried out by the developer with Cadent Gas in attendance to monitor the works.	
National Grid	June 2021 PEIR comments	Access Route to Proposed Substation NGET object to the proposal to access the proposed onshore substation through the NGET Norwich Main Substation. Our objection to the proposal to use the substation access for construction and post construction access is as follows: Impacts on existing operational site traffic, access, and safety requirements of the substation and other occupiers of the land; Impacts on other NGET committed and programmed works including but not limited to essential substation upgrade and maintenance works, substation extension works and essential outage and maintenance works required for the transmission network; Impacts on the local road network and accessibility to the Norwich Main substation from the wider highway network which is required 24/7.	The Applicant has continued to engage with National Grid on the use of the existing National Grid access. In order to address National Grid's concerns, additional means of access to the onshore substation have been included for within the Order Limits to the north and west of Norwich Main substation. Other measures such as improvements to the existing access and vehicle holding areas have also been proposed. The SEP/DEP operational access is proposed to be via the existing National Grid access. However, SEP/DEP operational traffic would only be required for planned maintenance – equivalent to one light goods vehicle visiting the site per week.
North Norfolk District Council (NNDC)	June 2021 PEIR comments	Many of the choices and influences in relation to site selection are beyond the immediate control or influence of NNDC. The grid connection offer and selected landfall location are ultimately determinative in how the project evolves. NNDC can understand why Weybourne was chosen	Noted.

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		as preferred landfall destination ahead of Bacton given the technical complexities of landfall location near to the Bacton Gas Terminal.	
NNDC	June 2021 PEIR comments	NNDC recognise that the final cable route within the identified route corridor area will be refined further as the project moves towards DCO consent stage. There will be an expectation from NNDC that the route is refined and options chosen (e.g. avoiding removal of important trees and hedgerows and other interest features) and use of HDD under features where no other satisfactory re-routing alternative is available. This is important so as to minimise the impact of the project both during the construction phase and also in terms of the longer term impacts associated with constraints above laid cables.	Throughout the site selection process and associated consultation, the onshore cable corridor presented at the PEIR stage has been refined to a width of 60m for the DCO application, increasing to a width of 100m for trenchless crossing zones, such as main rivers and A roads. The Applicant has committed to at least 62 trenchless crossings across the entire route, which have been included to avoid numerous features including main rivers and ecologically sensitive hedgerows with trees. Important trees and hedgerows are detailed in the **Arboriculture and Hedgerow Assessment** (document reference 6.3.20.15).
Oulton Parish Council	June 2021 PEIR comments	Oulton Parish Council have in the past voiced concerns that the continuing use of RAF Oulton and the ever-increasing length of temporary uses for industrial purposes, may well leave the community with a legacy issue.	The main construction compound option at RAF Oulton was discounted by the Applicant between the PEIR and final ES stage, primarily due to access issues and the potential for cumulative impacts with other developments'. The preferred option is located on the A1067 (Fakenham Road) near Attlebridge.
Swainsthorpe Parish Council	June 2021 PEIR comments	We would hope that onshore substation be situated as close to the existing substation as possible and that current access to the substation acts for both facilities. This will avoid weak bridges and take advantage of existing screening.	Site 1 has been selected as the preferred location of the onshore substation. This site was selected due to its close proximity to the Norwich Main Substation. During construction the preferred onshore substation access will be via the existing National Grid access to Norwich Main Substation. Additional access routes are proposed for the construction phase only. These are described within **Chapter 4 Project Description**.

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			The operational access is proposed to be via the existing National Grid access.
Swainsthorpe Parish Council	June 2021 PEIR comments	Whilst we would advocate for the substation to be built immediately adjacent to existing sub station further north, dramatically minimising the environmental impact, if it were necessary to choose between the two sites proffered we would hope the one with the least negative impact upon the landscape and environment be pursued. Despite being on higher ground site 2 to the west appears to be closer to existing electrical infrastructure and hence appears to be the obvious choice.	Site 1 has been selected as the preferred location of the onshore substation. This site was selected due to its close proximity to the Norwich Main Substation and the naturally low lying ground reducing potential visibility. A key consideration was also the increased archaeological significance of the area proposed for Site 2. **Section 3.10** contains a summary of the onshore substation site selection process and full details can be found in **Appendix 3.1**.
Swardeston Parish Council	June 2021 PEIR comments	Onshore Substation Site 2 would have a significantly greater impact as regards noise and disruption to local residents and users of recreational paths during substation construction, which could extend to anything from 4 to 7 years. Once complete, a substation at Site 2 would have a significantly greater visual impact on local residents and those using the nearby footpaths and bridle roads for the next 35+ years. Site 2 has been noted as containing a number of valuable heritage assets which would inevitably be impacted or lost as a consequence of construction at that location.	Site 1 has been selected as the preferred location of the onshore substation. This site was selected due to its close proximity to the Norwich Main Substation and the naturally low lying ground reducing potential visibility. A key consideration was also the increased archaeological significance of the area proposed for Site 2. **Section 3.10** contains a summary of the onshore substation site selection process and full details can be found in **Appendix 3.1**.
The Wildlife Trust and Norfolk Wildlife Trust	June 2021 PEIR comments	Chapter 4: Site Selection & Assessment of Alternatives Table 4-1 It would be helpful for the project to also consider statements made by BEIS in the recently published Energy White Paper (December 2020).	**Table 3-1** has been updated to show how consideration has been given to the BEIS Energy White Paper (BEIS, 2020), both in relation to offshore wind capacity targets and UK Government commitments to protecting the environment.
The Wildlife Trust and Norfolk Wildlife Trust	June 2021 PEIR comments	Chapter 4: Site selection & Assessment of Alternatives Paragraph 16 TWT are broadly supportive of coordination of cabling to reduce environmental impacts. We would like further information on how using an integrated approach to electrical infrastructure will reduce the amount of infrastructure needed in the onshore and offshore environments, with comparisons	**Chapter 4 Project Description** describes the differences between construction scenarios. Additionally, within each technical ES chapter, the worst-case scenario for each impact is presented and an assessment undertaken for each construction scenario.

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		of onshore and offshore footprints through the use of integrated vs. separated grid options.	Specifically, an integrated grid option would: Favour a concurrent build, which would reduce the duration of construction and overall levels of environmental impact and disruption. Reduce the total number of OSPs from two to one.
Natural England	June 2021 PEIR comments	Volume 1 Chapter 4 Site Selection and Assessment of Alternatives Table 4.2 Scoping Opinion, Natural England, Comment 3rd Bullet Point – Note NE asked for confirmation that the removal of Race Bank Extension from the current leasing round will not open up possibility that SEP might extend outside the scoping area as currently drawn (i.e. in the direction of the current Race Bank wind farm). 6th Bullet Point – density maps of the bird features in the GWSPA should have been considered in particular the density map for RTD. The shortest ECR does not necessarily minimise the potential impact of the project, even if it does minimise the footprint within the SPA. Recommendations Further clarity should be provided on these matters within the Environmental Statement (ES).	As noted under the scoping comments, the Applicant confirms that the boundaries of the proposed SEP wind farm site have not extended from those presented at the scoping stage. Densities of red-throated diver in this particular region of the Greater Wash SPA are relatively low, with the highest densities in the SPA (>3 birds per km^2) being found further to the north and west (Lawson et al, 2016). The mean density across the entire SPA is 0.36 birds per km^2. Within the export cable corridor presented at PEIR plus a 2km buffer, the modelled density of red-throated diver within the area of the Greater Wash SPA is between 0.07 birds per km^2 and 0.51 birds per km^2, with an average of 0.24 birds per km^2. Therefore, it can be said that the siting of the export cable corridor minimises the impact on red-throated divers by avoiding areas of the highest density and below the mean density of the SPA.
Natural England	June 2021 PEIR comments	Volume 1 Chapter 4 Site Selection and Assessment of Alternatives Section: 16, Bullet Point 2 Comment Key project design decisions that have been made:	As described in **Section 3.7.3.1**, the Applicant was advised by Natural England to route the offshore export cable corridor to avoid The Wash and North Norfolk Coast SAC in order to avoid Annex I habitats within it. The unfavourable condition status of the SAC was a factor in avoiding the SAC, but not the only one. The chosen route presents the shortest cable corridor overall (and so minimises the footprint of cable installation) and has the additional and distinct advantage of being close and parallel to the existing DOW export cable corridor,

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		Selection of the landfall at Weybourne with an ECC through the western portion the MCZ. Recommendations The Applicant needs to expand with details of whether the option for exploring the export cable route through the SAC was revisited.	for which Equinor has first-hand experience of undertaking successful cable burial works. The latter is considered in detail in the **Outline CSCB MCZ CSIMP** (document reference 9.7).
Natural England	June 2021 PEIR comments	Volume 1 Chapter 4 Site Selection and Assessment of Alternatives Section: 16. Bullet Points 3 & 4 Comment Key project design decisions that have been made: · ≤100m external cable protection per export cable in the MCZ. Recommendations Further to our response to the MEEB proposals (20 April 2021), neither Dudgeon nor Sheringham Shoal OWFs required cable protection. Therefore, we would encourage the development of design and installation measures that will increase the likelihood of successful burial. The aim should be to develop a project with sufficient confidence that the cables can be buried, and thus remove the need for cable protection. Otherwise the project design should only consider cable protection options that are mostly likely to be successfully decommissioned i.e. not rock armouring	The Applicant has reduced the worst-case external cable protection requirements within the MCZ as far as possible (100m per cable) and has used available information from the existing DOW and Sheringham Shoal Offshore Wind Farm (SOW) to achieve this. Furthermore, the Applicant has undertaken further geotechnical survey in 2021 to help inform the cable burial proposals, as reflected in the **Outline CSCB MCZ CSIMP** (document reference 9.7). The Applicant has also committed to using external cable protection systems in the MCZ that are removable on decommissioning (further details in the **Outline CSCB MCZ CSIMP**) (document reference 9.7).
Natural England	June 2021 PEIR comments	Volume 1 Chapter 4 Site Selection and Assessment of Alternatives Section: 17 / Table 4-3 Comment Natural England re-iterate their preference for integrated	As described in **Chapter 4 Project Description** a sequential approach with pre-investment (where either SEP is constructed first and installs the ducts for DEP, or DEP is constructed first and installs the ducts for SEP) is provisioned for within the **Draft DCO** (document reference 3.1)

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		construction options which significantly reduce ecological impacts for these projects. Recommendations Consideration should be given to installing infrastructure in both projects at the same time e.g. ducts	This option would result in an overall shorter construction duration than the sequential scenario, and would result in lower overall peaks during construction than the concurrent scenario. As it does not reflect the maximum peak effects or maximum duration of effects it has not been assessed as a specific scenario but is covered by the envelope of parameters considered.
Natural England	June 2021 PEIR comments	Volume 1 Chapter 4 Site Selection and Assessment of Alternatives Section: 4.8.2 Comment The Weybourne ECR north of the Cromer MCZ is approximately 500m wide, widening to approximately 1km wide upon entering the Cromer MCZ, and widens again towards the landfall area. Similar for the Bacton option. Recommendations Natural England advises that every effort should be made to minimise the area of impact within the Cromer Shoal Chalk Beds (CSCB) MCZ.	Noted. Please refer to responses provided above.
Natural England	June 2021 PEIR comments	Volume 1 Chapter 4 Site Selection and Assessment of Alternatives Section: 4.8.3.1 Comment Would an ECR passing through The Wash and North Norfolk Coast SAC have a greater detrimental effect than through the Cromer MCZ, or vice versa? Recommendations Please provide further analysis of this matter.	The impact pathways would be the same regardless of whether the export cable corridor passes through the MCZ or SAC and therefore this question depends on how the value of the qualifying features compares between the two sites. The Applicant considers the value of the same habitats to be equal across both the MCZ and the SAC and **Chapter 8 Benthic Ecology** has been updated to make this clear. However, as already stated, the unfavourable condition of the SAC was one factor considered at the time that the decision was made to route the export cable corridor through the MCZ. Other key factors include that this

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			presents the shortest and most direct route to landfall (reducing the overall level of disturbance) and has the additional and distinct advantage of being close and parallel to the existing DOW export cable corridor, for which Equinor has first-hand experience of undertaking successful cable burial works. This increases the confidence in the SEP and DEP cable installation and burial works being undertaken successfully.
Natural England	June 2021 PEIR comments	Volume 1 Chapter 4 Site Selection and Assessment of Alternatives Section: 4.8.3.1 Comment Sheringham Shoal post-construction surveys 'showed likely recovery within two years in most areas (Fugro, 2013). By August 2020, epifaunal community structure along the export cable corridor had recovered such that it was not significantly different to unimpacted areas.' Recommendations The 2020 Sheringham Shoal post- construction survey relied purely on photographical surveys of the ECR trench. This provided only close-up imagery of the epifaunal communities, which is not sufficient to fully assess changes in species abundance/distribution, habitat form/function and sediment composition along the ECR between sampling periods. The 2020 Sheringham Shoal post-construction benthic survey should, therefore, have also included the most recent geophysical and bathymetric surveys for comparative purposes to provide information on these issues i.e. whilst the cable trench may have infilled, there still remains a depression in the impacted areas compared to the unimpacted areas. Furthermore, seabed sediment thickness cannot be gauged through underwater imagery alone, as was	The Applicant understands that the most recent geophysical and bathymetric surveys have been provided to Natural England for comparative purposes. Text has been added to **Section 3.7.3.1** to make it clear that the 2020 Sheringham Shoal post-construction survey was undertaken using video transects. The potential limitations of the survey are noted in the survey report. The methodology was agreed with Natural England prior to the survey and was aimed at demonstrating whether there were any differences in epifaunal communities between impacted and unimpacted areas. The survey did not aim to provide information on whether the impacted areas (visible from the geophysical data as trenches on the sea bed) had recovered in terms of their physical form, as the existence of the trenches had already been identified from the geophysical data, and was used to inform the locations of the video transects. The Applicant understands that the geophysical surveys at Sheringham Shoal are ongoing and will provide further information on the physical recovery of the impacted areas of sea bed, as may be required. The Applicant considers that the results of the video transect surveys, which confirmed no significant differences in epifaunal communities between impacted

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		the case in the 2020 post-construction benthic survey. This would again have required accompanying geophysical/bathymetric survey data for validation and to calculate changes in sediment layer thickness. Moreover, the recent sedimentary processes study in the CSCB MCZ (April 2020), concluded that where the coarse lag is present along the Sheringham Shoal ECR, the trenches in which the ECs sit are visible on the post-construction seabed. This implies that the coarse lag is not mobile and sediment transport processes are insufficient to infill the trenches at these sites. Conversely, it is at the mobile seabed sites along the ECR (comprising Holocene sand areas or across Pollard Bank), where the trenches have infilled with sediment and the original trenches are no longer visible. Therefore, the statement made in Point 46 is an incomplete one and is thus is not considered sufficient to draw robust conclusions from.	and unimpacted areas, are highly relevant in terms of understanding the ecological implications of sea bed impacts from cable installation in the Cromer Shoal Chalk Beds MCZ.
Natural England	June 2021 PEIR comments	Volume 1 Chapter 4 Site Selection and Assessment of Alternatives Section: 4.8.3.1 Comment 'the Applicant has also committed to a long HDD at the landfall, which at Weybourne completely avoids the subtidal outcropping chalk MCZ feature, this is in a proven location for works of this nature on account of the successful HDD works already carried out for both Dudgeon and Sheringham Shoal OWFs.' Recommendations What does this mean, 'in a proven location for works of this nature'? Without the relevant surveys/assessments, we cannot assume that the HDD works at one location will be the same as those carried previously for Dudgeon and Sheringham Shoal OWFs.	**Section 3.7.3.1** has been amended to address this comment.

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Natural England	June 2021 PEIR comments	Volume 1 Chapter 4 Site Selection and Assessment of Alternatives Section: 4.8.3.1 Comment 'Ground investigation data including a geophysical seismic survey and boreholes carried out for Dudgeon OWF' Recommendations Should these data be referenced? If these data are the ones discussed in Appendix 4.2, then reference should also be made to this document.	A reference to these data as described in **Section 2.6** of **Appendix 3.2** has been added.
Natural England	June 2021 PEIR comments	Volume 1 Chapter 4 Site Selection and Assessment of Alternatives Section: 4.9.2 Comment "A number of challenging sections currently include....more detailed engineering feasibility work is undertaken . These areas include: · The landfall location at Weybourne; · Weybourne woods; and · North of Cawston" Please expand to explain why Weybourne Woods and the area North of Cawston is more challenging.	**Section 3.9.2** has been expanded to include further information on these areas.
Natural England	June 2021 PEIR comments	Appendix 4.2 Section: 6.1 Comment Weybourne West – if the offshore cable laying vessel cannot	It is anticipated that during the procurement process, the Applicant would ensure that the contractor's cable laying vessel was able to operate in water depths of 9m at the HDD exit location. However, in the unlikely event that the selected contractor's cable laying vessel was not able to operate in those depths, small changes in the

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		operate in the depths of water stated, then the profiles may need to be revised to suit the vessel draft. Recommendation Would this therefore be reflected in the Rochdale Envelope, and what could this mean in terms of impacts to the seabed? Please clarify.	profiles may be required. For example, the length of the HDD (currently assumed to be approximately 1,000m offshore, see **Chapter 8 Benthic Ecology**) could be increased but this would not have an influence on the Rochdale Envelope since HDD length is not a material factor in any of the impacts assessed. Additionally, the worst-case assumptions for length of export cable permits flexibility in the final location of the HDD exit pit (**Chapter 8 Benthic Ecology**).
Natural England	June 2021 PEIR comments	Appendix 4.2 Section: 11.2 Comment Seabed Works - Cable Duct Installation & Preparation Measures: Once the transition profile has been excavated then temporary protection would be needed to push the duct down onto the seabed and protect it. The level of protection required will need to be determined during detailed design. Recommendation The duration and size of the footprint/impacted area of seabed needs to be considered.	Noted.
Natural England	June 2021 PEIR comments	Appendix 4.2 Section: 12.1 Comment The available ground conditions appear suitable for the application of HDD however; further scheme specific ground investigation will be required to confirm the ground conditions and the feasibility of the proposed HDD profiles. The HDD profile should be re-assessed once further ground investigation has been completed and the results reported.	As described in the **Outline CSCB MCZ CSIMP** (document reference 9.7), in Q4 2021, the Applicant undertook a geotechnical survey (cone penetrometer testing and vibrocores), including within the export cable corridor as it passes through the MCZ. A survey of this type would usually be undertaken post-consent nearer to the point of construction but has been brought forward in this case in order to provide further information to inform the cable burial studies and the associated environmental considerations. Interpretation of the geotechnical survey results is ongoing. Details of the finalised export cable corridor and any necessary

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		Recommendation There is a risk that the ground conditions are not fully understood at this early stage. This matter will need to be revisited in later submissions.	micro-siting within the CSCB MCZ will be provided in the final CSIMP, informed by the pre-construction surveys described above, including the 2021 geotechnical investigations. Information describing the potential for micro-siting of the export cables is provided in the ICBS (**Appendix 1**).

14. Key project design decisions that have been made by the Applicant as a result of the consultation process and feedback received include:

- The intention to develop SEP and DEP as an integrated project with an integrated grid option providing transmission infrastructure which serves both of the wind farms. This benefits the planning and construction of the electrical infrastructure system, is likely to reduce overall levels of environmental impact and disruption, and helps to respond to any concerns regarding the lack of a holistic approach to offshore wind development.
- Selection of the landfall at Weybourne with an export cable corridor through the western portion of the Marine Conservation Zone (MCZ). This avoids The Wash and North Norfolk Coast Special Area of Conservation (SAC) (as advised by Natural England, see **Section 3.7.3.1**) and reduces the overall length of the export cable corridor.
- Commitment to no more than 100m of external cable protection per export cable in the MCZ, in relation to unburied cables. This reduces the extent of any longer term impacts on the MCZ.
- Commitment to not using loose rock type external cable protection systems in the MCZ. This facilitates the possibility of removal on decommissioning.
- Use of long horizontal directional drilling (HDD) at the landfall in order to avoid works such as trenching on the beach and cliffs and the complete avoidance of the sensitive outcropping chalk feature in the nearshore portion of the MCZ.
- The siting of the new onshore substation in proximity to the existing Norwich Main substation to minimise the proliferation of industrial infrastructure within the landscape.
- Commitment to trenchless techniques such as HDD to avoid direct interaction with all Main Rivers and to the reduce the requirement for road closures.
- Commitment to reduce the onshore working width when crossing sensitive features such as hedgerows and watercourses, to the haul road and cable trenching areas only (approximately 20m).

3.4 Project Alternatives

15. A number of strategic-level project design alternatives have been considered as part of the site selection and project design decision-making process. This strategic consideration of alternatives, which fed directly into the SEP and DEP offshore sites selection process, is detailed in **Table 3-3**.

Table 3-3: Strategic-Level Project Design Alternatives Considered

Alternatives considered	Decision	Main Environmental Benefits
• Integrated grid option; or • Separated grid option.	The Applicant will seek to develop SEP and DEP as an integrated project, but with both options included in the application to allow for	The integrated grid option would:

Alternatives considered	Decision	Main Environmental Benefits
	development in a phased approach, if necessary	• Deliver benefits to the planning and construction of the electrical infrastructure system as a result of the co-location of infrastructure. • Be likely to reduce the overall environmental impact and disruption.
• A single application for development consent for SEP and DEP; or • Separate consent applications.	A single development consent application to address both wind farms and the associated transmission infrastructure	Consistency in the approach to the environmental assessment, consultation and examination; reduced burden on stakeholders as only one application will be consulted on and subject to examination; and increased transparency for a potential compulsory acquisition process.
• Overhead lines along the ~60km route from landfall to grid connection location; or • Buried onshore cables within ducts along the ~60km route from landfall to grid connection location.	Buried onshore cables within ducts	The environmental benefit of burying cables as opposed to overhead lines and pylons is a significant reduction of permanent visual impacts.
Cable installation at the landfall: • Long HDD exiting in the subtidal; • Short HDD exiting in the intertidal; or • Open trench cut with cofferdam/s.	Long HDD exiting in the subtidal	The environmental benefit of long HDD at the landfall removes any possible interaction with the Weybourne Cliffs Site of Special Scientific Interest (SSSI), avoids any impact on the outcropping chalk feature of the Cromer Shoal Chalk Beds MCZ (the HDD exit pits will be seaward of this feature) and reduces potential risks associated with coastal cliff erosion.

3.5 Identification of the Offshore Wind Farm Location

16. The Applicant operates and part owns the existing SOW and DOW, located off the North Norfolk coast in the Southern North Sea (SNS) (**Figure 3.1**). These wind farms were developed under The Crown Estate's (TCE) Round 2 of UK offshore wind development and are both fully operational.

17. In February 2017, TCE issued a notice that it would accept applications for extensions to OWFs, with a deadline for submission of applications by the end of May 2018.

18. The Applicant submitted Agreement for Lease (AfL) applications to extend SOW and DOW. The AfL applications identified Areas of Interest (AoI) for each of the proposed OWFs. Subsequently, TCE undertook a plan level Habitats Regulations Assessment (HRA) of all the OWF extension applications received, which was completed in August 2019 (TCE, 2019). The Offshore Wind Extensions Plan HRA Report to Inform an Appropriate Assessment (RIAA) and the Appropriate Assessment (AA) completed by TCE ascertained that the plan including SEP and DEP, would not have an adverse effect on the integrity of any European Site, either alone or in combination with other plans or projects. SEP and DEP were awarded sea bed rights by TCE in August 2019 to progress the wind farm extensions and seek planning consent.

19. Key TCE criteria that influenced the site selection process included that wind farm extensions must share a boundary with the existing (parent) wind farm; and that other than the existing wind farm, the proposed extension/s must not encroach within a radius of 5km of any other wind farm (unless the tenant of any such wind farm had confirmed its agreement otherwise). The latter consideration limited the proposed boundary of the SEP wind farm site to the west due to an application to extend the Race Bank OWF from its eastern boundary. In addition, the TCE application criteria required that the proposed wind farm to be extended must be constructed and fully operational at the date of the application and the capacity in megawatts of the proposed extension must not exceed that of the existing wind farm. Equinor also took into account the requirement for the size of the proposed extension to be of an appropriate scale to the existing site, and to only apply for an area that was necessary and proportional to the installed capacity, taking account of necessary flexibility.

20. Equinor developed and applied the overarching site selection criteria outlined below:

- No nearer than 5km from the proposed Race Bank OWF extension;
- Avoid areas that are not feasible in terms of geology and bathymetry;
- Minimise cable and pipeline crossings;
- Distance to shore (no closer inshore than the existing SOW to limit potential landscape impacts);
- Water depths greater than 10m;
- Avoiding existing shipping lanes and areas of high shipping density;
- Maximise the benefits of the prevailing wind direction;
- Minimise wake effects on operational wind farms;
- Avoid wind farm area in marine nature conservation designations;
- Minimise the disruption to existing infrastructure and other marine users;
- Shortest and most direct route for the export cables to reduce environmental impacts, transmission losses and costs by minimising footprint for both the offshore and onshore cable corridors;
- Routeing options need to be able to connect to viable landfall locations; and

- Avoidance of key sensitive features where possible and where not possible, to minimise and mitigate impacts as appropriate.

21. The following sections describe how the site selection criteria were applied throughout the process.

3.5.1 Dudgeon Extension Areas of Interest Selection

22. At the AfL stage, applications were made for two distinct wind farm sites for DEP to provide the necessary flexibility and a sufficiently large area to achieve the required generating capacity. The AfL areas therefore comprise DEP North, an extension to the northwest and DEP South, an extension to the southeast (**Figure 3.1**).

23. Further to the TCE criteria outlined above, the key factors in the selection of the DEP North boundaries were:

- The northern boundary is defined by gas pipeline PL27 running between the Viking gas field in the east and the Theddlethorpe Gas Terminal on the Lincolnshire coast to the west, and diverts to avoid the Perenco-operated Waveney gas platform and its 500m safety zone.
- The eastern boundary is defined by the Esmond to Bacton gas pipeline running between the Esmond gas field in the north and the Bacton Gas Terminal to the south on the Norfolk coast.
- The western boundary is defined by a shipping lane between the existing SOW and DOW as indicated by Automatic Identification System (AIS) data from 2016 and 2017 (further details in **Chapter 13 Shipping and Navigation**).
- A gap was left between DEP North and the existing DOW northern boundary to avoid potential conflict with a planned oil and gas development by Independent Oil and Gas Plc. Approvals are in place for installation and operation of a normally unmanned production platform, Blythe, and an additional subsea well, Elgood, to be tied back to Blythe. Elgood and Blythe would be located adjacent to the north eastern and eastern boundaries respectively of the DOW, connected by a production pipeline around the DOW boundary.
- A shallow area (part of Cromer Knoll sandbank) to the north west of the existing DOW was excluded from the DEP North boundary for technical reasons due to the shallow water depth and bathymetry, which were considered unsuitable for foundation and cable installation. In addition, Natural England advised (during a meeting held 29th January 2018) that this shallow area was believed to be important for feeding birds and that it would therefore be of benefit to exclude the area from development. Following the bathymetry analysis, engineering review and the advice from Natural England, this area was removed from the southern boundary of DEP North.

24. Key factors in the selection of the DEP South boundaries were:

- The shipping lane between the existing SOW and DOW, limiting extension to the south and west.

- Although it was considered preferable to avoid the Esmond to Bacton gas pipeline, it traverses the DEP South wind farm site. Detailed design and layout of turbines will avoid the pipeline and infield cables will be arranged to minimise the number of pipeline crossings.

3.5.2 Sheringham Shoal Extension Area of Interest Selection

25. The key factors in the selection of the SEP boundaries were:

- Following submission of the application for AfL to TCE, the Applicant was informed of an application to extend the Race Bank OWF from its eastern boundary. Therefore, principles for the distance between the extensions were agreed with the Race Bank OWF developer (Ørsted) and TCE allowed the Applicant to redefine the extension boundary. The proposed western extension of Sheringham Shoal was limited in order to leave a 5km buffer from the proposed Race Bank OWF extension AoI in accordance with TCE's constraints criteria.
- The existing SOW is located 17km north of the seaside town of Sheringham at its nearest point to the shore. Zones of Visual Influence generated for the existing wind farm were studied, suggesting that the wind turbines are visible within 35km and that beyond this distance potential effects would not be significant. The SOW Visual Impact Assessment showed that the wind farm is potentially visible from the North Norfolk coast between Brancaster in the west and Walcott in the east. Assessment of the closest coastal viewpoints between 17km and 19.5km distant suggested that the wind farm is visible 63% of the time, decreasing with increasing distance beyond these viewpoints (Scira Offshore Energy Ltd, 2006). An extension to the south and closer to shore than the existing wind farm was therefore ruled out to minimise potential visual impacts.
- The eastern boundary of SEP is defined by the route of the existing DOW export cables.
- The northern boundary of SEP is constrained by the shipping lane between the existing SOW and DOW.

3.5.3 Wind Farm Extension AfL Areas

26. Following the site selection process described above, and further refinement after discussion with TCE and stakeholders, the wind farm extension AoIs were selected and included in the submitted AfL applications. The wind farm AfL boundaries are illustrated in **Figure 3.1**.

3.5.4 Wind Farm Site Boundaries at DCO Application

27. The SEP and DEP Development Consent Order (DCO) wind farm site boundaries (excluding offshore temporary works areas) are identical to those of the AfLs and as subsequently presented at the scoping and PEIR stages. Extensive site selection and constraints assessment work was undertaken during the determination of the AfL boundaries. It should be noted that, in April 2022, an offshore temporary works area buffer around the wind farm sites and offshore cable corridors was added to accommodate intrusive and non-intrusive temporary works (see **Figure 3.1** and **Section 3.8**).

3.6 Grid Connection

28. National Grid is responsible for operating the electricity transmission network in England and Wales. The Connection and Infrastructure Options Note (CION) Process is the mechanism used by National Grid to evaluate potential transmission options to identify the connection point in line with their obligation to develop and maintain an efficient, coordinated and economical system of the electricity transmission network. As part of the economic assessment, the CION considers the total life cost of the connection – assessing both the capital and projected operational costs to the onshore network (over a project's lifetime) to determine the most economic and efficient design option.

29. Following the completion of the CION process, National Grid made a grid connection offer to the Applicant in April 2019 for connection at Norwich Main substation, which would accommodate both SEP and DEP (see **Section 3.10** for further information). The Applicant accepted this offer in May 2019.

3.7 Offshore Export Cable Corridor and Landfall Site Selection

30. The offshore area surrounding the existing SOW and DOW is complex, due to the numerous existing activities and environmental designations, as well as for technical reasons such as ground conditions. Based on the location of the SEP and DEP AfLs, and the location of the grid connection point at Norwich Main Substation, an initial search area for the landfall was established, covering the North Norfolk coastline from The Wash to Happisburgh. The process for identifying options for the landfall location then began with a comprehensive desk study analysis of the coastline and offshore area. This included constraints mapping, site walkover and a series of workshops to understand the risks and challenges associated with different cable corridor and landfall options, and to rate and assess them. The evaluation included the following elements:

- Environmental sensitivities and designations;
- Length of the export cable corridor (offshore & onshore);
- Crossing of offshore utilities and cables; and
- Technical design and feasibility of the landfall location.

31. In early 2018, the Applicant was informed that the area designated as The Wash and North Norfolk Coast SAC was to be downgraded by Natural England to being considered in unfavourable condition, as a result of fisheries and OWF cable installation (Ørsted, 2018). The Applicant also had regard at this time to the emerging assessment outcomes and stakeholder advice in relation to Hornsea Project Three (e.g. Natural England, 2019a and Natural England, 2019b[3]). Alongside this, in the event that a landfall was selected in this area, it was considered that a route through the Cromer Shoal Chalk Beds MCZ (whose western boundary directly abuts the eastern boundary of the SAC) was preferable as it would provide a more direct and shorter route to the potential landfall options (reducing the overall impacts from cable installation) as well as having the distinct advantage of being close and parallel to the existing DOW export cable corridor, for which Equinor has first-hand experience of undertaking successful cable burial works. As such it was decided not to consider an export cable corridor through the SAC and therefore to exclude this area from the landfall search area.

32. In addition to the desk study analysis described above, a site walkover from Weybourne in the west to Happisburgh in the east was undertaken by the Applicant's project team in January 2019, to consider cliff heights and other relevant constraints along the coastline that were otherwise not obvious from the desk based mapping study.

33. The remaining areas of the North Norfolk coastline from The Wash to Happisburgh were assessed as to whether they would be suitable for landfall and the cable corridor, considering the distance from the wind farm sites, the extent of additional infrastructure that would be required, technical limitations and environmental sensitivities. Significant urban or otherwise built up areas were also excluded. Those landfall search areas were then either discounted or taken forward to the next stage of assessment.

34. At this stage, the following broad areas were identified for a potential landfall:

- Weybourne;
- Bacton; and
- Happisburgh.

[3] This document sets out Natural England's position on the potential effects of the proposed Hornsea Project Three OWF dated March 2019. This included that Natural England was unable to advise that an adverse effect on integrity could be ruled out for a range of factors, including the recent condition assessment, concerns with survey data and associated uncertainty in the impacts, the presence of possible cobble reef, permanent/lasting impacts from cable protection and concerns in relation to recovery from cable installation works.

3.7.1 Happisburgh Landfall Option

35. The offshore export cable corridor search area for Happisburgh could provide a cable corridor that avoids both the MCZ and SACs; however, it is not a suitable or feasible alternative. The offshore route to a landfall in the Happisburgh area is considerably longer than the routes to the other landfall options. Furthermore, a Happisburgh landfall would increase the length of the onshore cable corridor. The footprint of potential impacts would therefore be significantly larger for the overall development. A longer cable corridor would also significantly increase energy losses in comparison to the other routes. In addition, there is an increased number of records of Annex I *Sabellaria spinulosa* reef in this area, which would make the opportunity of micro-siting to avoid impacts more challenging.

36. With the construction of the Norfolk Boreas and Norfolk Vanguard cable corridors and landfall at Happisburgh, it is considered that there is unlikely to be sufficient room to accommodate another landfall, due to the number of properties on the frontage along the stretch of coastline south of the Cromer Shoal Chalk Beds MCZ to Eccles on Sea. In addition, a landfall connection at Happisburgh would require multiple crossings of offshore gas and chemical pipelines associated with the Bacton Gas Terminal (15 in total). This results in significant technical challenges, additional risks and uncertainty and increased cost.. There are also significant rates of erosion at Happisburgh which will not be protected by the Bacton Sandscaping Scheme, with the Shoreline Management Plan policy being for 'Managed Realignment' over the next 100 years. There are substantial stakeholder concerns in this regard and a dedicated community action group exists to try and reduce the erosion.

37. A further project making landfall at this location was considered as being likely to cause further objections, as experienced by other recent proposals. For these reasons, the Happisburgh area of search was removed from further consideration at an early stage in 2019.

3.7.2 Weybourne and Bacton Landfall Options

38. Weybourne and Bacton were both taken forwards as landfall options at the EIA scoping stage (**Figure 3.2**).

39. A key consideration in relation to the proposed HDD works was depth of burial and cable heating. The amount of power that can be transmitted through a cable is affected by how hot the cable is. Therefore, when considering cable design and what is currently technically feasible, consideration must be given to burying the cables in such a way that allows heat to dissipate.

40. At greater depths, cable rating would have to be reduced or would need a larger cross sectional area of cable to compensate, as it is harder for the heat to dissipate. With this in mind, Weybourne (near the existing SOW and DOW landfalls) was considered the most feasible option for the HDD landfall. The likely chalk bedrock encountered at around 20m below the sea bed (as identified by the 2008 geophysical seismic survey report which informed the original DOW landfall study), is known to be suitable for HDD. The HDD technique also requires no major construction works on the beach. This will limit any significant restrictions to access along the beach for the public.

3.7.3 Offshore Export Cable Corridor Identification for Scoping

41. Following selection of the wind farm sites and potential landfalls, a process was undertaken to define the offshore export cable corridors to be taken forward to scoping. The offshore export cable corridor selection was driven through consideration of hard and soft environmental and engineering constraints between the wind farm sites and the landfall. The offshore export cable corridor search areas were determined primarily by the location of the potential landfalls, the position of the OWFs and OSP/s relative to those landfalls, and the need to have sufficient flexibility and width to avoid significant environmental, planning and development constraints.

42. Two offshore export cable corridor options linking the SEP wind farm site to shore were considered in further detail, one to Weybourne and one to Bacton. At each location two landfall options were considered:

- Bacton
  - East of Bacton Gas Terminals; and
  - West of Bacton Gas Terminals.
- Weybourne
  - Weybourne West – near to the existing SOW and DOW landfalls; and
  - Weybourne East – between Sheringham and Weybourne.

43. Both offshore export cable corridor options exit the southern corner of the SEP wind farm site and must cross the existing Dudgeon offshore export cables and a shipping lane. Both offshore export cable corridor options must also cross the Hornsea Project Three export cable as it runs to the south of SOW and DOW. Both corridor options must also cross the Cromer Shoal Chalk Beds MCZ and the Greater Wash Special Protection Area (SPA) to reach landfall. However, they both take a direct (and therefore shorter) route to shore through the designations to minimise their footprint within them.

44. The Weybourne corridor routes to the east and parallel to the existing Dudgeon offshore export cables to avoid unnecessary crossings. The export cable corridor north of the MCZ is approximately 500m wide and widens to approximately 1km upon entering the MCZ, and widens again towards the landfall area.

45. The Bacton corridor routes approximately 17km in a south easterly direction between shipping lanes before turning south before it meets the Shearwater to Bacton gas pipeline. It then routes parallel to the pipeline towards landfall north of the Bacton Gas Terminal and south of Mundesley. This route avoids crossing numerous pipelines linking southern North Sea gas production to the Bacton Gas Terminal. The corridor is approximately 500m wide for the majority of the route, but widens in the MCZ and before approaching landfall.

3.7.3.1 Designated site considerations

46. During a meeting with Natural England in January 2018, it was advised that a route close to the existing DOW export cables, passing through mixed subtidal sediment habitats, was preferred over any route through The Wash and North Norfolk Coast SAC, due to the potential impacts on Annex I habitats. In a further consultation meeting on 24th April 2019, Natural England advised that whilst it would be preferable for the export cable corridor to avoid the Cromer Shoal Chalk Beds MCZ, if this were not possible, the area should be fully characterised during the assessment phase to determine the presence of the features (habitats) of concern and the potential to avoid or minimise impacts on them.

47. A detailed benthic and geophysical survey of the export cable corridor has since been undertaken to identify the habitats present and to inform the impact assessments (see **Chapter 8 Benthic Ecology** and the **Stage 1 CSCB MCZ Assessment** (document reference 5.6) for further details). Post construction surveys of the SOW site showed likely recovery within two years in most areas (Fugro, 2013). By August 2020, video transect surveys showed that epifaunal community structure along the export cable corridor had recovered such that it was not significantly different to unimpacted areas (**Section 8.6.2 in Chapter 8 Benthic Ecology** provides greater detail on the biotope recoverability) (Fugro, 2020).

48. The Applicant expects that further surveys will be undertaken prior to the start of construction to ensure that impacts on the benthic habitats and the MCZ can be avoided or minimised. As described in **Section 3.4**, the Applicant has also committed to a long HDD at the landfall, which at Weybourne completely avoids the subtidal outcropping chalk MCZ feature. HDD works at SOW and DOW were carried out successfully. Given that the SEP and DEP HDD location is within an area of similar ground conditions, it is anticipated that HDD will also be able to be carried out successfully for SEP and DEP (see the **Outline CSCB MCZ CSIMP** (document reference 9.7) for more details).

49. The **RIAA** (document reference 5.4) provides details of, and assessments for, the European sites screened in for further assessment.

3.7.4 Selection of Offshore Export Cable Corridor and Landfall for PEIR

50. Following further refinement considering environmental and engineering constraints and the receipt of the Scoping Opinion (The Planning Inspectorate, 2019), including Natural England's advice regarding the potential impacts on the features of Cromer Shoal Chalk Beds MCZ (see **Table 3-2**) and advice during consultation meetings, Weybourne was identified as the preferred landfall option for the offshore export cable corridor (**Figure 3.3** and **Figure 3.4**). The Weybourne landfall and offshore export cable corridor was selected on account of the following:

- Technical (i.e. engineering and design) advantages;
- Considerably flatter topography (8m cliffs at Weybourne compared to between 15m and 32m high cliffs at Bacton);
- Enables avoidance of the subtidal outcropping chalk CSCB MCZ feature;
- The total area impacted offshore is minimised as a result of the shorter export cable corridor;

- Good access using existing roads and tracks (Bacton would require a new access road);
- It avoids the Site of Special Scientific Interest (SSSI) and any interaction with National Nature Reserves (NNR) along the Norfolk coast (e.g. Mundesley Cliffs SSSI and Paston Great Barn NNR);
- It avoids the Annex I habitats of The Wash and North Norfolk Coast SAC which are in unfavourable condition (both Weybourne and Bacton landfall options avoid the SAC);
- The ability of using a long HDD technique at the landfall to completely avoid the subtidal outcropping chalk MCZ feature (see **Table 3-2** and Natural England's advice regarding the potential impacts on the features of Cromer Shoal Chalk Beds MCZ). This is in a proven location for works of this nature (i.e. successful HDD works have already been carried out for both SOW and DOW), whereas at Bacton it would not be possible to HDD under the full extent of the chalk, and the cable/s would encounter a further area of outcropping chalk offshore (Gardline, 2019);
- Avoids the Bacton Sandscaping Scheme area, so there will be no interference with that scheme or potential cumulative impacts;
- Located close to the existing Dudgeon and Sheringham Shoal HDD landfalls for which considerable experience, data and lessons learnt are available resulting in a high level of confidence in the engineering feasibility of landfall and HDD works at this location; and
- Private land along the beach for duct preparation (as was used during the construction of the DOW).

51. Following the decision to discount Bacton, further analysis was undertaken of the two options at Weybourne: Weybourne West and Weybourne East (see **Appendix 3.2**).

52. Weybourne East was considered to have considerably greater engineering constraints due to its having the higher, less favourable elevation of the two locations (15m compared to 8m at Weybourne West) and due to there being no history of performing a landfall HDD at this location. The National Trust also raised concerns regarding Weybourne East and the potential for impacts to National Trust land should this be option be taken forwards.

53. Access to the drill site is also more challenging at this location compared to Weybourne West. The landfall would require a new road to be constructed to the drill site across agricultural fields resulting in additional traffic movements, and impact to the arable habitat.

54. In contrast, the Weybourne West landfall is located just east of the existing SOW and DOW landfalls, to the west of Weybourne beach car park at the Muckleburgh Military Collection, which offers existing, private access. Ground investigation data including a geophysical seismic survey and boreholes carried out for the DOW (see **Section 2.6** of **Appendix 3.2**) and the January 2019 site walkover were used to confirm the suitability of this site as the landfall for SEP and DEP.

55. As a result and in conjunction with the landfall considerations set out above, the offshore export cable corridor to Weybourne (with landfall at Weybourne West) was selected and taken forward as the basis for more detailed assessment within the PEIR.

3.7.5 Offshore Export Cable Corridor and Landfall Site Selection for DCO Application

56. The offshore export cable corridor and offshore component of the landfall site included with the DCO application are identical to those presented at the PEIR stage (excluding the offshore temporary works area). In April 2022, an offshore temporary works area buffer around the wind farm sites and offshore cable corridors was added to accommodate intrusive and non-intrusive temporary works (see **Figure 3.1** and **Section 3.8**).

57. The onshore component of the landfall site is addressed in Section **3.9.3.1** below.

3.8 Offshore Temporary Works Area

58. In April 2022, the Applicant conducted a targeted consultation exercise following the addition of an offshore temporary works area to the SEP and DEP wind farm sites and offshore cable corridors. The offshore temporary works area is shown on **Figure 3.1** and consists of a 750m buffer either side of the area in which the offshore export and interlink cables will be installed, and a 200m buffer around the area in which wind turbines, OSPs and infield cables will be installed.

59. The offshore temporary works area has been defined such that the offshore Order Limits encompass both the area in which permanent installations will be placed (with adequate allowance for micro-siting around sensitive features, as required), plus the adjacent area of sea bed that may be required for temporary works only. See the **Works Plans (Offshore)** (document reference 2.7 for details).

60. Temporary works could occur during the construction, operation and decommissioning phases and include vessel anchoring and the use of jack-up vessels that will have a temporary works footprint, including for the purpose of foundation and wind turbine installation, cable installation and maintenance activities. No anchoring or use of jack-up vessels will be undertaken in the nearshore area of the MCZ where the presence of the outcropping chalk feature is confirmed by pre-construction survey.

61. The Applicant is committed to post-consent survey coverage of the offshore temporary works area involving a suite of geophysical, geotechnical and benthic surveys which will identify any sensitive features that may need to be avoided in consultation with the relevant stakeholders.

3.9 Onshore Cable Corridor Selection

62. In parallel with the identification of the landfall location, a process to identify the onshore cable corridor was undertaken. This process initially involved the identification of an onshore cable corridor between both potential landfall locations (i.e. Weybourne and Bacton) and the grid connection point at Norwich Main.

63. In order to minimise permanent visual impacts during the operational life of SEP and DEP, the onshore cables between the landfall and the electrical connection point would involve a new underground (buried) cable system rather than any new overhead lines.

64. Key principles that informed the cable corridor site selection exercise included:

- Accommodate a corridor 60m wide and up to 100m at trenchless crossings;
- Preference for shortest onshore cable to minimise the overall footprints and the number of receptors that will be affected;
- Avoid key sensitive features, where possible; and
- Avoid populated areas, where possible.

65. The cable corridor site selection exercise has specifically taken into account the following constraints:

- Sites designated for nature conservation (e.g. SPA, SSSI);
- Sites designated for their landscape importance (e.g. Area of Outstanding Natural Beauty (AONB));
- Historic designations (e.g. scheduled monuments);
- Residential properties;
- Flood zones / Source Protection Zones (SPZ);
- Contaminated land; and
- Other infrastructure (e.g. buried cables, railways, roads).

3.9.1 Onshore Cable Corridor – Search Areas

66. The Order Limits are based on a 60m-wide cable corridor (100m at trenchless crossings). In order to identify this, the site selection process begins with a wider corridor which is then continually refined to identify the preferred 60m-wide cable corridor.

67. As such, the first step in the site selection process was the identification of a broad cable corridor search area (3km in width). The cable corridor search area was identified using the guiding principles listed in **Section 3.8**. A buffer of 3km was also placed around the connection location at Norwich Main Substation, to create a substation search area (the onshore substation site selection is presented in **Section 3.10**). These areas were developed using high-level design principles (for example avoiding unsuitable ground conditions, access challenges, watercourse and road crossings etc.) and taking into account the constraints listed above. Three corridors were identified:

- Search Area Option 1 with a landfall at Weybourne and a north to south corridor passing to the west of Norwich;
- Search Area Option 2 with a landfall at Bacton and an onshore cable corridor running east to west before joining the Option 1 route and heading south; and
- Search Area Option 3. Also with a landfall at Bacton, this option headed more directly towards Norwich in a south westerly direction crossing the northern edge of the Broads National Park. This option was discounted from further consideration after early consultation in May 2019 to avoid impacts on the Broads National Park.

68. An initial feasibility and further route refinement exercise was undertaken on the two remaining 3km-wide cable corridor search areas in June 2019. The output from this was the identification of two 1km-wide onshore cable corridors for EIA scoping: one based on a Weybourne landfall, and one based on a Bacton landfall. These two scoping corridors were taken forward for consultation and presented within the scoping report submitted in October 2019 (**Figure 3.5** and **Figure 3.6**).

3.9.2 Onshore Cable Corridor – PEIR Stage

69. As described in **Section 3.7**, Weybourne was selected as the preferred landfall location in early 2020 and therefore ongoing refinement of the onshore cable corridor for the PEIR focused on the 1km wide onshore cable corridor route between Weybourne and Norwich Main Substation (**Figure 3.7**). Further refinement of the route following the scoping stage was informed by a process of information gathering, including:

- Responses from the local community during the Phase 1 Consultation (9th July to 20th August 2020);
- Completion of an engineering feasibility study;
- Discussions with landowners along the onshore cable scoping corridor;
- Additional desk-based data collection, such as utilities data and publicly available geological records;
- Further environmental surveys, including Extended Phase 1 Habitat Survey and Archaeological Geophysical Survey; and
- Ongoing technical engagement with key stakeholders, including other developers in the area.

70. The exercises listed above sought to narrow the width of the onshore cable corridor from 1km down to 200m, to identify a corridor for the purposes of assessment within the PEIR. This involved a series of workshops involving multiple workstreams within the Applicant's project team to work through the information available and determine the best possible route based on the key principles set out in **Section 3.8**. Responses received during the Phase 1 Consultation and landowner comments were each considered individually. In some instances, these comments resulted in a direct change to the alignment of the 200m-wide route; however, in some cases the responses received could not be implemented, or were considered again at the next stage of refinement (see **Section 3.3**). The Consultation Report submitted with the DCO application includes responses to all feedback received on the proposed alignment of the onshore cable corridor.

71. The purpose of defining a 200m-wide onshore cable corridor at PEIR was to allow for more targeted surveys to be undertaken (particularly species specific ecology surveys), targeted engineering studies, and to retain sufficient flexibility to incorporate stakeholder feedback from the phase two consultation to inform the preferred 60m-wide Order Limits. Whilst the majority of the route could be reduced to a 200m-wide corridor, at a number of complex locations a wider search area was retained whilst more detailed engineering feasibility work was undertaken. These areas included:

- The landfall area at Weybourne
    - Identification of the HDD compound location, areas for the HDD duct preparation and construction access routes.
- Weybourne Woods
    - Consideration of different routing options across Weybourne Woods to minimise tree loss and to avoid conflict with other constraints present including residential properties, tourist accommodation, users of the local road network, a County Wildlife Site (CWS) to the west and National Trust land to the east.
- North of Cawston
    - To manage potential interaction with a proposed solar park.

72. Refinement down to the 200m wide corridor for PEIR also involved identifying construction access points for early works, aligning the cable corridor where possible with field boundaries, and clipping the onshore cable corridor and access points to land registry boundaries. The PEIR boundary showing the 200m wide onshore cable corridor is shown on **Figure 3.8**. The overall benefits of the onshore cable corridor refinement process from 1km to 200m included:

- A reduced number of potentially affected landowners;
- Key sensitive habitats and features avoided where possible;
- A route that was feasible from an engineering and constructability perspective (whilst maintaining flexibility in some areas for further investigations);
- A comprehensive set of data and information from which to refine the route further for the DCO application; and

- Retention of sufficient flexibility at the PEIR stage to incorporate further stakeholder feedback.

73. The final PEIR boundary is shown on **Figure 3.8**. Note with respect to the offshore boundary, the boundary presented at PEIR is identical to the boundary presented at DCO application. Onshore, a number of refinements to the cable corridor and substation site boundaries have been made as described in **Section 3.9.3** and **3.10.4**.

3.9.3 Onshore Cable Corridor – DCO Application

74. Following Phase 2 consultation, the onshore cable corridor has been further refined to a width of 60m for the DCO application, increasing to a width of 100m for trenchless crossing zones, such as Main Rivers and A roads. This refinement process has been informed by phase two consultation feedback, as well as further landowner engagement, technical studies, and ongoing environmental survey and assessment work. In addition, any earlier relevant comments received on the onshore cable corridor (for example during the phase one consultation) were reviewed again as part of this process.

75. Continued engineering feasibility work was undertaken during 2021 to identify a preferred route for the 60m-wide cable corridor, within the existing 200m-wide PEIR boundary. This took into consideration factors such as cable tolerances, land accessibility, transport routes, crossing requirements and newly acquired data from ground investigations. This process also accounted for updated data from the 2021 survey effort, including updated ecological datasets, archaeology geophysical survey, traffic count data and landscape walkovers. In addition, individual landowner requests were reviewed and accommodated where practicable.

76. Multidisciplinary workshops were then held bringing together engineering, land, community engagement, and environmental specialists. These workshops included targeted discussions and an iterative decision-making process on the cable routing and sought to identify preferred options in light of all identified environmental constraints and stakeholder / community feedback.

77. The width of the onshore cable corridor (60m wide and up to 100m wide at trenchless crossings) accommodates all the project development scenarios under consideration, and includes contingency for micro-siting during construction should additional constraints be identified at a later stage in the development of SEP and DEP.

78. A preferred cable corridor alignment was also identified for the previously identified complex crossings. A brief summary on the locations is provided below:

3.9.3.1 Landfall location at Weybourne

79. Further engineering feasibility work and ground investigation was undertaken across the wider landfall area identified within the PEIR (shown on **Plate 3-2**), with the aim of identifying the preferred location to launch the landfall HDD and position the associated HDD compound. Accessibility studies were also undertaken to consider the access routes in and out of this area during landfall works. Also taken into account was the space required for approximately 1,500m of cable ducting that needs to be laid out and welded in preparation for the duct pulling exercise following the completion of the drill.

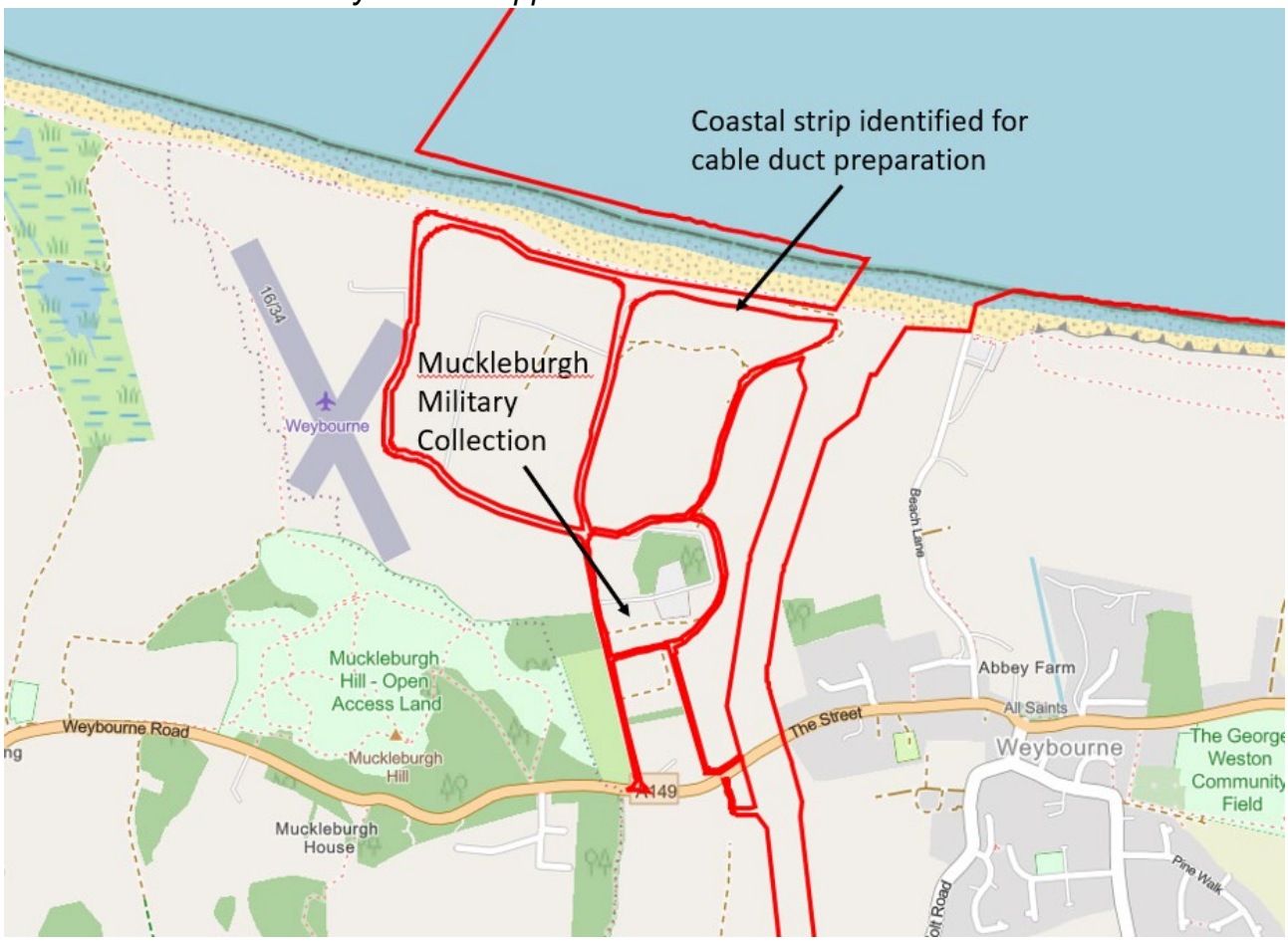
80. The findings of the ground investigation identified that a location at the eastern-most extent of the PEIR boundary was the preferred location to locate the HDD compound and transition joint bays. The location is within the Muckleburgh Estate approximately 100m east of the transition joint bays for the existing SOW and DOW and approximately 150m back from the shoreline, taking into account the rate of shoreline erosion.

81. Ecology surveys of the grassland habitat within the Muckleburgh Estate have also informed the refinement of the landfall area. The compound area has been reduced in size to minimise any encroachment on the surrounding grassland habitat. Furthermore, access to the compound will be gained through the existing entrance to the Muckleburgh Military Collection (shown on **Plate 3-3**) before utilising existing roads and tracks within the Muckleburgh Estate.

82. A 1,500m narrow strip of land within the Muckleburgh Estate is identified for the cable duct preparation (shown on **Plate 3-3**). This activity will also utilise existing access tracks within the Muckleburgh Estate to minimise impacts to the surrounding grassland habitat and associated reptile and invertebrate species.

Plate 3-2: Landfall Boundary at PEIR

Plate 3-3: Landfall Boundary at DCO Application



3.9.3.2 Weybourne Wood

83. Further engineering studies were undertaken to consider the feasibility of various routing options across Weybourne Wood. This included a comprehensive ground investigation campaign throughout the area.

    The area is predominantly woodland, with occasional properties, Kelling Heath Holiday Park to the west, Sandy Hill Lane (connecting Weybourne directly to the A148), Kelling Heath Park and 100 Acre Wood CWS and woodland under National Trust ownership. The wider area considered within the PEIR is shown on **Plate 3-4**.

84. Due to the extent of woodland (within an area designated as an AONB) the preferred approach was for a single trenchless crossing solution to avoid / minimise any tree losses. However, trenchless crossing solutions require additional separation distance between the buried cables, requiring an easement up to 100m wide.

85. To ensure that cables would not be installed beneath any residential properties or gardens, options were therefore limited to the central and eastern parts of this search area, i.e. directly beneath Weybourne Woods but avoiding the residential properties, holiday park and Sandy Hill Lane to the west of this search area.

86. Ground investigations carried out in summer 2021 confirmed the feasibility of a trenchless crossing under Weybourne Woods. It was also confirmed that this would require two separate drills to avoid any unnecessary increased risk of drill failure associated with longer crossings.

87. The preferred route (shown on **Plate 3-5**) is located within the woodland to the east of the properties off Sandy Hill Lane, avoiding any overlap with residential areas. This 800m-wide band of woodland will be crossed by two trenchless crossings, each approximately 400m in length. The midway point (400m into Weybourne Wood) has been the subject of an arboricultural survey, which has been used to locate the trenchless crossing compound within an existing gap in the wood – an area of previous commercial tree felling with 60% of the trees present already dead due to great spruce bark beetle. Some additional minor tree removals may still be required for access and these are assessed in further detail within **Chapter 20 Onshore Ecology and Ornithology** and **Chapter 26 Landscape and Visual Impact Assessment**.

88. This route was selected over the other options because:

- It avoids using open cut installation requiring an extended closure of Sandy Hill Lane.
- It avoids an open cut installation through the woodland resulting in more widespread tree loss and a greater impact to ecological receptors and recreational users.
- It is the most direct and shortest route, minimising the overall footprint and the number of receptors that will be impacted.
- It is technically feasible whilst maximising the distance to the nearest receptors.

Plate 3-4: PEIR Boundary in Weybourne Wood Area (National Trust land shown in pink, CWS shown in yellow)

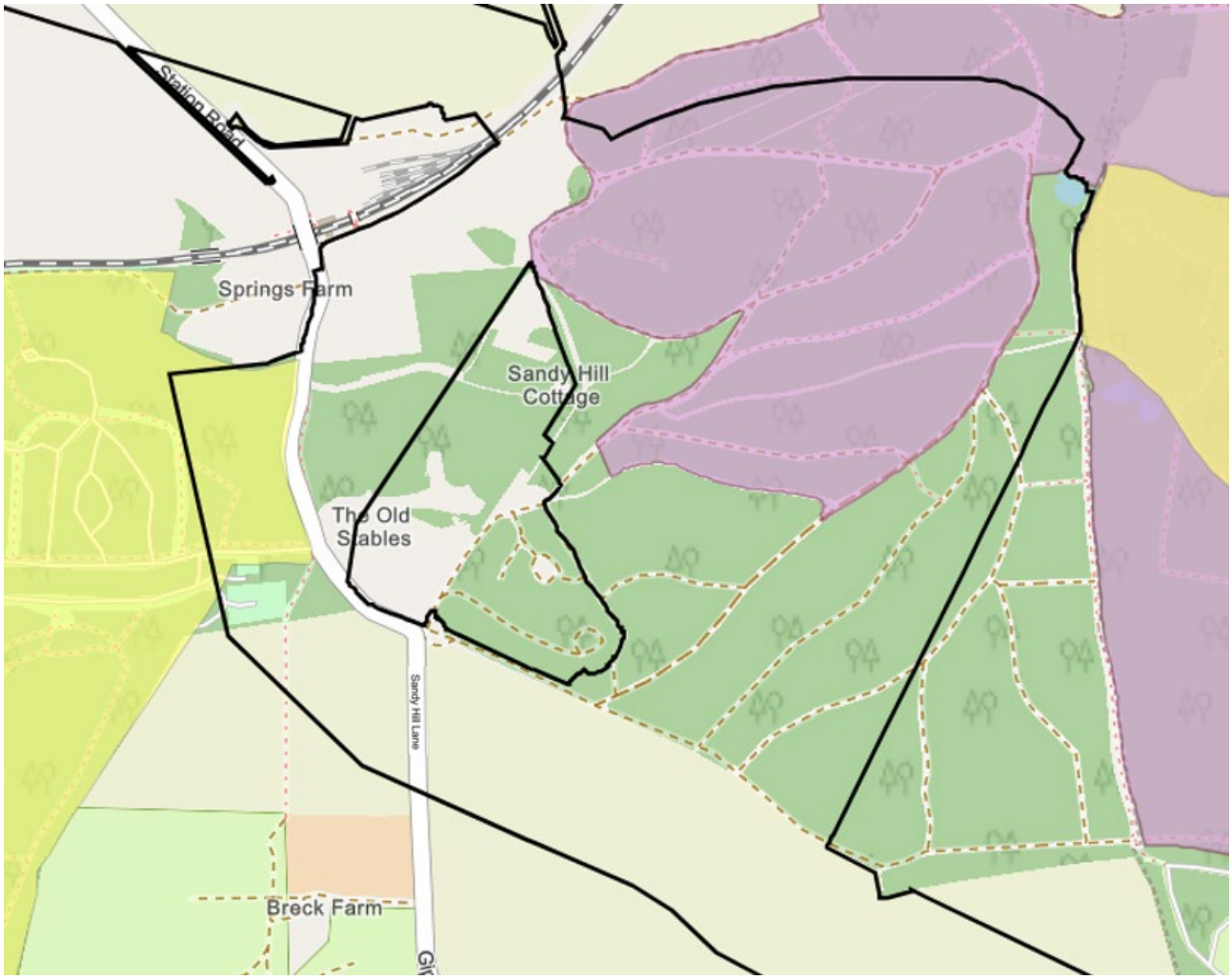
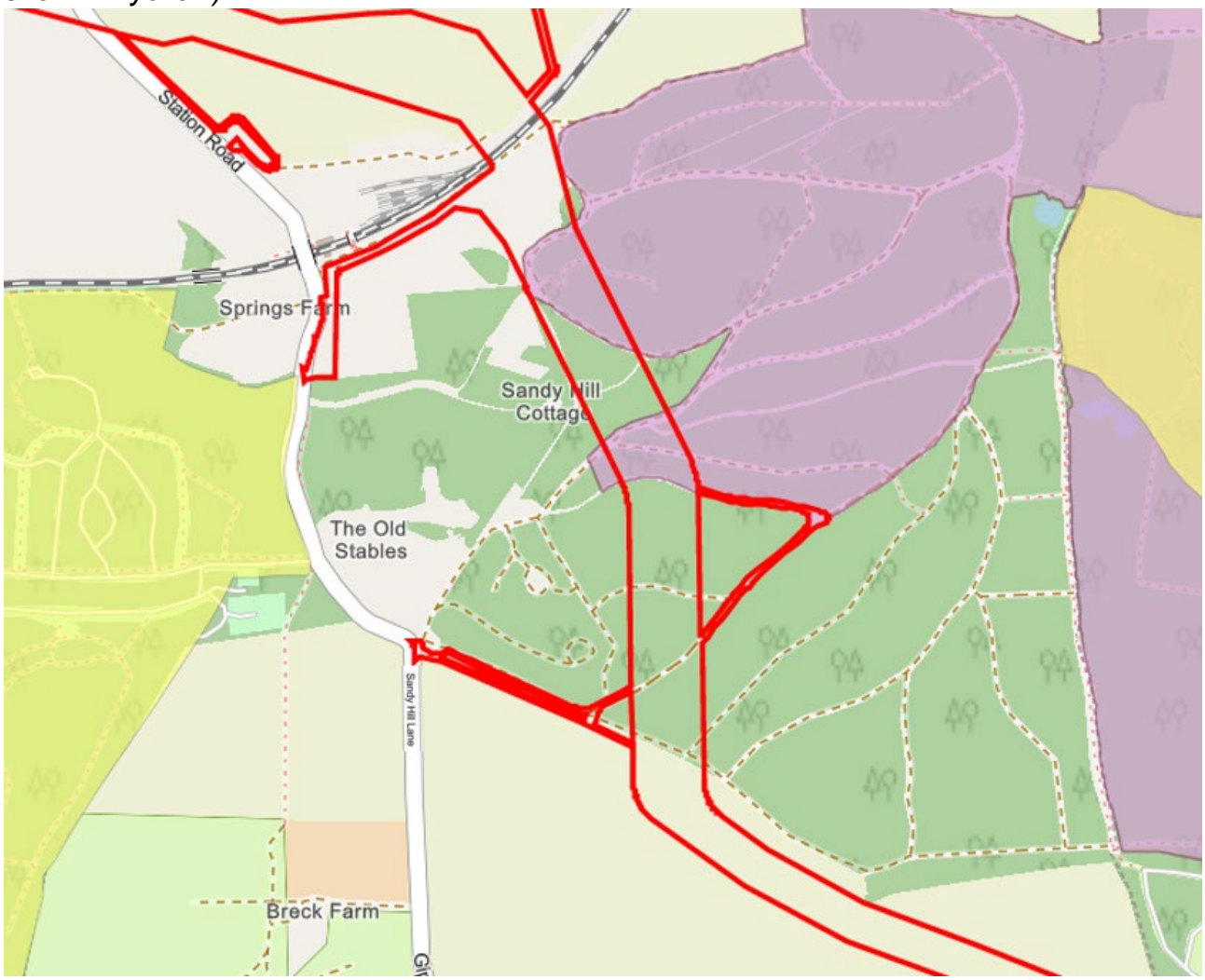


Plate 3-5: Order Limits in Weybourne Wood Area (National Trust land shown in pink, CWS shown in yellow)



3.9.3.3 North of Cawston

89. At the time of preparing the PEIR, an area north of Cawston was the subject of an undetermined planning application for a proposed solar park. The PEIR boundary was kept wider in this area to provide the flexibility to respond to a planning decision on this development. The wider area considered within the PEIR is shown on **Plate 3-6**.

90. At the time of writing the solar park planning application has been rejected; however, the decision is currently subject to an appeal. Therefore, to avoid any conflict with this potential future development, the Order Limits has sought to accommodate a trenchless crossing of this area if required.

91. Ground investigations undertaken in summer 2021 confirmed the feasibility of a trenchless crossing at this location. An alignment along the northern edge of the proposed solar park would require a trenchless crossing of approximately 650m. This compares to a trenchless crossing along the south-western edge of the solar park of approximately 800m.

92. A preference for the shorter of the two options was taken forward, to avoid any unnecessary increased risk of drill failure associated with longer crossings. The route identified at PEIR is shown on **Plate 3-6** and the route taken forward within the Order Limits is shown on **Plate** *3-7*.

Plate 3-6: PEIR Boundary North of Cawston

Plate 3-7: Order Limits North of Cawston

3.9.4 Main Construction Compound

93. Whilst the main onshore construction compound would only be temporary and would be fully reinstated after the completion of construction, it would be required for 36 months for the single project and two-project concurrent scenario, or for up to 72 months under the two-project sequential scenario. The Applicant recognises that the main onshore construction compound would have a continuous construction presence throughout the onshore works, and a decision was made to adopt the same level of site selection assessment for this aspect of the works as that taken for the permanent infrastructure.

94. The main onshore construction compound site selection exercise took into account the same constraints that were considered when identifying sites for permanent above-ground infrastructure (i.e. the onshore substation), namely:

- Avoid residential titles (including gardens) where possible;
- Avoid direct significant impacts to internationally and nationally designated areas (e.g. SACs, SPAs, and SSSIs etc.);
- Minimise significant impacts to the special qualities of AONB;

- Avoid mature woodland and historic woodland;
- Avoid areas that fall within Flood Zone 3; and
- Avoid Public Rights of Way.

95. In addition to the above:

- Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable;
- Locations should take advantage of the screening provided by land form and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum;
- Options should keep the visual, noise and other environmental effects to a reasonably practicable minimum; and
- The space required should be limited to the area required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use.

96. Options were identified to accommodate an area of 60,000m^2 (this could either be a single large site or two smaller sites), to support the full length of the cable corridor with good proximity to the cable corridor and good access to the existing road network. A long list of seven potential sites were identified and subject to initial engineering feasibility assessment and high-level constraints mapping.

97. The process of compound site selection included a Black/Red/Amber/Green (BRAG) assessment of identified potential compound sites, assessed against the following criteria and constraints (see **Appendix 3.3** for more information):

- Engineering/Land;
- Community disturbance;
- Traffic and Transport; and
- Archaeology/Nature Conservation.

98. Following this initial assessment, the following four short-listed options were identified:

- A1067 Fakenham Road;
- Woodforde Farm;
- A1067 Norwich Road; and
- RAF Oulton.

99. The four short-listed options were presented to stakeholders and local communities during formal consultation on the PEIR via a digital engagement consultation website. Based on strong community and Parish Council opposition to the proposed use of Woodforde Farm as a main construction compound site, related to existing traffic problems, and that it was the least preferred option for Norfolk County Council, this option was not taken forward for further consideration.

100. Norfolk County Council also indicated that they would not be able to support a proposal for the use of RAF Oulton due to the cumulative traffic impacts with Hornsea Project Three and Norfolk Vanguard/Boreas. RAF Oulton was therefore also discounted at this stage. The two remaining options taken forward for further feasibility work were:

- A1067 Fakenham Road; and
- A1067 Norwich Road.

101. Further feasibility survey works was undertaken at both of these locations, combined with further stakeholder engagement. A summary of which is set out below:

- Norwich Road site is an existing industrial site and has extensive areas of asbestos that would require remediation (no historic contamination at Fakenham Road site);
- Norwich Road site is an existing industrial site and would require demolition of existing buildings that are not appropriate for the main compound use (no historic buildings at Fakenham Road site);
- Introduction of a new access off the A1067 into the Norwich Road site would not be accepted by NCC (proposed new access into the Fakenham Road site accepted by NCC);
- Internal roads within the wider industrial area that would be required to access the A1067 Norwich Road site (as a new access was not acceptable to NCC) are too narrow to allow safe passage of cable drum transporting vehicles (no existing issues at Fakenhame Road site); and
- Norwich Road site is not sufficiently large enough to include all the main compound activities and an additional area would be required (Fakenham Road site sufficient size for all main compound activities).

102. This exercise ultimately identified the A1067 Fakenham Road as the preferred option for the main onshore construction compound, which is captured within the Order Limits. Further details on the main onshore construction compound site selection exercise are included in **Appendix 3.3**.

3.10 Onshore Substation

103. As described in **Section 3.6**, following the completion of the CION process, National Grid made the Applicant a grid connection offer in April 2019 for connection at Norwich Main Substation, which would accommodate both SEP and DEP. This offer was accepted by the Applicant in May 2019, and therefore the location of Norwich Main Substation formed the basis for the onshore substation site selection work.

104. SEP and DEP will require the construction of an onshore substation that will accommodate both projects. Some of the onshore substation infrastructure will be shared between SEP and DEP and the number of buildings required would be the same whether one or both projects are progressed.

105. The onshore substation site selection exercise has specifically taken into account the following constraints (please see **Appendix 3.1** for more information):

- Residential properties + 250m buffer;
- SPA;
- SAC;
- Ramsar sites;
- AONB;
- SSSI;
- Local Nature Reserves;
- NNR;
- County Wildlife Sites;
- Registered Parks and Gardens;
- Ancient Woodland;
- RSPB reserves;
- National Trust land;
- Common land;
- Public Rights of Way;
- Main Rivers;
- Flood Zones 2 & 3;
- Scheduled Monuments;
- Conservation Areas;
- Listed buildings;
- Historic Environment Records;
- Historic landfill sites;
- SPZs;
- Existing National Grid infrastructure including overhead lines; and
- The DCO limits of other NSIPs (including Hornsea Project Three).

3.10.1 Horlock Rules

106. In order to identify the most appropriate location to site the onshore substation, National Grid's Guidelines on Substation Siting and Design (The Horlock Rules) have been taken into consideration. These guidelines document National Grid's best practice for the consideration of relevant constraints associated with the siting of substations. The Horlock Rules have been considered as part of the development of the onshore substation location, as outlined within **Appendix 3.1 Onshore Substation Site Selection Report**.

3.10.2 Onshore Substation – Substation Zones

107. Following the identification of Norwich Main Substation as the grid connection point, an exercise was undertaken to identify areas with the greatest potential to accommodate the proposed permanent above ground infrastructure, taking into account the design assumptions and site selection principles combined with environmental constraints mapping based on publicly accessible environmental datasets, including environmental receptors and in some instances associated buffers.

108. The guiding design and site selection principles for locating the onshore substation were to identify an economic and efficient connection (i.e. as close as possible to the connection point) whilst taking into account environmental constraints and available space as defined above.

109. Those areas with the fewest constraints and therefore the greatest potential to avoid impacts were identified as potential substation zones for further consideration. Nine zones were identified within the 3km buffer (A-I) as shown in **Figure 3.9**.

110. A comparative assessment of these zones was then undertaken to further determine which zones had the greatest potential to accommodate the proposed infrastructure. This considered the maximum and minimum distance of separation from the nearest properties and other sensitive receptors that could be achieved for each substation zone, as well as associated engineering constraints such as the maximum and minimum total length of buried cabling required to connect the substation to Norwich Main and the how many challenging crossings (roads, railways, rivers, etc.) might be required to achieve connections within each zone. The nine zones were ranked from least preferred to most preferred on a scale of 1 to 9.

111. This exercise identified that zones A, B, C, D and E had relatively greater opportunity to accommodate the proposed infrastructure compared to zones F, G, H and I.

112. Within each of the five preferred zones (A-E) visual heat maps were produced to better identify areas within each zone that were comparatively more or less preferred for potential locations of substations. Using this as a guide, and in combination with aerial imagery to better understand the locations of field boundaries etc, potential locations (fields) that could accommodate the maximum substation footprint (6ha) were then identified within each zone. An example of this process is presented for substation Zone B below (**Plate 3-8** and **Plate 3-9**).

Plate 3-8: Zone B with Constraints Mapped

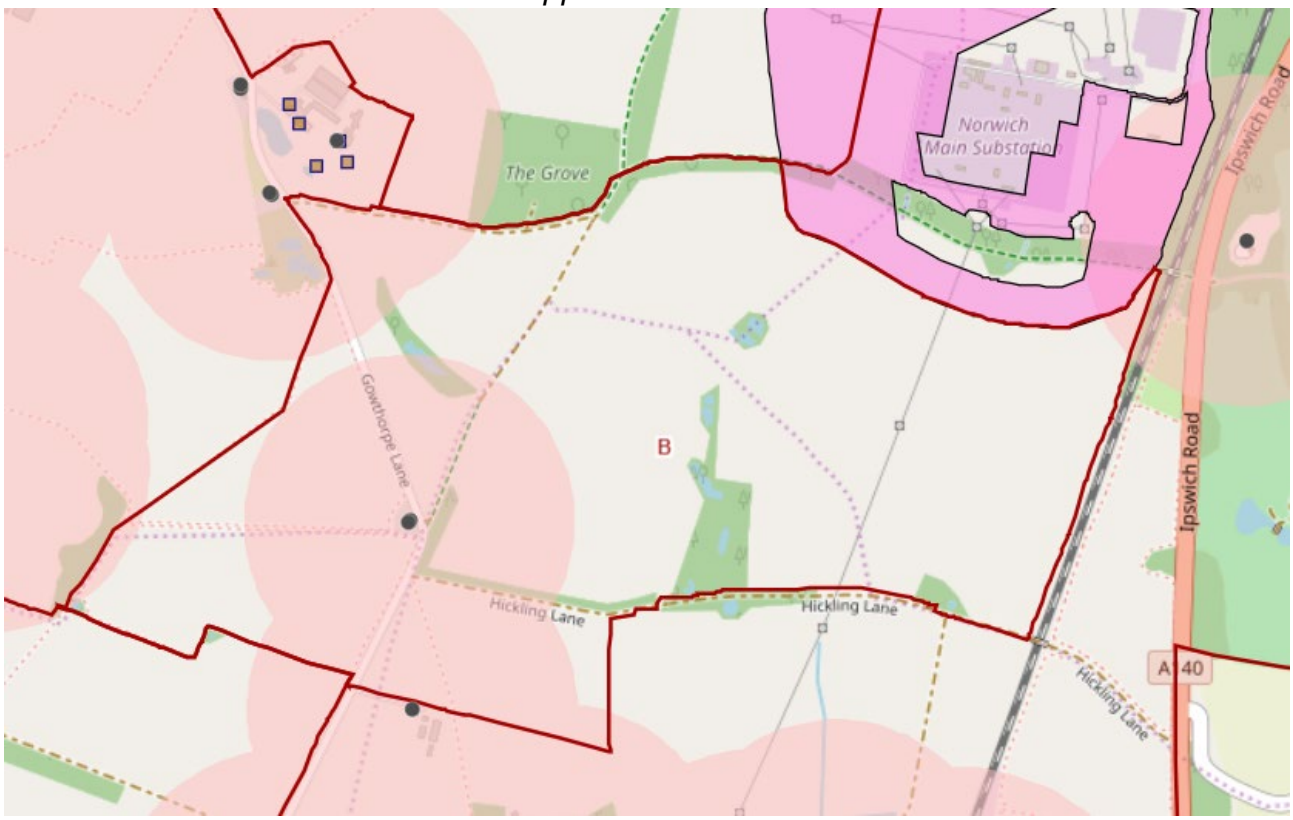
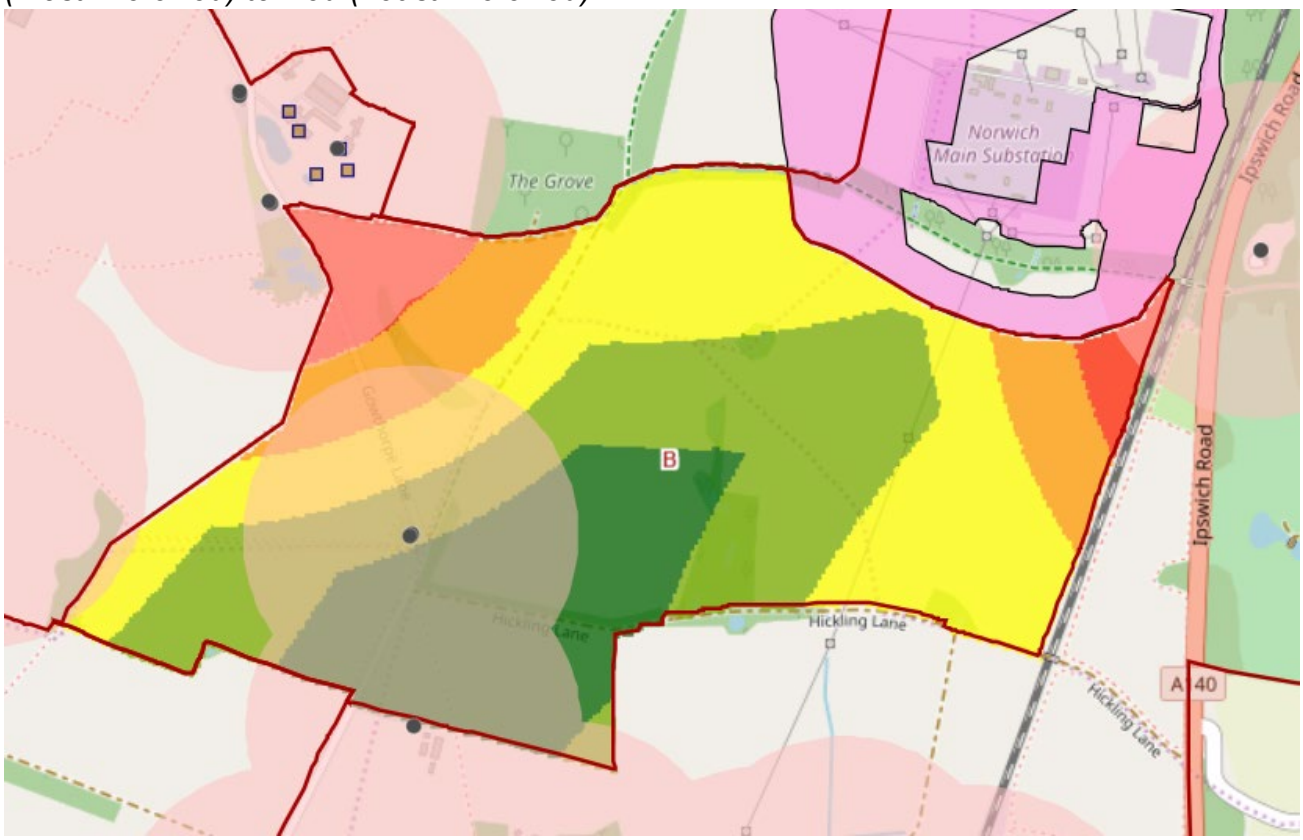


Plate 3-9: Zone B with Constraints and Combined Ranking Visually Presented - Dark Green (Most Preferred) to Red (Least Preferred)

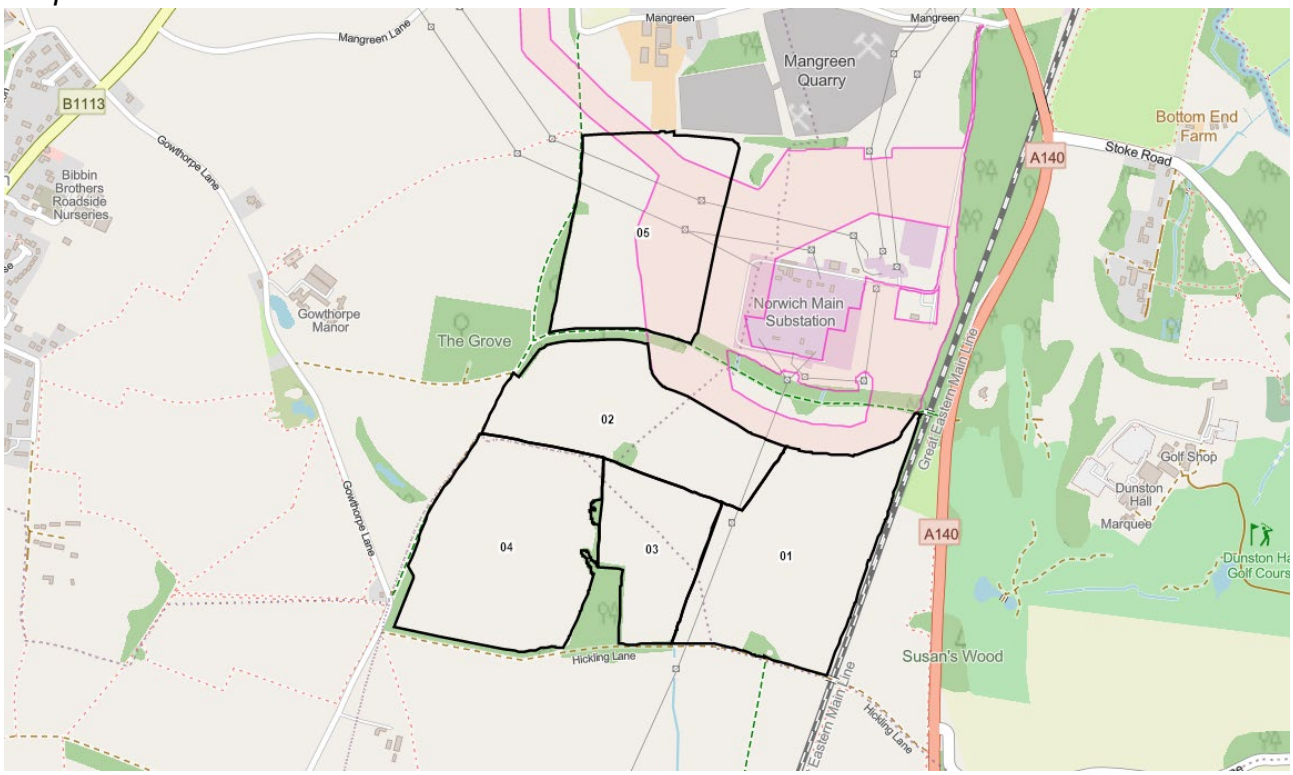


113. This process resulted in the identification of a long-list of 17 fields across the five preferred zones A-E.

114. A BRAG assessment was undertaken for the 17 fields to identify the risks and opportunities associated with each field option. Higher risk fields were given a red rating, whilst those with medium risks were coded amber and those with the least risk are assigned green. Black options are those which are not feasible from an engineering or environmental perspective. The aim was to ascertain which fields carry the least risk with respect to the assessment criteria applied and based upon professional judgement.

115. Five of the 17 fields were identified as having the fewest risks primarily based on the distance of separation between them and the nearest residential properties (typically in excess of 400m) and other visual receptors, and the relatively short distance for onward cabling for the 400kV cable connection to Norwich Main. These five fields are identified in **Plate 3-10** below.

Plate 3-10: The Five Fields Identified with the Greatest Potential to Accommodate the Proposed Substation Infrastructure.



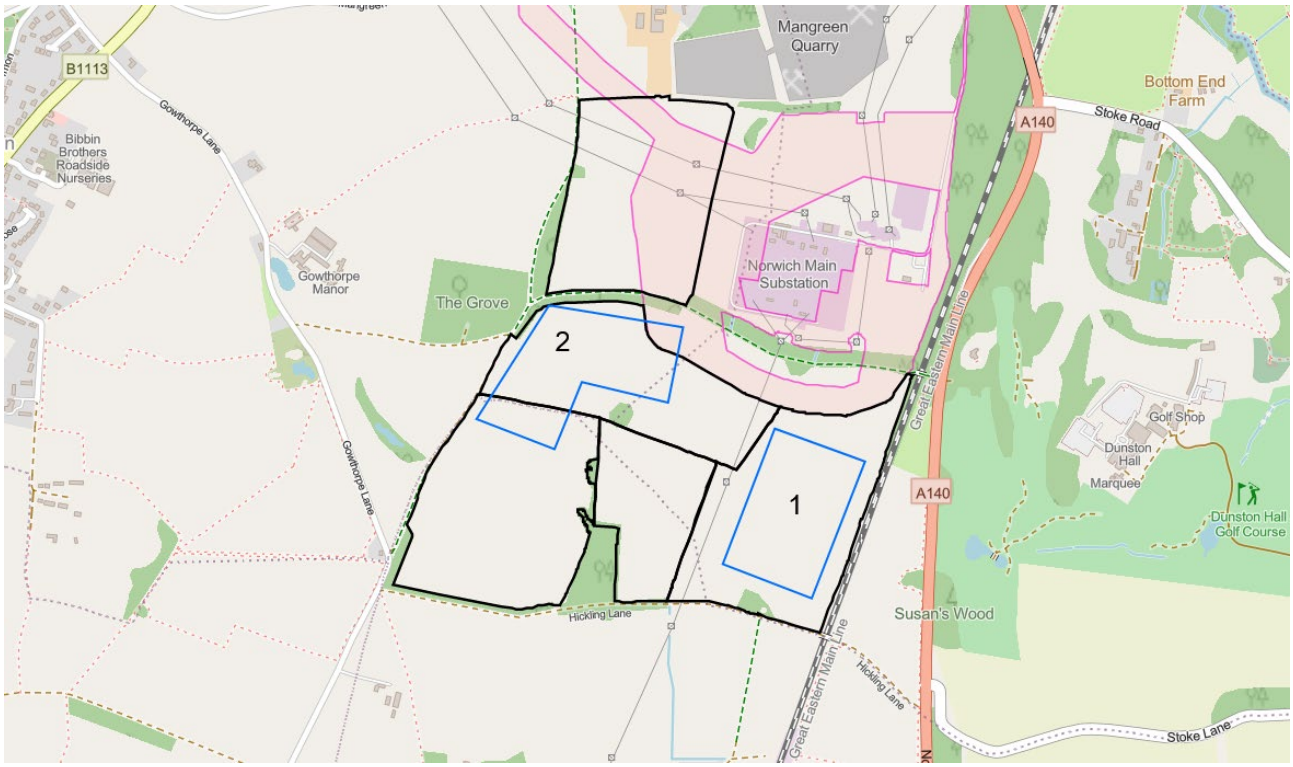
116. The five fields identified were consulted upon during public consultation through a digital engagement consultation website. Phase 1 consultation on site selection for the onshore substation and cable corridor ran from 9th July to 20th August 2020, which included meetings with landowners, stakeholders and regulators.

117. The feedback from local communities is presented in **Table 3-2.**

3.10.3 Identification of PEIR Boundary

118. Further engineering work and stakeholder engagement was undertaken in autumn 2020 to identify preferred locations to potentially accommodate the proposed infrastructure within the five fields taken forward. This confirmed that there would be insufficient space to accommodate the proposed infrastructure in Field 5 given the extent of the works footprint associated with Hornsea Project Three, and this field was subsequently discounted. Alongside the engineering feasibility exercise, additional consideration was given to the theoretical visibility from the nearest residential areas. These exercises identified a preference for Field 1 and parts of Fields 2 and 4 to accommodate the proposed substation infrastructure. On this basis two substation site options were identified and were assessed within the PEIR. The two substation site options are shown on **Plate 3-11** and **Figure 3.10**.

Plate 3-11: The Two Substation Options (Blue Boundary) Taken Forward for Assessment within the PEIR.



3.10.4 Identification of Order limits

119. Based on the detailed topic assessments presented within the PEIR and feedback from local communities as part of the associated consultation exercise, Site 1 was identified as the preferred location of the onshore substation. The main benefits of this site include:

- Avoids a potential linear settlement of high heritage significance;
- Takes advantage of a natural low point within the landscape reducing its relative visibility from views across the Tas Valley;

- Positioned closer to the area most influenced by existing infrastructure including the Norwich Main Substation, pylons and overhead wires, railway lines, the A140 and A47;
- Fewer residential receptors potentially affected by operational noise prior to mitigation being applied; and
- Slight preference from community feedback.

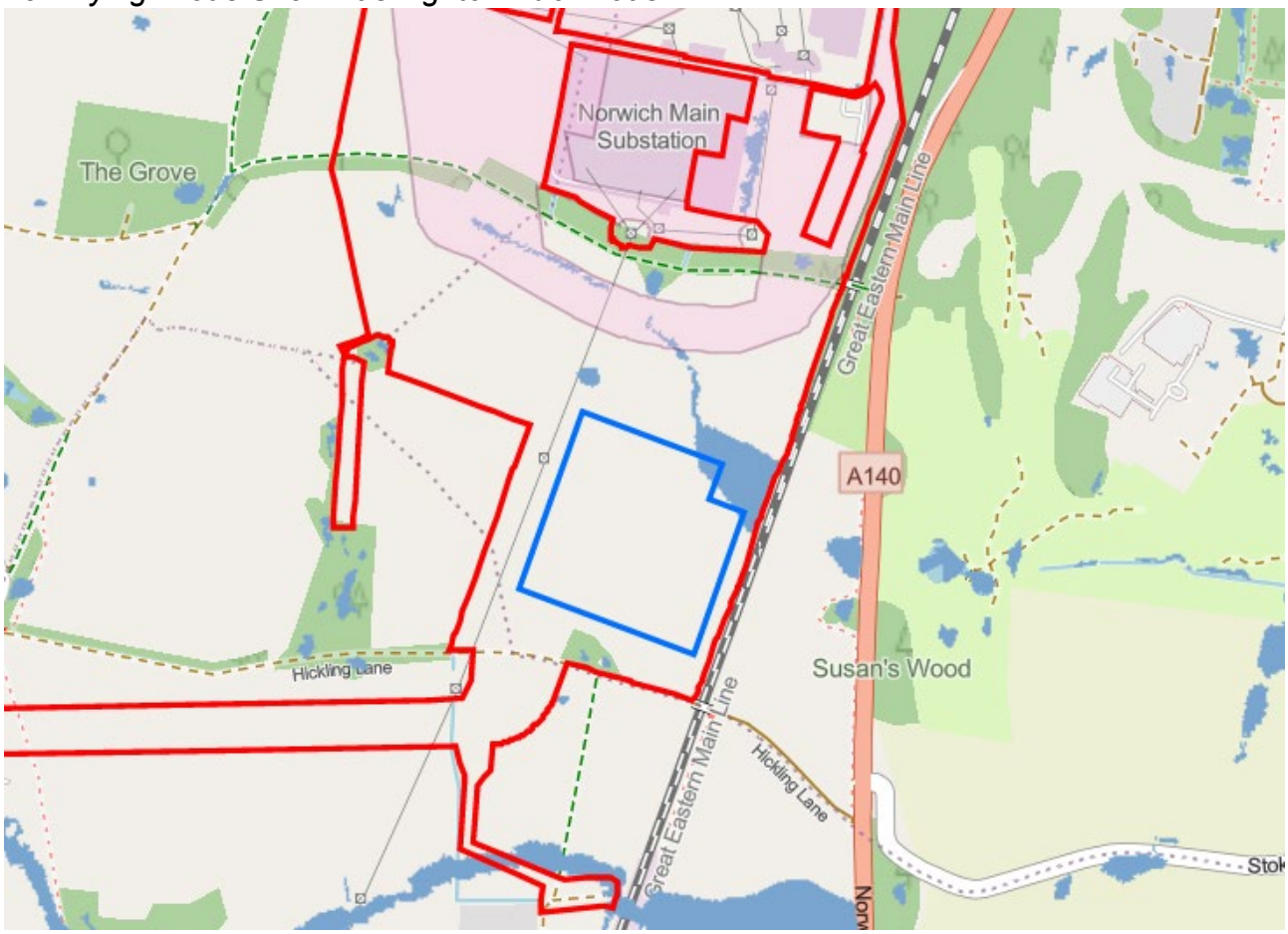
120. Following the completion of formal consultation on the PEIR, a revision to the National Planning Policy Framework (NPPF) was released. This updated the previous flood risk planning advice and now requires all sources of flood risk to be taken into account as part of site selection, i.e. when applying the Sequential Test; the previous advice was limited to fluvial and tidal sources of flood risk.

121. Neither the updated NPPF nor the supporting NPPF guidance provides a set of criteria as to how the Sequential Test should be applied for sources of flooding other than fluvial or tidal, for example surface water flooding, in terms of development vulnerability and the varying level of flood risk. Surface water flood risk effectively considers the existing topography and identifies areas that are natural low points where water may collect during severe rainfall events. The natural low point within the preferred substation field is identified within the national dataset as one of these areas that could result in ponding water during these types of events.

122. Following the identification of the preferred location of the onshore substation a further review of surface water flood risk was undertaken in consultation with both the Environment Agency and Norfolk County Council as Lead Local Flood Authority. Through this exercise a series of design iterations were made to modify the substation footprint to minimise interaction with this natural low point along the eastern part of that field close to the rail line. The footprint remains 6ha, but the shape has been modified to remove the corner that would otherwise overlap with this area of potential surface water flood risk.

123. The final position of the preferred substation, in relation to the natural low point which has been identified as an area of potential surface water flood risk, is shown on **Plate 3-12**. Further details of the process of assessing the extent of this potential area of surface water flood risk and work undertaken to modify the substation layout are provided in **ES Appendix 18.2 Flood Risk Assessment** (document reference: 6.3.18.2).

Plate 3-12: Preferred Substation Footprint (Royal Blue Boundary) Taken Forward for the DCO Application. Areas of Potential Surface Water Flood Risk Associated with Naturally Low Lying Areas Shown as Lighter Blue Areas



3.11 Summary

124. The site selection process for SEP and DEP has been an iterative one involving the consideration of technical and environmental constraints, and stakeholder and community feedback. For the offshore elements this has involved an initial zone selection undertaken by TCE and further detailed site-specific studies conducted by the Applicant. These processes involved consultation with a range of stakeholders and the collation of existing and site-specific data in order to refine broad search areas into the current boundaries for the offshore sites.

125. For the onshore infrastructure (i.e. landfall, onshore cable corridor and onshore substation location) the site selection process involved the consideration of technical constraints, environmental effects, stakeholder and community feedback, and constructability. Each part of the site selection and refinement process has been consulted on, and feedback from these consultations has been a key part in determining the Order Limits.

126. **Table 3-4** gives an overview of the site selection decisions that have been described in this chapter.

Table 3-4: Summary of Key Site Selection Decisions

Infrastructure Element	Options Considered	Decision	Main Environmental Benefits
Landfall	• Weybourne; • Bacton; and • Happisburgh.	Weybourne West	• Lower elevation at the coastline and other technical advantages; • Enables a shorter route for the offshore export cables, minimising the footprint of cable installation works; • Avoids populated areas at the coast and those at risk of coastal erosion as far as possible; • Avoids The Wash and North Norfolk Coast SAC; • Fewer offshore cable and pipeline crossings; • Existing access; • High confidence in the feasibility of HDD works due to previous installation campaigns at SOW and DOW; and • The preferred location minimises direct disturbance to the Muckleburgh Collection, and minimises direct disturbance to users of the coastal path.
Offshore export cable corridor	Multiple	Export cable corridor to Weybourne (with landfall at Weybourne West)	• Shorter route, minimising footprint of cable installation works; • Avoids The Wash and North Norfolk Coast SAC; • Fewer offshore cable and pipeline crossings; • Avoids Bacton sandscaping scheme; and • Avoids area of outcropping chalk further offshore.
Onshore substation	17 sites within 5 zones	Site 1	• Avoids a potential linear settlement of high heritage significance. • Takes advantage of a natural low point within the landscape reducing its relative visibility from views across the Tas Valley. • Positioned closer to the area most influenced by existing infrastructure including the Norwich Main substation, pylons and overhead wires, railway lines, the A140 and A47. • Fewer residential receptors potentially affected by operational noise prior to mitigation being applied. • Slight preference from community feedback. • Final footprint avoids the lowest part of the field that is identified as an area of potential surface water flood risk.
Main construction compound	• A1067 Fakenham Road • Woodforde Farm	• A1067 Fakenham Road	• The option with the greatest separation distance from the nearest residential properties (200m). • Located adjacent to the works corridor.

Infrastructure Element	Options Considered	Decision	Main Environmental Benefits
	• A1067 Norwich Road • RAF Oulton		• Served by good transport links and accessibility. • Avoids cumulative traffic impacts in Cawston and Oulton related to the Hornsea Project Three main construction compound located at RAF Oulton. • Does not suffer from historic contamination issues.
Onshore cable corridor	The proposed onshore cable corridor was selected based upon guiding design principles and a cable corridor refinement process which included consultation feedback. The onshore cable corridor is largely determined by the location and configuration of the onshore substation relative to the landfall. A route refinement process was undertaken at the ES stage to reduce the 200m wide corridor presented at PEIR to a route that has a final width of 60m for the DCO application, increasing to a width of 100m for trenchless crossing zones, such as main rivers and A roads.		
National Grid connection point	Following the completion of the CION process, National Grid made a grid connection offer in April 2019 for connection at Norwich Main National Grid Substation that would accommodate both SEP and DEP. The Applicant accepted this offer in May 2019.		

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