Outer Dowsing Offshore Wind

Preliminary Environmental Information Report

Volume 1, Chapter 4: Site Selection and Consideration of Alternatives

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OUTER DOWSING OFFSHORE WIND

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Abbreviations

Acronym	Meaning
ALC	Agricultural Land Classification
AfL	Agreement for Lease
AQMA	Air Quality Management Area
AIS	Air Insulated Switchgear
BEIS	Department for Business, Energy & Industrial Strategy, now Department for Energy Security and Net Zero (DESNZ)
BRAG	Black, Red, Amber and Green
CDG	Central Design Group
CES	Crown Estate Scotland
CION	Connections and Infrastructure Option Note
CLB	Cable Lay Barges
CLG	Community Liaison Group
CLV	Cable Laying Vessel
DCO	Development Consent Order
DESNZ	Department for Energy Security and Net Zero
DERFA	Department for Environment, Food & Rural Affairs
DLUHC	Department for Levelling Up, Housing and Communities
ECC	Export Cable Corridor (offshore ECC or onshore ECC)
EIA	Environmental Impact Assessment
EPP	Evidence Plan Process
ES	Environmental Statement
ESO	Electricity System Operator
ETG	Expert Topic Group
GIS	Gas Insulated Switchgear
HDD	Horizontal Directional Drilling
HER	Historic Environment Record
HND	Holistic Network Design
HRA	Habitats Regulations Assessment
IDRBNR	Inner Dowsing, Race Bank and North Ridge
IHLS	International Herring Larval Survey
IMO	International Maritime Organisation
LCoE	Levelised Cost of Energy
LNR	Local Nature Reserve
MCA	Maritime and Coastguard Agency
MCZ	Marine Conservation Zone
MDS	Maximum Design Scenario
MoD	Ministry of Defence
MHWS	Mean High Water Spring
MMO	Marine Management Organisation
MPS	Marine Policy Statement
MW	Mega Watt
NATS	National Air Traffic Services
NERC	Natural Environment and Rural Communities
NGESO	National Grid Electricity System Operator
NHLE	National Heritage List for England

Acronym	Meaning
NNR	National Nature Reserve
NOA	Network Options Assessment
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Planning
O&M	Operations and Maintenance
ODOW	Outer Dowsing Offshore Wind (The Project)
Ofgem	Office of Gas and Electricity Markets
OnSS	Onshore Substation
ORCP	Offshore Reactive Compensation Platform
OSPAR	Oslo / Paris convention (for the Protection of the Marine Environment of the North-East Atlantic)
OTNR	Offshore Transmission Network Review
OWF	Offshore Windfarm
PEIR	Preliminary Environmental Information Report
RIAA	Report to Inform Appropriate Assessment
PEXA	Practice and Exercise Areas
PLGR	Pre-lay grapnel runs
PQQ	Pre-Qualification Questionnaire
PRoW	Public Rights of Way
RAF	Royal Air Force
SAC	Special Area of Conservation
SoCC	Statement of Community Consultation
SPA	Special Protection Area
SPZ	Source Protection Zones
SSSI	Site of Special Scientific Interest
TCE	The Crown Estate
TJB	Transition Joint Bay
TOs	Transmission Operators
TSS	Traffic Separation Scheme
UK	United Kingdom

Terminology

Term	Definition
Array area	The area offshore within the PEIR Boundary within which the generating stations (including wind turbine generators (WTG) and inter array cables), offshore accommodation platforms, offshore transformer substations and associated cabling are positioned.
Baseline	The status of the environment at the time of assessment without the development in place.
Project Design envelope	A description of the range of possible elements that make up the Project's design options under consideration, as set out in detail in the project description. This envelope is used to define the Project for Environmental Impact Assessment (EIA) purposes when the exact engineering parameters are not yet known. This is also often referred to as the "Rochdale Envelope" approach.

Term	Definition
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP) from the Secretary of State (SoS) for Department for Energy Security and Net Zero (DESNZ).
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of an impact with the sensitivity of a receptor, in accordance with defined significance criteria.
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the Environmental Impact Assessment (EIA) Regulations, including the publication of an Environmental Statement (ES).
Environmental Statement (ES)	The suite of documents that detail the processes and results of the Environmental Impact Assessment (EIA).
Evidence Plan	A voluntary process of stakeholder consultation with appropriate Expert Topic Groups (ETGs) that discusses and, where possible, agrees the detailed approach to the Environmental Impact Assessment (EIA) and information to support Habitats Regulations Assessment (HRA) for those relevant topics included in the process, undertaken during the pre-application period.
GT R4 Ltd	The Applicant is GTR4 Limited (a joint venture between Corio Generation, TotalEnergies and Gulf Energy Development (GULF)), trading as Outer Dowsing Offshore Wind. The project is being developed by Corio Generation (a wholly owned Green Investment Group portfolio company), TotalEnergies and GULF'.
Habitats Regulations Assessment (HRA)	Habitats Regulations Assessment. A process which helps determine likely significant effects and (where appropriate) assesses adverse impacts on the integrity of European conservation sites and Ramsar sites. The process consists of up to four stages of assessment: screening, appropriate assessment, assessment of alternative solutions and assessment of imperative reasons of over-riding public interest (IROPI) and compensatory measures.
Haul Road	The track within the onshore ECC which the construction traffic would use to facilitate construction.
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial.
Inter-array cables	Cable which connects the wind turbines to each other and to the offshore substation(s).
Intertidal	Area where the ocean meets the land between high and low tides.
Landfall	The location at the land-sea interface where the offshore export cable will come ashore.
National Grid's OnSS	Onshore substation which is owned and operated by National Grid
Outer Dowsing Offshore Wind (ODOW)	The Project.
Offshore Export Cable Corridor (ECC)	The Offshore Export Cable Corridor (Offshore ECC) is the area within the Preliminary Environmental Information Report (PEIR) Boundary within which the export cable running from the array to landfall will be situated.
Offshore Substation (OSS)	Platforms located within the array area which house electrical equipment and control and instrumentation systems. They also provide access facilities for work boats and helicopters.

Term	Definition
Offshore Reactive Compensation Platform (ORCP)	Platforms located outside the array area which house electrical equipment and control and instrumentation systems. They also provide access facilities for work boats.
Onshore Export Cable Corridor (ECC)	The Onshore Export Cable Corridor (Onshore ECC) is the area within which the export cable running from the landfall to the onshore substation will be situated.
Onshore substation (OnSS)	The Project's onshore substation, containing electrical equipment to enable connection to the National Grid
Onshore Infrastructure	The combined name for all onshore infrastructure associated with the Project from landfall to grid connection.
Pre-construction and post-construction	The phases of the Project before and after construction takes place.
Preliminary Environmental Information Report (PEIR)	The PEIR is written in the style of a draft Environmental Statement (ES) and provides information to support and inform the statutory consultation process in the pre-application phase. Following that consultation, the PEIR documentation will be updated to produce the Project's ES that will accompany the application for the Development Consent Order (DCO).
PEIR Boundary	The PEIR Boundary is outlined in Figure 3.1 of Volume 1, Chapter 3: Project Description and comprises the extent of the land and/or seabed for which the PEIR assessments are based upon.
Receptor	A distinct part of the environment on which effects could occur and can be the subject of specific assessments. Examples of receptors include species (or groups) of animals or plants, people (often categorised further such as 'residential' or those using areas for amenity or recreation), watercourses etc.
study area	Area(s) within which environmental impact may occur – to be defined on a receptor-by-receptor basis by the relevant technical specialist.
The Applicant	GT R4 Ltd. The Applicant making the application for a DCO. The Applicant is GT R4 Limited (a joint venture between Corio Generation, TotalEnergies and Gulf Energy Development (GULF)), trading as Outer Dowsing Offshore Wind. The project is being developed by Corio Generation (a wholly owned Green Investment Group portfolio company), TotalEnergies and GULF.
The Planning Inspectorate	The agency responsible for operating the planning process for Nationally Significant Infrastructure Projects (NSIPs).
The Project	Outer Dowsing Offshore Wind including proposed onshore and offshore infrastructure
Transition Joint Bay (TJBs)	The offshore and onshore cable circuits are jointed on the landward side of the sea defences/beach in a Transition Joint Bay (TJB). The TJB is an underground chamber constructed of reinforced concrete which provides a secure and stable environment for the cable.
Trenchless technique	Trenchless technology is an underground construction method of installing, repairing and renewing underground pipes, ducts and cables using techniques which minimize or eliminate the need for excavation. Trenchless technologies involve methods of new pipe installation with minimum surface and environmental disruptions. These techniques may include Horizontal Directional Drilling (HDD), thrust boring, auger boring, and pipe ramming, which allow ducts to be installed under an obstruction without breaking open the ground and digging a trench.
Subsea	Subsea comprises everything existing or occurring below the surface of the sea.
Wind turbine generator (WTG)	All the components of a wind turbine, including the tower, nacelle, and rotor.

4 Site Selection and Consideration of Alternatives

4.1 Introduction

4.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) provides a description of the site selection process and the approach followed by Outer Dowsing Offshore Wind ("the Project"). This chapter also provides information on the alternatives considered for both the onshore and offshore elements of the Project.

4.1.2 GTR4 Limited (trading as Outer Dowsing Offshore Wind) hereafter referred to as the 'Applicant', is proposing to develop the Project. The Project will be located approximately 54km from the Lincolnshire coastline in the southern North Sea. The Project will include both offshore and onshore infrastructure including an offshore generating station (windfarm), export cables to landfall, onshore cables, and connection to the electricity transmission network, and ancillary and associated development (see Volume 1, Chapter 3: Project Description for full details).

4.1.3 This chapter outlines the staged approach to defining the spatial boundaries and constituent parts of the Project. It also explains and details the main alternatives considered for the Project, including location and infrastructure options, in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the EIA Regulations); the Marine Works (Environmental Impact Assessment) Regulations 2017 (as amended); Conservation of Habitats and Species Regulations 2017 and The Conservation of Offshore Marine Habitats and Species Regulations 2017. Whilst there is no legal requirement to consider alternatives for the purposes of an EIA, where they have been considered, the Environmental Impact Assessment (EIA) Regulations require that these should be described and the main reasons for the choice between alternative options described (including for example, relevant environmental, social, technical and economic factors). The Overarching National Policy Statement for Energy (NPS EN-1) highlights the approach to the consideration of alternatives under the applicable EIA Regulations and also in relation to the Habitats Regulations Assessment (HRA) process.

4.1.4 More detail on the legislative obligations and the information to be provided is set out in Volume 1, Chapter 2: Need, Policy, and Legislative Context, and throughout this chapter where relevant to the consideration of site selection and alternatives.

Site and Route Selection Overview and Background

Selection of the Project Array Area

4.1.5 In October 2019, The Crown Estate (TCE) launched Offshore Wind Leasing Round 4 (commonly referred to as Round 4) for seabed rights to develop offshore wind projects in English and Welsh waters. The Round 4 leasing process offered seabed rights for offshore wind development within four bidding regions (North Wales & Irish Sea, Eastern, South East, and Dogger Bank - see Figure 4.4.) with a total capacity of circa 8 giga Watts (GW). The process consisted of three stages.

4.1.6 Following an initial prequalification stage (PQQ), at Stage 1 eligible bidders were required to identify a portfolio of sites on which they may choose to bid in each and any of the bidding regions and within a set of rules established by TCE (including an evaluation of environmental constraints measured against environmental characterisation for each region provided by TCE). Where those sites were accepted by TCE through evaluation of the Stage 1 submissions, Stage 2 saw bids being placed in a competitive auction process for areas up to 500km^2 and for a development capacity of up to 1500MW.

4.1.7 Following the Stage 2 auction process, the Applicant was awarded Preferred Bidder status for the Project array area, located in the Eastern bidding region, in February 2021.

4.1.8 TCE subsequently undertook a Plan-Level Habitats Regulations Assessment (HRA) for Round 4 that was completed in July 2022 (following the approval of a Plan-level derogation requirement by the Secretary of State). The Agreement for Lease (AfL) for the Project was signed by the Applicant in January 2023.

4.1.9 Since being awarded Preferred Bidder status in February 2021, the Applicant has been progressing the development of the Project, with survey campaigns commencing in March 2021 (aerial ornithology and marine mammal surveys), and the EIA Scoping Report for the Project being published in July 2022 (ODOW, 2022).

4.1.10 As part of the AfL with TCE, the Project must reduce the array area boundary to meet an energy density requirement of 5MW per km^2, from the current 3MW/km^2 prior to construction. This equates to a reduction in the array area from the current 500km^2 to approximately 300km^2. The Project intends to make this reduction prior to the Application. Full details of the final reduced area and the rationale for the final site selection will be provided in the Environmental Statement (ES).

Route and Site Selection of the Electrical Transmission Infrastructure

4.1.11 Subsequent to the award of Preferred Bidder status, the Applicant commenced work to determine options for the connection of the Project to the National Grid electricity transmission system , through the development of offshore and onshore export cable route options, cable landfall options and grid connection options (interface points with the transmission network).

4.1.12 The grid connection options (and therefore to a great extent the export cable routing and onshore substation siting) has been predominantly driven by the Offshore Transmission Network Review (OTNR)[1] which was launched by UK Government in July 2020. The OTNR evaluated grid connection options for all Round 4 projects, leading to a Holistic Network Design (HND) and identification of specific grid connection options for the Project.

4.1.13 In addition, the TCE Plan level HRA process, whilst focusing predominantly on the potential effects arising from the Project array area, nonetheless gave some consideration to offshore export cabling, and the conclusions and outcomes of the Plan level HRA have been relevant to developing and evaluating the offshore export cable route options.

Offshore Transmission Network Review (OTNR) and the Pathway to 2030 Holistic Network Design (HND)

4.1.14 For offshore wind projects developed under previous leasing rounds, the onshore grid connection location had been determined by National Grid following a grid connection application made by a project, through the Connection and Infrastructure Options Note (CION) process, with the applicant developing the offshore and onshore cable route and selecting the onshore substation (OnSS) site following confirmation of the grid connection point determined by the CION process.

4.1.15 However, this process has now been superseded by the OTNR process initiated by the UK Government in response to the Committee for Climate Change 2020 call to *'Develop a strategy to coordinate interconnectors and offshore networks for windfarms and their connections to the onshore network and bring forward any legislation necessary to enable coordination'*.

[1] https://www.gov.uk/government/groups/offshore-transmission-network-review

4.1.16 The OTNR was established by the Secretary of State for the Department of Business, Enterprise and Industrial Strategy (BEIS) (now the Department for Energy Security and Net Zero (DESNZ)) in July 2020 to look into the way that the offshore transmission network is designed and delivered, consistent with the ambition to deliver net zero emissions by 2050 and more immediately the Government's ambition to deliver 50GW of offshore wind by 2030.

4.1.17 BEIS (now DESNZ) is leading the OTNR with support from a range of government and industrial bodies, including TCE and CES, the Department for the Environment, Farming and Rural Affairs (Defra), Marine Scotland, the Marine Management Organisation (MMO), the Ministry of Housing, Communities and Local Government (now Department for Levelling Up, Housing and Communities (DLUHC)), National Grid Electrical System Operator (NGESO), the Office of Gas and Electricity Markets (Ofgem) and Welsh Government. An advisory group was established which additionally included offshore wind developers, network operators, technical and environmental advisers and stakeholders.

4.1.18 The OTNR established four workstreams looking at the delivery of offshore wind to meet the 2050 targets, as follows (summarised from BEIS OTNR presentation, December 2020[2]):

Workstream	Description
Early Opportunities	▪ Identify inflight projects which could be coordinated by leveraging flexibility within the existing regime or by making small changes to current processes. ▪ Some projects are likely to be too far in the development process to implement changes without major commercial consequences.
Pathway to 2030	▪ Support the achievement of 40GW[3] of offshore wind generation by 2030 through exploring opportunities for centralised planning and delivery of onshore and offshore grid infrastructure. ▪ Focus on a subset of existing planned and possibly new projects with connections planned in the late 2020s and early 2030s.
Enduring Regime	▪ Developing options for the enduring regime as well as designing and implementing regulatory changes to current frameworks required to enable coordination. ▪ Enduring regime will apply to projects coming through from future seabed leasing, with the potential also to benefit projects emerging from Leasing Round 4 and ScotWind (2021).
Multi-purpose interconnectors	▪ Making tactical changes to enable the delivery of early opportunity Multi-Purpose interconnectors. ▪ Developing an enduring regime to effectively deliver projects from 2030 onwards.

4.1.19 Alongside the OTNR, Ofgem undertook a consultation on the regulatory regime to deliver changes to the transmission regime aligned with the themes of the OTNR.

2 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/946574/presentation-17-10-20.pdf

3 Whilst the presentation states 40GW, it is widely acknowledged that the target is 50GW.

4.1.20 BEIS and Ofgem requested that National Grid NGESO undertake a Holistic Network Design (HND) process in consultation with a Central Design Group (CDG) and working under a Terms of Reference (ToR). The HND ToR required NGESO to deliver an HND that considered the onshore and offshore network required to connect offshore wind and also required the HND to be economic and efficient, deliverable and operable, and minimise the impact on the environment and local communities.

4.1.21 More specifically, the purpose of the Pathway to 2030 HND was to provide a recommended onshore and offshore design for a 2030 network that would facilitate the UK Government ambition for 50GW of offshore wind in Great Britain by 2030. In line with the ToR, the HND connects 23GW of offshore wind, which combined with the existing and planned offshore wind projects that are out-of-scope of the HND, facilitates the connection of up to 50GW by 2030. The HND was informed by the Network Options Assessment (NOA), which identified the wider network reinforcements needed to improve the capability of the network. The NOA 2021/22 publication has been refreshed to integrate the offshore network design and provide an updated view on the required onshore network reinforcements necessary to produce the HND.

4.1.22 The HND has been delivered by NGESO in consultation with the CDG. The onshore Transmission Operators (TOs) have also played a key role in the process, by identifying onshore interface options and providing options and cost estimates for wider network reinforcements.

4.1.23 Of importance to the Project is that the HND specifically covers the connection of all Round 4 projects (i.e. incorporating Round 4 into the capacity to be connected as part of the pathway to 2030 workstream of the OTNR), as well as a proportion of ScotWind projects and capacities for future development in certain other regions and locations.

4.1.24 The HND process considered a "radial" counterfactual and a "coordinated" option for each project and at a number of potential connection locations (plus noting any wider reinforcement works required to facilitate) and undertook a comparative evaluation for each option equally weighting economic cost, deliverability and operability, and environmental and societal impacts.

4.1.25 At an early stage NGESO identified a study area for the East coast projects of relevance to the HND (including the Project), which encompassed grid connection options across Yorkshire, Lincolnshire, and Norfolk (discussed in Section 4.5). These were refined as the HND study progressed with the HND recommendations being published in July 2022, identifying two possible connection options for the Project in Lincolnshire: one at the 'Lincolnshire Node', and one at Weston Marsh (discussed in Section 4.6). At the time of writing, the final grid connection option has not been determined and remains the subject of ongoing evaluation by the ESO, with no grid connection offer having been made to the Applicant.

4.1.26 The Applicant was in discussion with the HND throughout the development of the process and provided information to support the HND work. In parallel the Applicant progressed a number of options for grid connection and associated cable route and substation sites, aligned with the options that were developed and evaluated by the HND, in order to ensure the development could progress, as far as possible, in parallel with the HND process. This site selection and alternatives report sets out the detail of those options and their evaluation focusing on the grid connection locations that were ultimately identified by the HND.

Round 4 Plan-Level HRA Cable Routing Considerations

4.1.27 Due to the uncertainty associated with the potential grid connection locations at the time of the Round 4 leasing process and the subsequent plan level HRA process, and therefore the uncertainty over the offshore export cable routing between the Round 4 projects and the grid, the TCE Plan level HRA assessment necessarily focussed on the impacts from the offshore array infrastructure. However, TCE did undertake some high-level determination and appraisal of offshore cabling constraints for the Round 4 projects (Figure 4.1) using assumed broad 'cable regions' to ensure that the Plan-Level HRA had fully considered potential impacts arising from the plan.

4.1.28 To enable this, TCE defined a study area for the expected cable routes from each of the Round 4 project array areas to the adjacent coastline. For the Project, this study area comprised an area of sea from the array area to both the Lincolnshire and southern Yorkshire coastlines (noting that the Plan-Level HRA offshore export cable study area was somewhat smaller than the grid connection study area evaluated by NGESO for the HND for the relevant East coast Round 4 projects).

4.1.29 The Plan-Level HRA (TCE, 2022) was able to conclude that no adverse effects on the National Site Network would occur as a result of offshore export cable connections for all but one of the Round 4 projects, on the basis of a set of mitigations developed by TCE. These mitigations therefore form relevant considerations for identifying and evaluating potential offshore export cable routes for the Project. The mitigations apply to sites depending on their classification as Black, Red, Amber or Green as below – the classification of relevant SACs are presented within TCE (2022):

- Green (low risk): no specific measures but activities to be undertaken in line with industry best practice (e.g. application of an environmental management plan, pollution control plan and spillage response plan, and adherence to international conventions such as International Convention for the Prevention of Pollution from Ships (MARPOL) and International Regulations for Preventing Collisions at Sea (COLREGS).
- Amber (low – medium risk): specific detail must be provided to The Crown Estate at the route selection and refinement stage. Cable route selection studies should be undertaken with a detailed evidence document provided outlining the process completed to identify the proposed export cable route(s) as well as feature specific information.
- Red (high risk): affected developers must avoid irreparable damage (loss of a non-recoverable habitat) to these red risk features. Evidence should be submitted to The Crown Estate at the route selection and refinement stage outlining avoidance measures, mitigation and installation methods to reduce impacts depending on the type of risk.
- Black (high risk): affected developers must spatially avoid these black risk features. Evidence should be submitted to The Crown Estate at the route selection and refinement stage outlining the avoidance of these features.

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6000000 5950000 5900000 5850000 5800000

N

CREYKE BECK

YA

GRIMSBY WEST

LC

LINCOLNSHIRE NODE

LB

LA

WESTON MARSH

North York Moors National Park

Scarborough

Kingston upon Hull

Scunthorpe

Grimsby

Lincoln

Boston

Grantham

Peterborough

Corby

Ely

Norwich

The Broads Authority

Great Yarmouth

Lowestoft

M62

M18

A1(M)

Legend

- Array Area
- Onshore Substation
- Offshore ECC Area of Search
- Landfall Sector
- OTNR Area of Search
- Plan Level HRA Cable Route Area of Search

Coordinate System: WGS 1984 UTM Zone 31N

0 25 50 km

Scale: 1:900,000

Preliminary Environmental Information Report

Offshore Area of Search and Potential Onshore Connection Locations

Figure 4.1

OUTER DOWSING OFFSHORE WIND

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GoBe

EIA/HRA Regulations

4.1.30 Schedule 4 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (hereafter the EIA Regulations) requires that an Environmental Statement includes:

"a description of the reasonable alternatives (for example in terms of project 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".

4.1.31 There is no requirement in the EIA Regulations to assess all potential options, only to provide a description of those that have been considered.

4.1.32 Furthermore, under the Conservation of Habitats and Species Regulations 2017 and The Conservation of Offshore Marine Habitats and Species Regulations 2017, a consideration of alternatives to the proposed project may be required where the development is likely to have a significant effect on a European Site that may adversely affect its integrity.

4.1.33 This chapter of the PEIR provides a description of the reasonable spatial alternatives that have been considered by the Applicant for the Project and, where appropriate, presents a comparison of the environmental effects and technical and/or commercial feasibility between the various options. In some cases (for example, the array layout) alternative options form part of the proposal at this stage and assessment of the range of development detail proposed within the design envelope (as set out in Volume 1, Chapter 3: Project Description) has been considered in detail in the relevant chapters of this PEIR.

Planning Inspectorate Advice Notes

4.1.34 The Planning Act 2008 (as amended) (2008 Act), and related secondary legislation, establishes the legislative requirements in relation to applications for orders granting development consent for Nationally Significant Infrastructure Projects (NSIPs) (for further detail refer to Volume 1, Chapter 2: Need, Policy, and Legislative Context).

4.1.35 The Planning Inspectorate (The Inspectorate) Advice Note Seven: Environmental Impact Assessment (The Inspectorate, 2020) suggests that the EIA needs to explain:

"the reasonable alternatives considered and the reasons for the chosen option taking into account the effects of the Proposed Development on the environment".

4.1.36 The Inspectorate Advice Note Ten: Habitats Regulations Assessment relevant to nationally significant infrastructure projects (The Inspectorate, 2022) identifies the requirement for a consideration of alternative solutions in the event that an adverse effect on integrity on a European site and its features is concluded.

National Policy Statements

4.1.37 From a policy perspective, the National Policy Statement (NPS) for Renewable Energy Infrastructure (NPS EN-3) does not contain a general requirement to consider alternatives or to establish whether the proposed project represents the best option.

4.1.38 However, consideration is given in paragraph 4.2.15 of NPS EN-1 to the requirements under the EIA Regulations, Habitats Regulations and Offshore Habitats Regulations regarding the consideration of alternatives, notably:

" Applicants are obliged to include in their ES, information about the reasonable alternatives they have studied. This should include an indication of the main reasons for the applicant's choice, taking into account the environmental, social and economic effects and including, where relevant, technical and commercial feasibility"; and

"In some circumstances, the NPSs may impose a policy requirement to consider alternatives."

4.1.39 Requirements under the Habitats Regulations and the Offshore Habitats Regulations will be addressed in the draft Report to Inform Appropriate Assessment (RIAA). Where there is a policy or legal requirement to consider alternatives, paragraph 4.2.21 of NPS EN-1 highlights other guiding principles that the Secretary of State should consider when deciding what weight should be given to alternatives, specifically:

"…the consideration of alternatives in order to comply with policy requirements should be carried out in a proportionate manner;

The Secretary of State should be guided in considering alternative proposals by whether there is a realistic prospect of the alternative delivering the same infrastructure capacity (including energy security, climate change, and other environmental benefits) in the same timescale as the proposed development.

The Secretary of State should not refuse an application for development on one site simply because fewer adverse impacts would result from developing similar infrastructure on another suitable site, and it should have regard as appropriate to the possibility that all suitable sites for energy infrastructure of the type proposed may be needed for future proposals.

Alternatives not among the main alternatives studied by the applicant (as reflected in the ES) should only be considered to the extent that the Secretary of State thinks they are both important and relevant to the decision;

As the Secretary of State must assess an application in accordance with the relevant NPS (subject to the exceptions set out in section 104 of the Planning Act 2008), if the Secretary of State concludes that a decision to grant consent to a hypothetical alternative proposal would not be in accordance with the policies set out in the relevant NPS, the existence of that alternative is unlikely to be important and relevant to the Secretary of State's decision;

Alternative proposals which mean the necessary development could not proceed, for example because the alternative proposals are not commercially viable or alternative proposals for sites would not be physically suitable, can be excluded on the grounds that they are not important and relevant to the Secretary of State's decision;

Alternative proposals which are vague or inchoate can be excluded on the grounds that they are not important and relevant to the Secretary of State's decision;

It is intended that potential alternatives to a proposed development should, wherever possible, be identified before an application is made to the Secretary of State (so as to allow appropriate consultation and the development of a suitable evidence base in relation to any alternatives which are particularly relevant). Therefore, where an alternative is first put forward by a third party after an application has been made, the Secretary of State may place the onus on the person proposing the alternative to provide the evidence for its suitability as such and the Secretary of State should not necessarily expect the applicant to have assessed it,. and

Through the Environment Act 2021 the Government has set 13 legally binding targets for England covering the areas of: biodiversity; air quality; water; resource efficiency and waste reduction; tree

and woodland cover; and Marine Protected Areas. The Secretary of State must consider duties under the Environment Act 2021 in relation to environmental targets and have regard to the policies set out in the Government's Environmental Improvement Plan for improving the natural environment.

4.1.40 The NPS for Renewable Energy Infrastructure (NPS EN-3) states at paragraph 2.6.81 that the applicant should include an assessment of the effects of installing cable across the intertidal zone which should include information, where relevant, about:

" any alternative landfall sites that have been considered by the applicant during the design phase and an explanation for the final choice"; and

" any alternative cable installation methods that have been considered by the applicant during the design phase and an explanation for the final choice."

Draft National Policy Statements

4.1.41 It is noted that all NPSs are subject to ongoing revision, with a draft suite of NPSs produced for consultation in 2021. Revised drafts of the NPSs were published for consultation in March 2023. At the time of writing the NPSs have not been amended, however, the revised drafts include elements of relevance to the site selection of certain offshore wind developments.

4.1.42 Draft NPS for electricity networks infrastructure (EN-5) states the following, at paragraph 2.13.5:

" Radial offshore transmission options to single windfarms should only be proposed where options assessment work identifies that a co-ordinated solution is not feasible. For OTNR Early Opportunities projects, co-ordinated design work should be brought forward by applicants."

4.1.43 In March 2022 Ofgem confirmed that the connection for the Project should be a radial connection, and that, as such, no opportunities for coordination with other projects are possible.

4.1.44 This PEIR has been prepared taking account of the March 2023 draft NPSs. It is expected that the revised NPSs will be finalised prior to submission of the application.

Marine Policy Statement

4.1.45 The Marine Policy Statement (MPS) adopted by all UK administrations in March 2011 provides the policy framework for the preparation of marine plans, establishing how decisions affecting the marine area should be made in order to enable sustainable development. 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.

4.1.46 The objectives of the East Inshore and East Offshore Marine Plans (adopted in 2014) (and relevant policies established under them) are relevant to decision making and should be considered from the outset of development to ensure policy compliance.

The Horlock and Holford Rules

4.1.47 For the OnSS site selection, reference has been made to the National Grid Guidelines on Substation Siting and Design ('The Horlock Rules') (National Grid, undated(a)). These guidelines document National Grid's best practice for the consideration of relevant constraints associated with the siting of electricity network infrastructure.

4.1.48 In addition, National Grid employs the 'Holford Rules' (National Grid, undated(b)) as guidelines on overhead line routing. Whilst environmental assessment for overhead lines addresses wider topics than the visual amenity issue on which the Rules concentrate, they remain a valuable tool in selecting and assessing potential onshore route options as part of the environmental assessment process. They also provide the context which supports the Project decision to underground the cables, rather than develop overhead line s, for connection to the National Grid substation connection point.

Other Relevant Guidance

4.1.49 Offshore routeing options have had due regard to the following guidance:

- The Crown Estate (2012) Guidance on the Principles of Cable Routeing and Spacing;
- The Crown Estate (2017) Cable Route Protocol;
- The Crown Estate (2019) Plan-level Habitats Regulations Assessment for Round 4 (and associated mitigation measures);
- The Crown Estate (2021) Cable Route Identification and Leasing Guidelines: Transmission Assets Infrastructure for Offshore Renewable Installations; and
- The Crown Estate Offshore Transmission Application for Agreement for Lease requirements (unpublished).

4.2 Consultation

4.2.1 This PEIR is supported by two key documents that outline the Project's consultation to date; PEIR Chapter 6 Consultation Process (document 6.1.6), which focuses on the Project's Evidence Plan Process (EPP) to date and the Consultation Summary Report (document 5.1), which focuses on public, community, local council and landowner consultation. The feedback from these consultations and how they have influenced the Project's design to date is outlined in the respective documents.

4.2.2 As with all major infrastructure development projects, the site selection and design process for the Project has undergone various iterations, involving early engagement with stakeholders, communities, and landowners to seek input to refine the key elements of the Project.

4.2.3 Consultation on refinements to the Project's sites' selection alternative, the route, layout and configuration have been undertaken through informal and formal consultation, and bilateral engagement with individual stakeholders. Feedback received has been taken into consideration throughout, via a range of means including (but not exclusively limited to), further details can be found in the Consultation Summary Report (document 5.1):

- The Scoping Report (August 2022) sets out the development of the site selection and consideration of alternatives at the scoping stage;
- The Inspectorate's Scoping opinion (September 2022) sets out the Inspectorate's (and other statutory consultees) formal response to the scoping Report;
- 1st round of Public Information Days held at four public venues in southern Lincolnshire during October 2022;
- 2nd round of Public Information Days on the alternative Weston Marsh ECC route held at two public venues in southern Lincolnshire during February 2023;
- County and District Council briefings;
- Evidence Plan Process (EPP) Expert Topic Group (ETG) meetings,
- Community Liaison Group (CLG) meetings held in November 2022, February 2023 and April 2023
- Regular bilateral engagement with key stakeholders (including but not limited to Natural England, MMO, shipping navigation stakeholders, local planning authorities, etc), and
- Engagement with landowners across the onshore route options and around the substation zones.

4.2.4 Details of these various engagements are provided in:

- Chapter 3 Project Description (document 6.1.3)– an overview of the consultation undertaken in the context of project design decisions;
- Chapter 5 EIA Methodology (document 6.5.3) – an overview of the consultation undertaken in the context of the wider EIA process;
- Chapter 6 Consultation Process (document 6.5.6),
- Consultation Summary (document reference 5.1); and
- Statement of Community Consultation (SoCC) (document reference 5.1.1) – providing the methodology to consult on the development of the Project to date.

4.2.5 Each of the technical chapters Volume 1, Chapter 7 - 31 of this PEIR, also include a consultation section which summarise the consultation undertaken to date to inform and focus the approach to each technical aspect of the environmental assessment. Specific details of how the Project has taken account of the comments received are also provided in each chapter of the PEIR where relevant.

4.3 Site Selection and Alternatives Approach

Overview

4.3.1 Alternative options for methods of construction, operation and maintenance (O&M) and decommissioning have been considered alongside different technologies and materials within each individual PEIR chapter (Volume 1, Chapters 7 to 31) in order to assess and compare, so far as possible at this stage in the Project, the potential environmental effects.

4.3.2 In relation to the selection of the array area, offshore reactive compensation platforms, offshore and onshore export cable routes and landfall options, and the selection of onshore substation site options and the evaluation of the alternative options considered, Figure 4.2 summarises the process completed to date.

4.3.3 The development of options has been subject to consultation with a variety of key statutory and non-statutory stakeholders and, particularly with regard to onshore aspects with relevant local communities and landowner interests (see Section 4.2).

4.3.4 The following structure has been adopted and is subsequently described:

- Stage 1 – Identification of the array area;
- Stage 2 – Identification of the landfall zones;
- Stage 3 – Offshore refinement of the Project;
- Stage 4 – Identification of offshore export cable corridor (ECC), including the offshore reactive compensation platform search area (ORCP);
- Stage 5 – Identification of proposed onshore substation (OnSS) location;
- Stage 6 – Identification of the onshore ECC; and
- Stage 7 – Onshore refinement of the Project.

4.3.5 Development of the Project has continued since the production of the Scoping Report in July 2022, and this process will continue through and beyond the PEIR stage, being informed by engagement with stakeholders, ongoing engineering design and feasibility work, consideration of additional survey data and assessment outcomes, and following receipt of the statutory consultation responses informed by this PEIR. A Consultation Report which will accompany the final DCO application, will provide a record of how the Project has had regard to the responses received to the consultation.

4.3.6 An overview of the process of site selection, and the associated consultation that has informed the Project design is illustrated in Figure 4.2 and Figure 4.3.

4.3.7 It is important to note that whilst the site selection process is illustrated and described as a linear approach in this chapter for ease of presentation, the reality of any project development is that site selection is an ongoing, inter-related and iterative process with decisions made having considered multiple factors. Decisions on site selection are required at various stages to enable the Project to progress and are based on the best information available at the time.

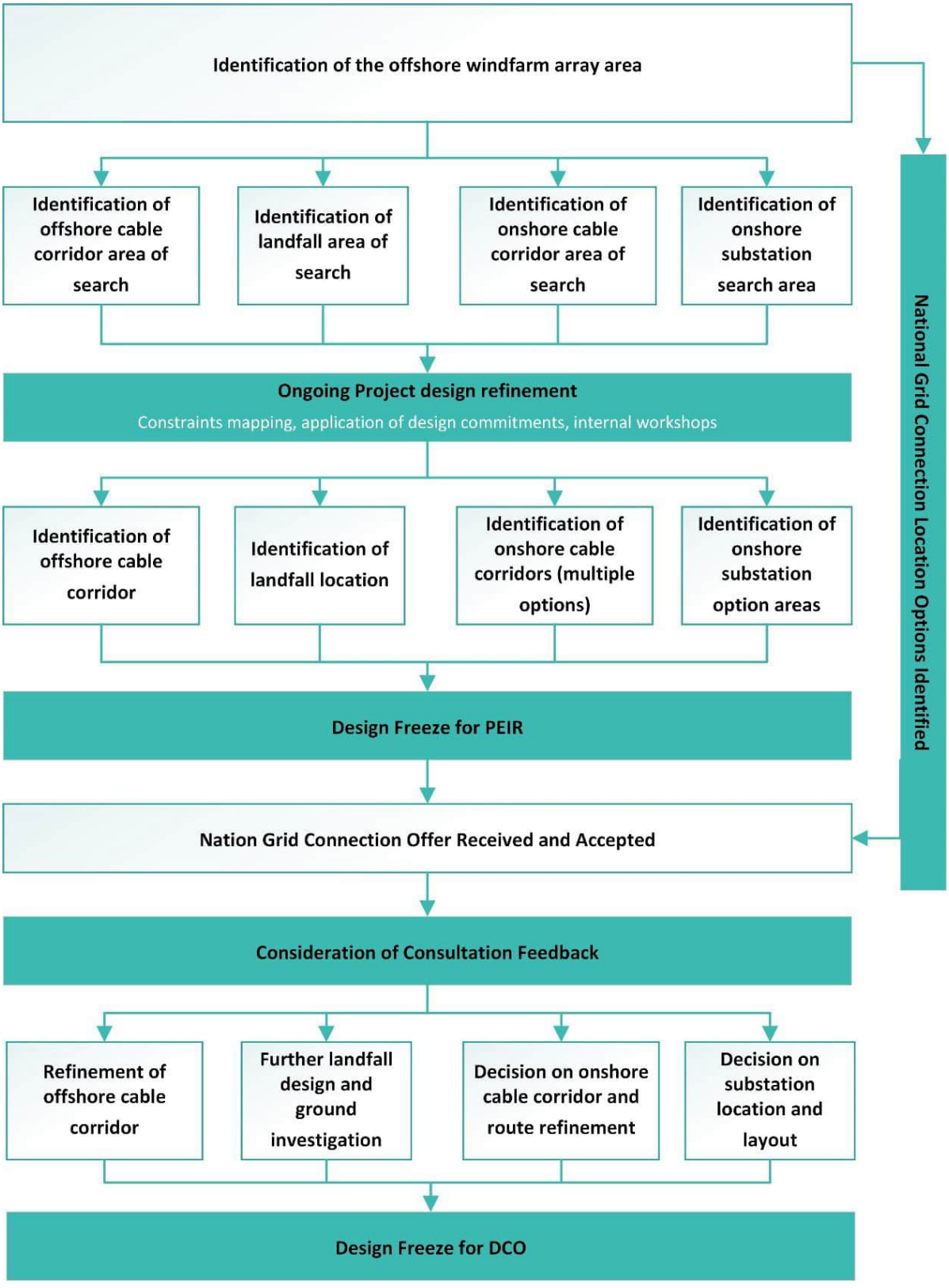


Figure 4.2: Design stages overview

Other Considerations

4.3.8 In addition to the specific constraints discussed throughout this chapter, a number of fundamental principles have been applied to the site selection process These are drawn from the experience of the Project and based on the technical expertise of consultants supporting the process and include, but are not limited to:

- A preference for the shortest route for cable routing to reduce environmental and social impacts by minimising footprint for the offshore and onshore ECCs, as well as minimising cost (hence ultimately reducing the cost of energy to the consumer) and minimising transmission losses;
- Avoidance, wherever feasible, of key sensitive features and where not, seeking to mitigate any resulting impacts;
- Minimising the disruption to populated areas; and
- The need to accommodate the maximum Project design envelope for the ECC and OnSS.

4.3.9 The site selection process for the Project has been iterative, taking account of key locational decisions. This process began with the identification of the Project's array location and, with the identification by NGESO of the two connection options proposed as a result of the HND - Lincolnshire Node and Weston Marsh. This in turn informed the location of the onshore infrastructure. The iterative process of constraints mapping, assessment and continued consultation undertaken to date has been key in the identification of project design for the offshore ECC, landfall, onshore ECCs and OnSS study areas.

4.3.10 The overall aim of the process is to understand the relevant constraints (environmental, engineering/technical and economic) to ensure that the adopted locations are robust and deliverable. The final design of the Project will aim to minimise impacts on the environment and communities whilst ensuring that the lowest cost of energy can be passed to consumers.

4.3.11 Prior to starting each stage of the site selection process (as identified in Figure 4.2), a series of transparent design principles and engineering assumptions were identified, which guided the decisions made at each stage. These design principles and engineering assumptions covered environmental, physical, technical, commercial and social considerations and opportunities, and are set out against each Project component in the following sections.

4.3.12 Figure 4.3 provides a schematic of the main steps for the Project's site selection process for each of the primary project components, including the phases that will follow the statutory consultation process, informed by this PEIR. Additional information is considered at each stage in the process to further narrow down the options to those where the environmental and social effects are considered manageable (i.e., where fewer sensitive or valued receptors could be affected) and the technical and cost implications are acceptable. The utilisation of a detailed black, red, amber, green (BRAG) assessment has been used as one of a number of tools (including site visits, workshops, and professional experience from other offshore wind projects) to quantitatively, where possible, indicate the magnitude of constraints associated with each site and route option, and thus ensure consideration of the alternatives and the selection (and subsequent design and mitigation refinements) of the preferred options.

Figure 4.3 Project site selection timeline

4.4 Stage 1 – Identification of the Array Area

Overview

4.4.1 As noted previously, the design process is often illustrated as a linear or multi-linear process for the purposes of presentation. It is however important to note that the Project has undergone an iterative design and site selection process, to ensure the Project can make the greatest contribution to renewable energy targets as possible, whilst minimising environmental impacts and following principles of good design.

4.4.2 The following section therefore describes the process of identifying the array boundary through the Round 4 leasing process and through the initial development phases up to statutory consultation, informed by this PEIR.

4.4.3 Following the statutory consultation process, and to align with the requirements of the TCE lease process, the current 500km^2 array area will be reduced to 300km^2. The Applicant expects to undertake this revision prior to the making of the DCO application and through consideration of the available data and information gathered to inform this PEIR and with due regard to the consultation responses received.

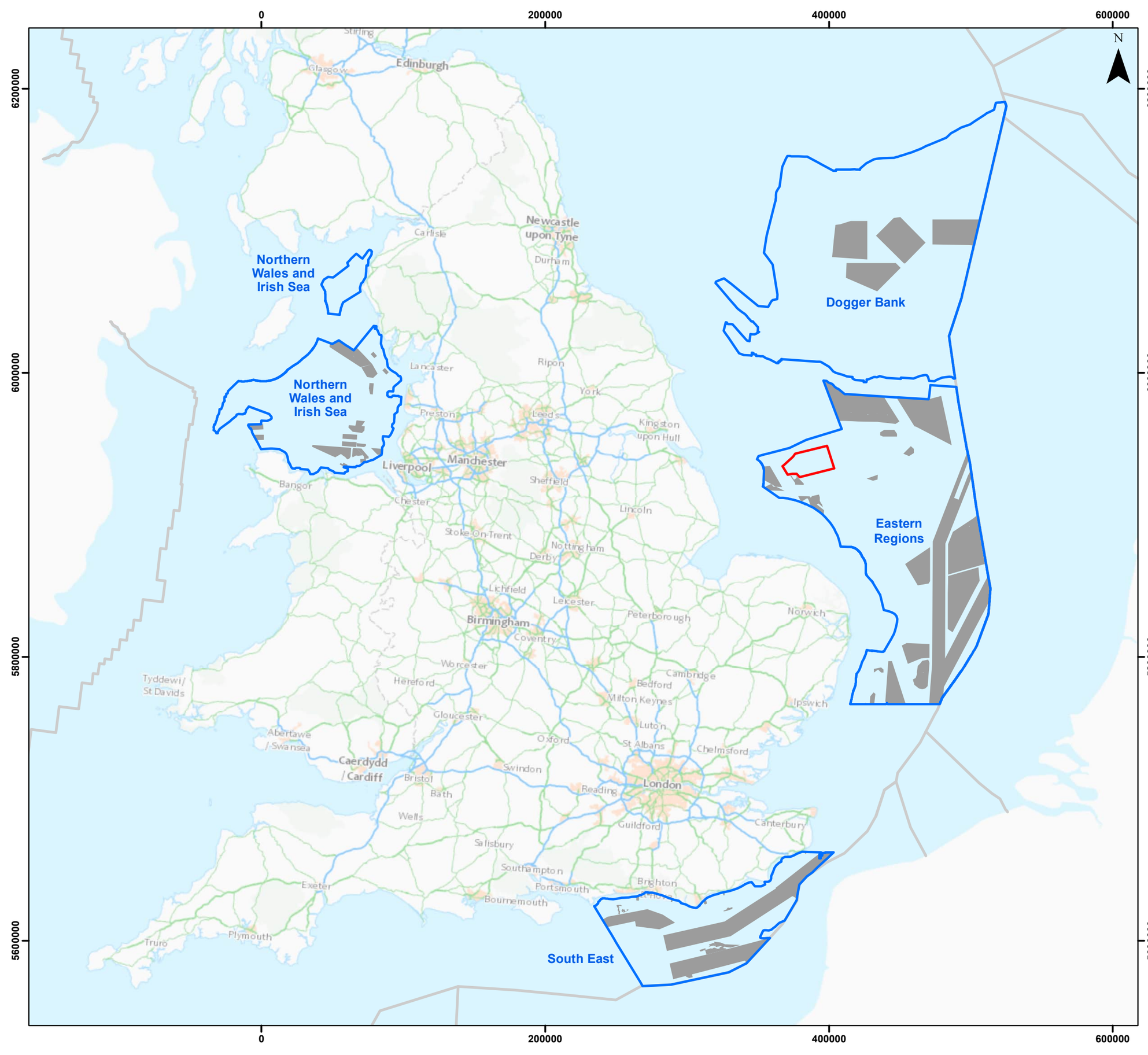
Agreement for Lease (AfL) Boundary - Site Selection

4.4.4 As noted in section 4 of this chapter, the array area was selected in response to the Round 4 leasing process adopted by TCE to issue rights to develop up to circa 8GW of offshore wind in four bidding regions (North Wales & Irish Sea, Eastern, South East, and Dogger Bank).

4.4.5 As part of the process, TCE undertook a detailed characterisation of the bidding areas and amended the boundaries within which sites could be located through an iterative process; the bidding areas were subject to environmental characterisation by TCE which identified, on a bidding region scale, some of the key environmental constraints that might be encountered. The Round Four Bidding Regions are included in Figure 4.4.

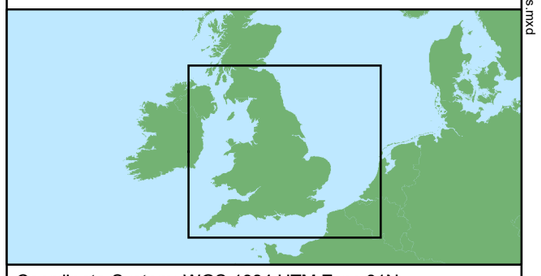
4.4.6 In response, the Applicant undertook GIS based constraints mapping and evaluation to mirror the process completed by TCE and to identify within the bidding regions, preferred sites. This included an evaluation of potential environmental constraints and issues (adopting TCE's own environmental characterisation as a framework); at this stage all of the Applicant's sites were approved by TCE and the Applicant entered the Stage 2 auction process, ultimately being awarded Preferred Bidder status for the Project in February 2021.

4.4.7 The Applicant identified possible sites for bidding using a GIS based constraints mapping process but also more broadly considering potential issues for the consenting process, including an evaluation of possible HRA risk (i.e. potential effects on designated sites) and likely requirements for mitigation and compensation. This evaluation followed a step-wise process to identify potential development sites including the Project array area (including boundary placement and alignment), as summarised in Figure 4.5.



Legend

- ODOW Array Area
- TCE Round Four Bidding Areas
- TCE Round Four Hard Constraints
- EEZ Boundaries



Coordinate System: WGS 1984 UTM Zone 31N

0 50 100 km

Scale: 1:2,500,000

Preliminary Environmental Information Report

Round Four Bidding Regions and the Project Array Area

Figure 4.4

OUTER DOWSING OFFSHORE WIND

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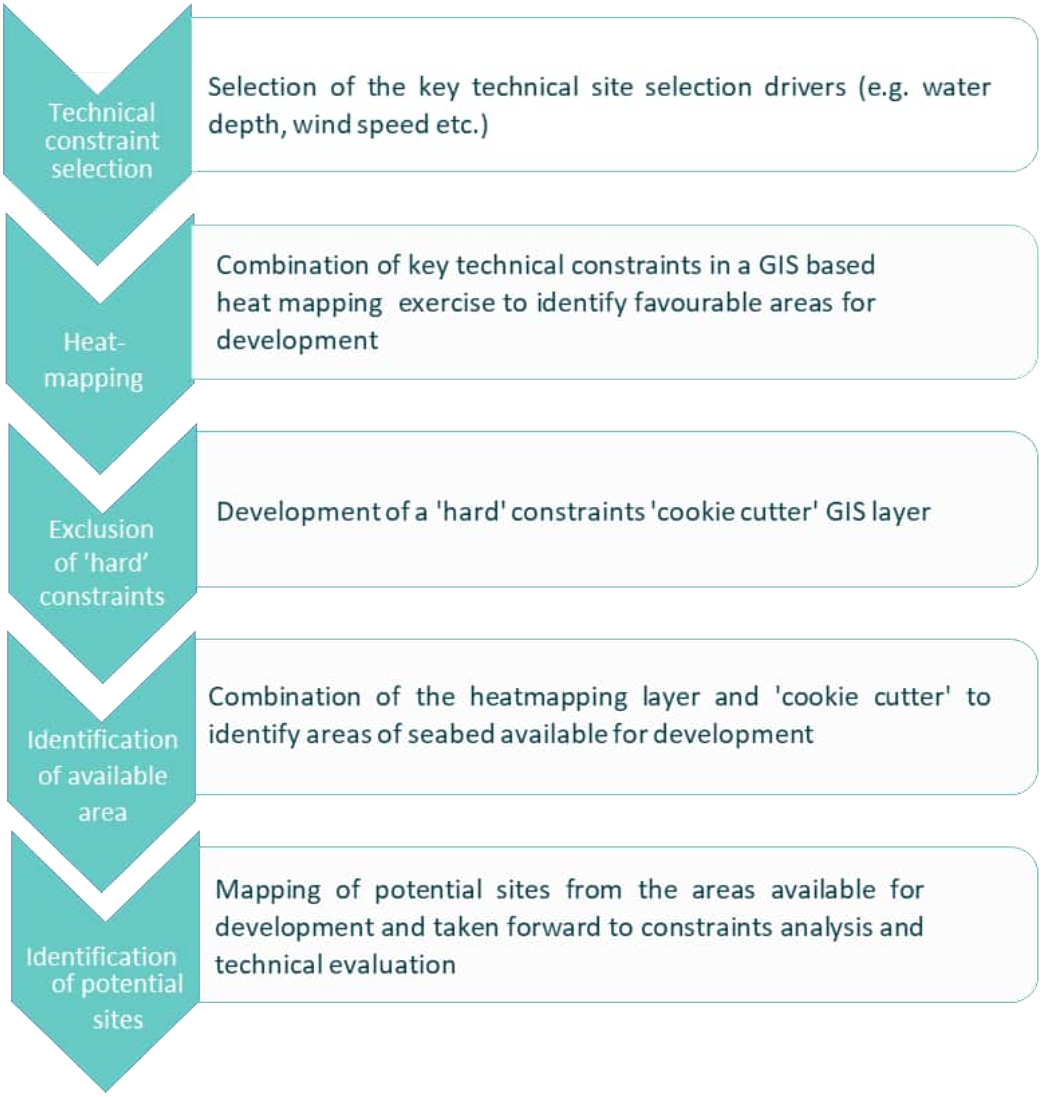


Figure 4.5: Round 4 Array Area - Site Selection Methodology Process

4.4.8 'Hard' constraints were selected as areas within the TCE bidding regions that were excluded from consideration and included:

- Existing or proposed offshore windfarms plus buffer;
- Existing or proposed aggregate dredging areas plus buffer;
- Oil and gas platforms and other assets plus buffer;
- Areas close to the coast;
- Areas designated for seabed interest (e.g. Special Areas of Conservation (SACs) for benthic habitats and Marine Conservation Zones (MCZs)); and
- Shipping routeing measures (International Maritime Organisation (IMO) designated) and areas of high shipping density (based on available Automatic Identification System data).

4.4.9 Areas selected were then evaluated for 'soft' environmental constraints for features such as:

- Fishing activity;
- Presence of subsea cables and pipelines;
- Presence of known wrecks or archaeological features;
- Oil and gas activity (including licence blocks);
- Ministry of Defence (MoD) activity (Practise and Exercise Areas (PEXA), firing ranges, etc.);
- MoD and National Air Traffic Services (NATS) radar;
- Proximity to designated sites;
- Seascape and landscape visual impacts;
- Fish spawning areas; and
- HRA risk (effects on mobile species – seabirds and marine mammals.

4.4.10 Additionally, each of the sites was evaluated with regard to feasibility and cost of project development (incorporating elements such as design and cost of wind turbine foundation, electrical transmission infrastructure including proximity to grid connection, wind yield and O&M) to produce a Levelised Cost of Energy (LCoE) value as a metric for the relative technical and commercial evaluation of sites.

4.4.11 For the Project array area, particular focus was given to existing constraints in the area which were factors in developing the array area boundary, specifically:

- Busy shipping routes to the west and north of the area;
- Existing oil and gas platforms to the south and east of the area (with predicted ongoing production and no known or planned decommissioning), as well as a number of platforms within the area; and
- An existing aggregate dredging licence area to the southwest.

4.4.12 The Project was identified through this evaluation process as a preferred site for bidding in the Stage 2 auction process, with the Applicant successful in the auction process in February 2021 and being awarded Preferred Bidder status by TCE. Following completion of the Plan-Level HRA by TCE, the Applicant signed the Agreement for Lease (AfL) for the Project in January 2023.

4.5 Stage 2 – Identification of Landfall Zones and Export cable Landfall Options

Overview

4.5.1 In August 2021, the Project accepted a preliminary grid connection offer, under the CION process for a 1.5GW connection in the Humber region. This was subsequently superseded by the OTNR process as described in Section 4. At the time of writing, the Project's final grid connection location has not been confirmed but the Pathway to 2030 HND report has concluded that connection options are proposed at either Lincolnshire Node (a new connection point to be developed by National Grid) or a connection in the vicinity of the existing overhead lines at Weston Marsh; these options remain subject to further evaluation by NGESO prior to a grid connection offer being made.

4.5.2 In order to progress development work in parallel with the completion of the Pathway to 2030 HND process, the Applicant chose to progress a landfall assessment to consider landfall options (and associated offshore and onshore cable route options) for the grid connection interface points identified by the HND, and ultimately focusing on the proposed grid connection options at Lincolnshire Node or Weston Marsh.

4.5.3 The study area for the landfall assessment was therefore determined by the initial study area identified by the HND for the east coast Round 4 projects; this covered a large proportion of the central east coast of England, from the Yorkshire coast (south of Flamborough Head) down to the north coast of Norfolk.

4.5.4 However, once the grid connection options for the Project were confirmed by National Grid, the Project was able to focus on the evaluation of landfall options along the Lincolnshire Coastline, which would be the most economically and environmentally viable landfall options for the Project. This section therefore focuses on this part of the assessment, with the full landfall assessment and detailed methodology included for reference in Appendix 6.2.4.1.

4.5.5 The initial landfall assessment considered landfall character and opportunity across the study area, undertaking a BRAG assessment utilising the method described in Appendix 6.2.4.1. Key areas such as the Wash and the Humber Estuary were eliminated by the Project at a relatively early stage due to their constrained nature and the presence of the number of important environmental designations (SPA, RAMSAR, SSSI).

4.5.6 The preliminary BRAG assessments, based on GIS data analysis and desk top study were validated by site visits by the Project development team and technical advisers to the most promising landfall locations across Lincolnshire, as identified by the preliminary BRAG Analysis (Appendix 6.2.4.1).

4.5.7 The landfall appraisal also took account of the environment immediately landward and seaward of the coast to evaluate any constraints on the onwards routeing of cables from the identified landfall. For example, constraints such as the presence of wrecks or other obstructions, shipping activity or sites used for aggregate dredging or disposal in the nearshore were considered when assessing the suitability of a landfall for an offshore cable laying operation. Ultimately, the suitability of any given landfall also relies on the ability to bring an offshore cable route to the coast at that point, and the ability to route a cable route onshore towards the grid connection location. See Appendix 6.2.4.1 for the detailed assessment.

Recommendations for Landfall Options

4.5.8 The combination of the BRAG matrix, site visits, feasibility of the cable routing to and from the landfall and expert opinion, led to a short-list of recommended landfall options being taken forwards for further appraisal and refinement.

4.5.9 The short-listed landfalls for the Lincolnshire coastline are outlined in Figure 4.6 and the evaluation of these is described throughout the remainder of this section.

300000 320000 340000

5920000

5900000

Lincolnshire

River Humber

Grimsby Cleethorpes A46 A18 A16 A158 A1028

Lincolnshire Wolds Louth Horncastle Spilsby Wainfleet All Saints

Location 1
LC-44

Location 2
LC-38

LC

Location 3
LC-35

Location 4
LB-32

Location 5
LB-9, LB-10
LB-19, LB-20,
LB-21, LB-22,
LB-23, LB-24

LB

Location 6
LB-B12,
LB-B13

LA

Location 7
LA-1

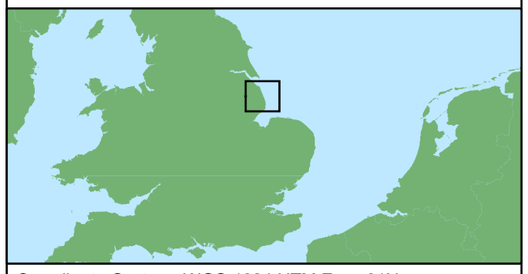
N

Legend

- Landfall Sector
- Offshore Cable Route Options with Fans

Landfall Location Recommendation

- Yes
- Maybe
- No



Coordinate System: WGS 1984 UTM Zone 31N

0 5 10 km

Scale: 1:200,000

Preliminary Environmental Information Report

Landfall Locations in the Context of the Landfall Assessment Regional Codes (and Offshore Route Numbers)

Figure 4.6

OUTER DOWSING OFFSHORE WIND

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Location 1 – LC-44

4.5.10 Section LC-44 was initially classified Amber, having a medium scoring for engineering constraints, with the main environmental constraint being the presence of the Humber Estuary SAC, SPA and Ramsar.

4.5.11 A site visit was undertaken from the Horseshoe Point carpark walking north along the sea defence.

4.5.12 The sections are all characterised by an extensive sandy/muddy beach (up to 2km intertidal area), backed by saltmarsh and sand dunes and a man-made sea defence. There is good access to the rear of the sea defence via metalled roads.

Environmental Considerations

4.5.13 Section LC-44 is bounded to the north by the limits of the study area (Grimsby Unitary Council boundary) and the Hornsea OWF (One & Two) export cables to the south. The section has a small saltmarsh and sand dune present at the southern extent, with the saltmarsh not present and much more extensive sand dunes present at the north of the site. The section is situated within the Humber Estuary SAC which includes the saltmarsh and sand dune features amongst other features. It is also situated within the Humber Estuary SPA, which is an important area for overwintering birds.

4.5.14 The offshore cable routes approaching this landfall may need to pass through a number of designated sites in the immediate offshore environment including, potentially, the Holderness Offshore MCZ, the Greater Wash SPA and the Humber Estuary SAC, SPA and Ramsar. At the north of this sector, there may be constraints related to the Humber Approaches Traffic Separation Scheme (TSS) which controls traffic entering and leaving the Humber estuary as well as interactions with other sea users, including a need to avoid the offshore Tetney pipeline mooring point and designated anchorages in the approaches to the Humber. A military firing range is present just offshore of the more southerly sectors of this areas.

4.5.15 This landfall is also heavily constrained in the immediate landward area by a combination of SSSI, SAC and Ramsar designations, and the presence of the flood zone. There are no obvious routes away from the coast that can avoid these designated areas.

4.5.16 Arable fields are present landward of the sea defence. Due to the nature of the sea defence and designated features, accessibility arrangements for access to the intertidal are considered challenging.

Engineering Considerations

4.5.17 This potential landfall location features a generally low-lying morphology facing an extended muddy/sandy intertidal flat constrained by the environmental designations and the presence of a military firing range which are classified as obstructions at landfall. Although there seems to be a sufficient area for TJB construction across the beach, the nature of the area utilisation, operations and environmental designation will inevitably constrain the construction works. There is the potential for trenchless drilling and open cut trenching landfall construction methods to be feasible, however this will most likely be more challenging compared with other potential landfalls. It is worth noting that trenchless drilling will most likely approach the limit in terms of borepath length due to the entry point having to be located back towards the fields.

Location 2 – LC-38

4.5.18 Section LC-38 was initially classified Red, having a high scoring for engineering constraints and with the main environmental constraint being the presence of the Humber Estuary SAC, SPA and Ramsar.

4.5.19 A site visit was made to the Donna Nook carpark. The site is characterised by extensive sand dunes, with saltmarsh seaward of the dunes, with a wide extensive intertidal area. Access is possible to the beach via existing tracks.

Environmental Considerations

4.5.20 Section LC-38 is bounded by the Hornsea cables to the north and the village of Saltfleet to the south. The section has extensive sand dunes and saltmarsh habitats visible at the coast. Section LC-38 also contains the Donna Nook seal colony.

4.5.21 Donna Nook is part of the training area for the Royal Air Force (RAF), designated as an MoD firing range, with targets used in training clearly visible within the section, directly offshore.

4.5.22 The section is situated within the Humber Estuary SAC and SPA, and would likely be subject to restrictions on works during sensitive periods for the features of these sites, including seals, due to the proximity of this section to haul out and breeding sites.

4.5.23 The offshore cable routes for this landfall would also likely be required to pass through a number of designated sites in the immediate offshore area, including those for seabed features. Specifically, the offshore cable routes may be required to pass through the Holderness Offshore MCZ, the Greater Wash SPA and the Humber Estuary SAC, SPA and Ramsar. Some cabling options for this sector may also pass through the Silver Pit, a deep-water channel due east of the Humber estuary which although not currently designated is known to be of conservation interest and also an area used extensively by the commercial fishing industry.

4.5.24 This landfall is heavily constrained in the immediate landward area by a combination of SSSI, SAC and Ramsar designations, and the presence of the flood zone. There are no obvious routes away from the coast that can avoid these designated areas.

Engineering Considerations

4.5.25 This potential landfall location features a generally low-lying morphology, with large fields facing very extended muddy/sandy intertidal flats in the nearshore, limiting installation methodologies. There is a sufficient area for TJB construction across the large agricultural fields adjacent to the beach, with trenchless and open cut construction methods to be potentially feasible.

4.5.26 Approaching the landfall and across the beach there is evidence of wrecks showing portion of hull or superstructure. This feature might increase the degree of complexity for the cable pull in.

Location 3 – LC-35

4.5.27 Section LC-35 was initially classified Amber, having a medium scoring for engineering constraints, with the main environmental constraint being the presence of the Humber Estuary SAC, SPA and Ramsar.

4.5.28 A site visit was made to the beach from Crook Bank carpark. The site is characterised by extensive sand dunes at the rear of the beach, with extensive intertidal sandflats.

Environmental Considerations

4.5.29 The section is bounded by the Donna Nook MoD military danger area to the north and the Theddlethorpe pipelines to the south.

4.5.30 The section is situated within the Humber Estuary SAC and Saltfleet- Theddlethorpe Dunes and Gibraltar Point SAC which includes the sand dune feature amongst other designations. It is also situated within the Humber Estuary SPA.

4.5.31 The offshore cable routes for this landfall would be required to pass through a number of designated sites in the near offshore environment, including those for seabed features. Specifically, the cable routes may be required to pass through the Holderness Offshore MCZ, the Greater Wash SPA and the Humber Estuary SAC, SPA and Ramsar. Some cabling options for this sector also pass through the Silver Pit.

4.5.32 This landfall sector is also heavily constrained in the near landward area by a combination of SSSI, SAC and Ramsar designations, and the presence of the flood zone. There are no obvious routes away from the coast that can avoid these designated areas.

Engineering Considerations

4.5.33 This potential landfall location features a generally low-lying morphology, with large fields facing extended muddy/sandy intertidal flats. There is a sufficient area for TJB construction across the large agricultural fields adjacent to the beach, with trenchless drilling and open cut trenching landfall construction methods considered to be potentially feasible.

4.5.34 Approaching the southern portion of the landfall there is evidence of wrecks showing portion of hull or superstructure in proximity of the Theddlethorpe pipelines landing area. The presence of the Theddlethorpe pipelines and the wreck in the southern portion of the landfall will reduce the feasible cable landing area.

Location 4 – LB-32 and LB-33

4.5.35 Sections LB-32 and LB-33 were initially classified Green, having a low scoring for engineering and environmental constraints. A black area separates these sections due to existing beach access.

4.5.36 A site visit was made via the footpath adjacent to the Seal Sanctuary Wildlife Centre. The site is characterised by a high dune system and a medium width intertidal area.

Environmental Considerations

4.5.37 The sections are bounded by the Theddlethorpe pipelines to the north and Mablethorpe to the south. The Haven/Golden Sands Holiday Park is just inland of section LB-33, with possible recreational land landward of section LB-32.

4.5.38 The landfall sectors in this area are not situated within any designated sites, although there are extensive dune systems backing the beach with a reasonably high elevation.

4.5.39 The offshore export cable routes for this landfall would be required to pass through a number of designated sites in the near offshore environment, including those for seabed features. Specifically, the offshore export cable routes may be required to pass through the Inner Dowsing, Race Bank and North Ridge (IDRBNR) SAC and the Greater Wash SPA. Some cabling options for this sector also pass through the Silver Pit.

4.5.40 Potential offshore cable routes may also require relatively nearshore cable crossings due to the existing infrastructure within the area, including the Viking Link subsea interconnector cables and the Triton Knoll offshore windfarm export cables.

4.5.41 The immediate onshore area landward of the landfalls in this sector is identified as restorable habitat and Network Enhancement Zone 1, which could be crossed with suitable mitigation. Beyond this there is a potential onshore cable route, noting that this could not avoid existing large caravan parks.

Engineering Considerations

4.5.42 The landfall features an open low-lying beach backed by sand dune systems while the northern area features large intertidal flats. The southern portion of the landfall features a limited area to locate the TJB, therefore if this landfall is taken forwards the TJB will need to be located within a caravan park adjacent to the beach. From a nearshore vessel accessibility perspective, the presence of the out of service Theddlethorpe pipeline will restrict the cable landing corridor area.

Location 5 – LB-24 – LB-19

4.5.43 Sections LB-24 to LB-19 were initially classified Green, having a low scoring for engineering and environmental constraints. A black area separates these sections due to the presence of the landfall for the Viking Link subsea interconnector cables, with Amber areas adjacent to the Viking Link indicating the required buffer area.

4.5.44 Site visits were made to sections LB-24 to LB-19 from the carpark south of Sutton-on-Sea and accessed via the sea wall. The area is characterised by a man-made sea wall backing the beach with small, semi-stabilised sand dunes seaward of this.

Environmental Considerations

4.5.45 The sections are bounded by the urban area of Sutton-on-Sea to the north and the Triton Knoll offshore windfarm export cables to the south. Inland of the seawall from sections LB-24 to LB-19, publicly available mapping (Ordnance Survey) suggests that there is a golf course, but the site visit confirmed that this now appears to be disused (for an extensive period of time) and is now being used as a public access recreational area. Signs of possible use of this area as a landfill were noted, but this was not confirmed and would require further evaluation.

4.5.46 The area is not within any designated .sites, although small sand dunes were present seaward of the sea wall and appeared to be stabilising.

4.5.47 The offshore export cable routes for this landfall would be required to pass through a number of designated sites in the near offshore environment, including those for seabed features. Specifically, the offshore export cable routes may be required to pass through the IDRBNR SAC and the Greater Wash SPA. Some cabling options for this sector also pass through the Silver Pit.

4.5.48 Potential routes may also require relatively nearshore cable crossings due to the existing infrastructure within the area, including the Viking Link subsea interconnector cables and the Triton Knoll offshore windfarm export cables.

4.5.49 Much of the study area landward of the landfall sector is dominated by flood zone and sand dunes, with the Sea Bank Clay Pits SSSI immediately inland from the coast. However, there is a possible export cable route away from the coast leading towards the southwest. This route would avoid the SSSI and the large concentration of potentially sensitive receptors identified further to the north.

Engineering Considerations

4.5.50 The landfall features an open and low-lying sandy beach backed by a concrete dyke. There is a large agricultural field located approximately 500m landward from the dyke adjacent to the location of the Viking Link subsea interconnector TJB. Given the presence of the Viking Link cables it can be concluded that this area has already proven to be feasible for trenchless drilling and therefore there is the likelihood that the same construction method could be undertaken without major issues.

Location 6 – LB-10 and LB-9

4.5.51 Sections LB-10 and LB-9 were initially classified as Amber, having a medium scoring for engineering constraints, with the main environmental constraints being the Sea Bank Clay Pits SSSI and the Chapel Point to Wolla Bank SSSI.

4.5.52 Site visits were made to sections LB-10 and LB-9 from the Wolla Bank carpark. The area is characterised by tall sand dunes backing the beach.

Environmental Considerations

4.5.53 This section of coast is bounded by Chapel St Leonards to the south and the residential and holiday properties at Anderby Creek to the north. The entire length of this section of beach is lined by tall sand dunes, which are protected by a programme of artificial beach nourishment/replenishment undertaken in the spring/summer for the past eight years. To the west of the dunes, much of the area is wetland, which is important bird habitat, before passing into intensely farmed agricultural land on the west side of Roman Bank/Anderby Road. It should be noted that through discussion with the beach replenishment contractors, the presence of a 600m long 800mm diameter pipe that is buried along the length of the beach in this location was made aware to the Project, which is used for the annual replenishment programme. This is a hazard that would need to be accounted for when considering the area as a landfall for export cable installation.

4.5.54 The offshore cable routes for this landfall would be required to pass through a number of designated sites in the near offshore environment, including those for seabed features. Specifically, the offshore export cable routes may be required to pass through the IDRBNR SAC and the Greater Wash SPA.

4.5.55 The landfall is situated adjacent to the wetlands south of Anderby Creek which are a designated local wildlife site, specifically Anderby Marsh Local Nature Reserve (LNR) and Wolla Bank LNR, whilst further south, the Sea Bank Clay Pits SSSI spans both sides of the main road. Any cable routes within this sector would need to be installed by Trenchless drilling from the west side of Roman Bank to avoid any direct impact on the LNR, SSSI, and sand dune ecosystems.

Engineering Considerations

4.5.56 Wolla Bank landfall features an open and low-lying sandy beach stretching for approximately 2km length south of Anderby Creek. The landfall is backed by sand dune systems facing relatively extended and flat agricultural land.

4.5.57 South of Anderby Creek across the Wolla Bank beach there is a distinctive seasonal shift in the foreshore width, the timing of this shift is affected by nourishment activities.

4.5.58 There is evidence of localised tidal ponds and groynes which appear to be covered by sand. The area behind the sand dune features a relatively extended sea bank with drains.

4.5.59 North of the landfall, in proximity to the boundary with Anderby Creek, there is an outfall pipe owned by the Environment Agency and marked with a permanent buoy.

Location 7 – LB-B13 and LB-B12

4.5.60 Sections LB-B13 and LB-B12 were originally classified as Black due to the extensive caravan parks situated landward of the coast and the associated constraints relating to available space for the TJB and onwards onshore routeing.

4.5.61 Site visits were made to sections LB-B12 and LB-B13 from the end of Trunch Lane by the Golden Anchor Holiday Park and a carpark by Lakeside Leisure. The landfall was characterised by a sandy beach backed by small sand dunes and a man-made sea wall.

Environmental Considerations

4.5.62 The sections are bounded by Chapel St Leonards to the north and the Butlins holiday resort to the south. The whole length of this section is backed by caravan parks landward of the concrete sea wall. At the north of LB-B12, there appeared to be a gap in the caravan parks, with only a small number of caravans between the coast and arable land. However, from site visit observations, it was noted that there appeared to be continued development of this area. Furthermore, there are ponds which are possibly linked to drainage adjacent to the sea wall.

4.5.63 The area is not within any designated sites, however small sand dunes were present seaward of the sea wall and appeared to be stabilising.

4.5.64 The offshore cable routes for this landfall would be required to pass through a number of designated sites in the near offshore environment, including those for seabed features. Specifically, the cable routes may be required to pass through the IDRBNR SAC and the Greater Wash SPA.

Engineering Considerations

The landfall features an open and low-lying sandy beach in proximity of a residential area. The landfall features a limited area to locate the TJB, therefore if this landfall is shortlisted, the TJB compound will need to be located within a caravan park adjacent to the beach. Only Trenchless drilling installation would be feasible at this location due to the highly developed nature of this area, its public use and the presence of caravan parks

Location 8 – LA-1

4.5.65 Section LA-1 was originally classified as Amber, having a low scoring for engineering constraints, with the main environmental constraint being the presence of the Saltfleetby-Theddlethorpe Dunes and Gibraltar Point SAC and Gibraltar Point SSSI.

4.5.66 A site visit was made to the north of the section, via a footpath from Seacroft Esplanade. The landfall was characterised by relatively extensive intertidal area with a very large dune system.

Environmental Considerations

4.5.67 The section is bounded by Skegness to the north and the boundary of the Wash SPA. Immediately landward of the dune system is a residential road and large residential properties, behind which is the Seacroft Golf Club.

4.5.68 The section is situated within the Saltfleetby-Theddlethorpe Dunes and Gibraltar Point SAC and Gibraltar Point SSSI which is designated in part for the sand dune system.

4.5.69 The offshore cable routes for this landfall would be required to pass through a number of designated sites in the near offshore environment, including those for seabed features. Specifically, the cable routes may be required to pass through the IDRBNR SAC and the Greater Wash SPA.

4.5.70 This section is dominated by the presence of the Gibraltar Point area, designated as SSSI, SPA Ramsar and a National Nature Reserve (NNR). These areas are further constrained in the landward environment by Flood Zone 3 and the presence of a Source Protection Zone (SPZ) throughout as well as the presence of the coastal saltmarsh. There is no obvious route away from the coast at this location that can avoid these designated sites.

Engineering Considerations

4.5.71 The landfall features a relatively large and extended muddy intertidal region with sufficient access to the beach from the southern direction. There is a sufficient space to locate the TJB compound in the field behind Drummond Road, however, this will affect the Trenchless drilling pull in length, which may be beyond the design limit . Due to the coastal morphology and the presence of residential areas facing the landfall, it is unlikely that an open cut trench solution would be feasible. This would also result in a more complex onshore routing, due to the presence of the golf course and residential properties, which would increase the overall cost of installation.

Preferred Landfall Options

4.5.72 Following the BRAG analysis and site visits for the landfall appraisals, a number of landfall sectors were identified as preferred options for the various assumed grid connection options for the Project and therefore the focus for associated offshore and onshore cable routeing to the grid connection options being considered separately by the HND process, namely:

- Lincolnshire Node or Weston Marsh (Lincolnshire – sector LB):
  - Landfall sectors LB-24 – LB-19 and LB-10 and LB-9 were all identified as preferred landfall locations for a connection at either the Lincolnshire Node or Weston Marsh locations being considered by the HND (and subsequently confirmed as the preferred options for the Project by the Pathway to 2030 HND report). These sections were all identified as having comparatively limited engineering and environmental constraints, with any constraints being considered to be localised and largely avoidable through the micro-siting of the landfall and associated works (e.g. small SSSIs or outfall pipes), with a high degree of optionality for the onwards onshore routeing towards either of the grid connection locations.
- Weston Marsh (south Lincolnshire – sector LA):
  - Landfall sector LA has a very limited number of feasible landfall options, with all of these being relatively highly constrained from both an engineering and environmental perspective. LA-1 is the only viable landfall option within this sector and would only be considered further for southern Lincolnshire connection options where more northerly options were deemed unfeasible due to either offshore or onshore cable routeing constraints.

4.6 Stage 3 – Offshore Refinement of the Project

Updates from the HND Process

4.6.1 In July 2022, NGESO published the preliminary outcomes of the HND, which confirmed that two connections options remained under consideration for the Project; Lincolnshire Node and Weston Marsh.

4.6.2 It was noted that a final decision from the HND would be confirmed following the completion of the HND evaluation process which is expected to be completed in Early Summer 2023.

Selection of the Final Landfall and Offshore Cable Route

4.6.3 Following confirmation from the HND, only landfall options and associated ECCs within landfall sector LB (Figure 4.6) remained available and suitable for a connection to either of the two grid connection locations and was considered unlikely to result in potentially significant effects to designated sites at the landfall.

4.6.4 To ensure the most favourable export cable route was taken forward, considering engineering and environmental constraints, it was necessary to take a holistic approach to the selection of the preferred combination of landfall and offshore export cable route.

4.6.5 Export cable routes L3 and L4 (Figure 4.9 and Figure 4.10 respectively) both provided for connections to all of the LB sector landfalls, however, L3 results in a comparatively reduced overlap with the IDRBNR SAC and as such was identified as the preferred option to that landfall sector, following confirmation of export cable route L2 being unfeasible due to the engineering and siting challenges (See section 4.7).

4.6.6 Whilst export cable route L3 allows for connection to all landfall options within sector LB, to reach the majority of the cable deviations to the northerly landfalls in the sector would require crossing the existing Triton Knoll offshore windfarm export cables and the Viking Link subsea interconnector cables in the nearshore area. Due to the shallow bathymetry of this area, it was considered that these crossings would be a high risk from a consenting perspective, as well as being a commercial constraint with regard to the need to instigate crossing agreements with the asset owners.

4.6.7 The two preferred landfall options within sector LB, LB-9 and LB-10, were scored as of being of a relatively low constraint for both engineering and environmental factors, however, option LB-10 (Wolla Bank) provides benefits over LB-9 by being sufficiently large to enable avoidance of the SSSIs at the landfall and onshore.

4.6.8 Therefore, the combination of the L3 export cable route with the landfall section LB-10 was identified as the most feasible routeing option for the Project.

4.6.9 The offshore PEIR boundary is illustrated in Figure 4.7.

325000
350000
375000
400000
425000
5950000
5925000
5900000
5875000
N
ernsea
Mablethorpe
Spilsby
Skegness
Wainfleet All Saints
The Wash
Hunstanton
Wells-Next-The-Sea
Sheringham
Holt

Legend

- Offshore PEIR Boundary
- Array Area
- Offshore Export Cable Corridor
- ORCP Search Area

Coordinate System: WGS 1984 UTM Zone 31N

0 10 20 km

Scale: 1:400,000

Preliminary Environmental Information Report

Offshore PEIR Boundary

Figure 4.7

OUTER DOWSING OFFSHORE WIND

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4.7 Stage 4 – Identification of the Offshore ECC Route Options

Overview

4.7.1 Export cable routing for the Project has been broadly considered at a high level through a number of third-party studies; specifically, and at a conceptual level, by the Round 4 Plan-Level HRA process and as part of the HND process. The study area for the Project's offshore ECC routing has been informed by the study areas developed for offshore ECC routing by both the Round 4 Plan-Level HRA and the HND and through the ongoing discussions with NGESO over the developing grid connection options as the HND study progressed.

4.7.2 As a consequence of the high degree of optionality for potential grid connection options identified at the start of the HND process, and consequent evaluation of the landfall options for the Project, a number of landfall "sectors" were delineated to enable targeted and robust offshore ECC optioneering to take place (see section 4.5 above for determination of preferred landfall sectors). These preferred landfall sectors were each selected to enable routeing to specific grid connection options being considered by the HND (at the time connections in both Yorkshire and Lincolnshire were still being evaluated by the HND), based on proximity to the connection points, with the intention that excessively long onshore cable routes and associated impacts on communities were avoided.

4.7.3 A single study area for the Yorkshire coast landfall options and the Lincolnshire coast options was considered with the detailed assessment and methodology included in Appendix 6.2.4.1. This section outlines the assessment relating to the Lincolnshire coastline which, for purposes of assessment was split into three sectors: LA, LB and LC. Only Sectors LB and LA were considered for landfall options for the Project once the grid connection options were confirmed at Weston Marsh and therefore only the assessment on these sectors have been included in this chapter (Figure 4.8). The full assessment of all the Offshore ECC Routes assessed for the project prior to the outcomes of the HND being published can be found in Appendix 6.2.4.1

Lincolnshire

4.7.4 Five offshore export cable corridor options were identified to the preferred landfall options identified on the Lincolnshire coastline for the Weston Marsh and Lincolnshire Node connection options; these were split between the landfall sectors LA and LB (Figure 4.9 to Figure 4.12). The routeing to the Lincolnshire landfall sectors was highly constrained in particular by a combination of the Inner Dowsing, Race Bank and North Ridge SAC, known wrecks, other marine users and the Inner Silver Pit bathymetric feature.

4.7.5 The analysis of the export cable corridor options, comprising consideration of the engineering feasibility and the environmental constraints, is presented in the following sections.

300000
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400000
5950000
5900000
5850000

CREYKE BECK
GRIMSBY WEST
LINCOLNSHIRE NODE
WESTON MARSH
LB
LA
Westermost Rough
Humber Gateway
Hornsea Project Four
Hornsea Project Two
Triton Knoll
Race Bank
Dudgeon
Sheringham Shoal
Inner Dowsing
Lynn
Lincs

N

Legend

- Array Area
- Onshore Substation
- Offshore ECC Area of Search
- Landfall Sector
- Offshore Wind Farm
- Infrastructure Constraint
- Cable - Active
- Cable - Not In Use
- Pipeline - Active
- Pipeline - Not In Use
- Pipeline - Abandoned
- Disposal Sites
- Aggregates - Production Agreement Area
- Aggregates - Exploration and Option Area
- Ships Routeing Measures Areas
- Sites of Special Scientific Interest
- Ramsar Site
- Marine Conservation Zone
- Areas of Outstanding Natural Beauty
- Special Protection Areas
- Special Areas of Conservation
- Herring Spawning Grounds (1998)
- Annex I Reef
- Annex I additional areas managed as reef
- Annex I Sandbank
- Wreck with 500m Buffer
- Subsea Obstruction

Coordinate System: WGS 1984 UTM Zone 31N

0 10 20 km

Scale: 1:500,000

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Offshore Study Area and Location of the Lincolnshire Coast Landfall Sectors “LA” and “LB” considered for the Weston Marsh and Lincolnshire Node Connection Options
Figure 4.8

OUTER DOWSING OFFSHORE WIND

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Lincolnshire 3 (L3)

4.7.6 This offshore export cable route corridor was designed to reach landfalls which would be appropriate for an onward routeing to a grid connection location at or in the vicinity of either the Lincolnshire Node or Weston Marsh. This offshore export cable route option (Figure 4.9) is up to approximately 80km and has a maximum water depth of approximately 35m.

Designated Sites

4.7.7 Offshore export cable route option L3 passes through the IDRBNR SAC. In defining the proposed route corridor, any known areas of *Sabellaria* reef were mapped and avoided; however, it was not possible to fully avoid the sandbank features of the site, with part of the North Ridge sandbank at the eastern extent of the SAC being unavoidable for this route. At the western edge of the SAC, there are two offshore export cable route sub-options that have been designed to meet the landfall deviations, with these sub-options having been developed to potentially avoid the presence of an aggregates dredging licence option and exploration area (known as aggregates area 1805). Depending on whether the option on this aggregate site is taken forward by the operator, it may be possible to avoid the Inner Dowsing sandbank by routeing through the aggregate site. However, in the event that it is not possible to route through the aggregates option area, it would be necessary to also cross the Inner Dowsing sandbank at the western edge of the SAC.

4.7.8 Whilst the L3 export cable route option has been designed to avoid any known areas of *S. spinulosa* reef with the SAC, it is nonetheless recognised that it is likely that there will be areas of confirmed or potential biogenic reef identified during the export cable route characterisation surveys (and pre-construction surveys) beyond those currently known/mapped.

4.7.9 The L3 export cable route option also crosses the Greater Wash SPA, which cannot be avoided should this route option be taken forwards.

Non-Designated Sensitive Habitats

4.7.10 Export cable route L3 passes through the Banks herring ground. Whilst there is overlap with the historical spawning ground, recent data from IHLS suggests that active spawning grounds are situated to the east and north of Flamborough Head. Nonetheless, any percussive piling from an ORCP within the export cable route corridor, may lead to concerns over impacts on spawning herring.

4.7.11 Natural England have advised that other projects that have been developed off this part of the Lincolnshire coast have identified extensive areas of geogenic (stony) reef. It is likely that some potential reef would be recorded along the L3 offshore export cable route option (within and outside the IDRBNR SAC). As habitats protected under the NERC Act (2008), best efforts would need to be made to avoid these habitats, both within and outside any designated sites, which could constrain the offshore export cable route. It is likely that some reef could be recorded along the L3 route option; however, if identified, in most instances it should be possible to avoid such features through micrositing of the cable within the corridor.

Other Marine Users

4.7.12 One of the deviations for this offshore export cable route overlaps with the corner of a marine aggregate exploration and option lease area (Area 1805) which is due to expire in 2024 (unless the option is taken up). If the option is not progressed by the option lease holder, this would not then be a constraint on the Project routing offshore export cables through this area. If the option is progressed, it is possible that the overlap area would not be progressed to licensing (e.g., if it was shown the area was not a focus for the aggregates resource) or that the route could be micro-sited around this lease area.

4.7.13 The aggregate option lease area also overlaps with an inactive disposal site, which the L3 export cable route option would also pass through. This disposal site may pose some constraint on the potential designation of the cable route as disposal areas for use by the Project during construction as it is understood that overlap between disposal areas is not permitted.

4.7.14 The proximity of the offshore export cable route corridor to the existing Race Bank and proposed Dudgeon Extension offshore windfarms increases the likelihood of higher vessel traffic within the region.

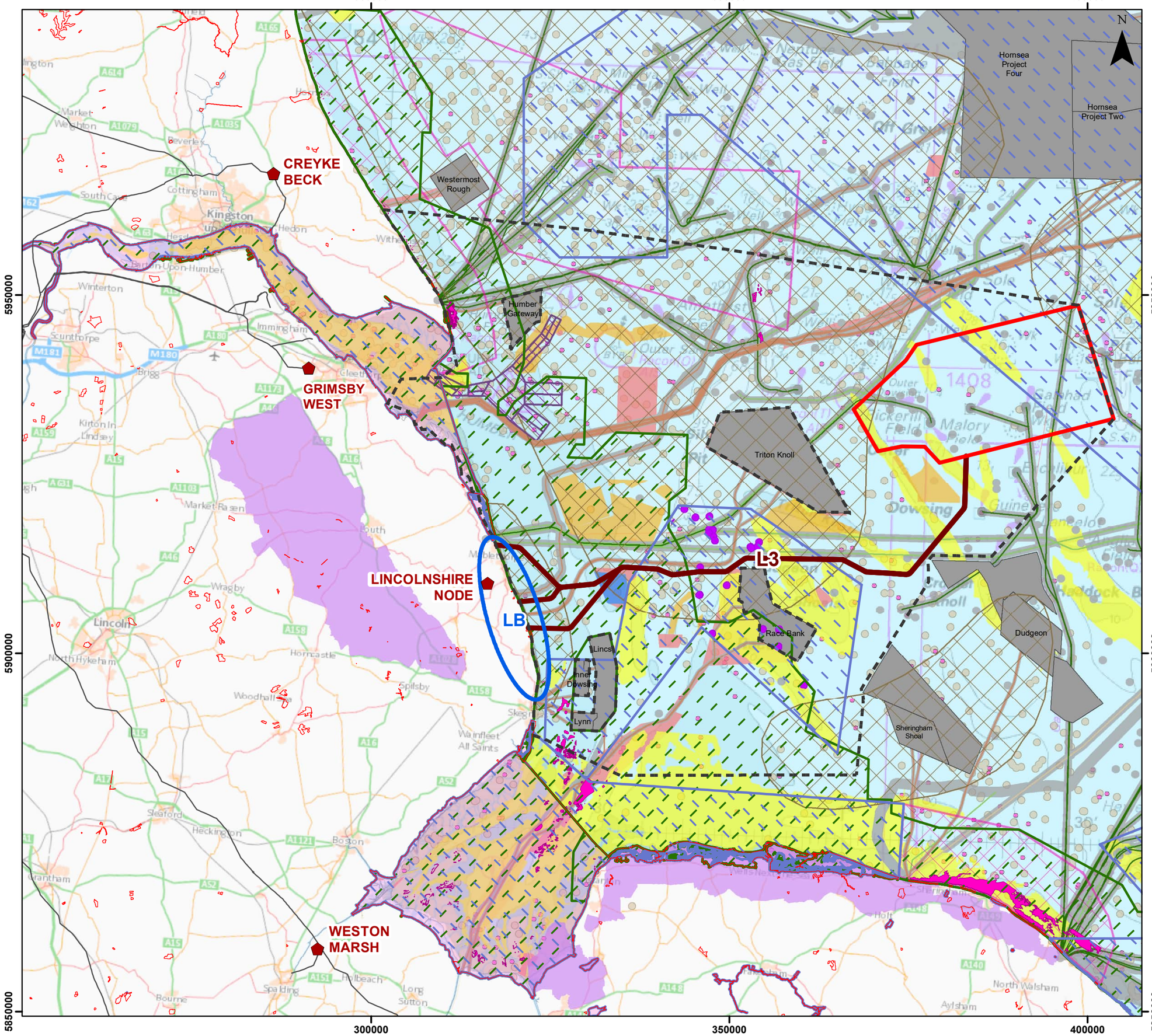
4.7.15 The two more northerly landfall options (LB32 and LB19) would require relatively nearshore crossings of existing subsea cables (i.e., the Triton Knoll offshore windfarm export cable and the Viking Link subsea interconnector cables). For this reason, the southern deviation to LB 9 and LB10 at Wolla Bank is preferred. Please refer to Figure 4.6 to see the landfall location options.

Cable Installation and Technical Risks

4.7.16 Whilst most wrecks and seabed obstructions are located outside of the buffer zone around the route corridor, in some of the most congested zones, the wrecks and obstruction do lie near the boundaries of the buffer zone. However, the minimum distance between the export cable route centreline and the nearest wreck is around 700m, which is a substantial distance and therefore wrecks are not considered to be a major constraint.

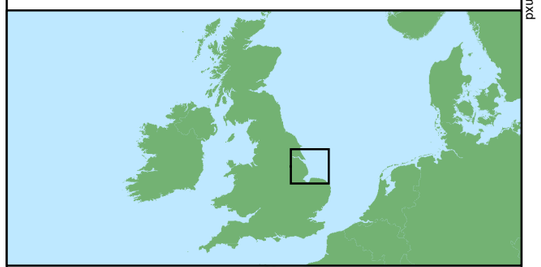
4.7.17 The offshore export cable route corridor has a relatively small amount of crossing with other existing seabed assets but, for large sections, it lies in relatively close proximity to existing subsea pipelines.

4.7.18 Some areas are relatively shallow and may mean that extra precaution needs to be taken with cable installation vessel selection (shallow draught, ability to ground, etc.) and/or timing of installation relative to tidal heights.



Legend

- Array Area
- Onshore Substation
- Offshore ECC Area of Search
- Offshore Cable Route Options
- Landfall Sector
- Offshore Wind Farm
- Infrastructure Constraint
- Cable - Active
- Cable - Not In Use
- Pipeline - Active
- Pipeline - Not In Use
- Pipeline - Abandoned
- Disposal Sites
- Aggregates - Production Agreement Area
- Aggregates - Exploration and Option Area
- Ships Routeing Measures Areas
- Sites of Special Scientific Interest
- Ramsar Site
- Marine Conservation Zone
- Areas of Outstanding Natural Beauty
- Special Protection Areas
- Special Areas of Conservation
- Herring Spawning Grounds (1998)
- Annex I Reef
- Annex I additional areas managed as reef
- Annex I Sandbank
- Wreck with 500m Buffer
- Subsea Obstruction



Coordinate System: WGS 1984 UTM Zone 31N

0 10 20 km

Scale: 1:500,000

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Proposed Export Cable Route Option L3 Connecting to Landfall Sector LB

Figure 4.9

OUTER DOWSING OFFSHORE WIND

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Lincolnshire 4 (L4)

4.7.19 The L4 offshore export cable route option was designed to reach landfalls which would be appropriate for an onwards routeing to a grid connection location at or in the vicinity of either the Lincolnshire Node or Weston Marsh connections. This offshore export cable route option (Figure 4.10) is up to approximately 90km in length and has a maximum water depth of approximately 30m.

Designated Sites

4.7.20 Offshore export cable route option L4 passes through the IDRBNR SAC. This offshore export cable route was designed to avoid any known areas of *S. spinulosa* reef; however, due to this route aiming to avoid the constrained routing to the north of Race Bank offshore windfarm and in order to reach the LB landfalls, this export cable route option does cross the SAC sandbank features.

4.7.21 Whilst the L4 export cable route option has been designed to avoid any known areas of *S. spinulosa* reef with the SAC, it is recognised that it is likely that there will be areas of biogenic reef identified within the characterisation surveys (and pre-construction surveys) beyond those currently known/mapped which will need to be mitigated for.

4.7.22 The L4 export cable route option also crosses the Greater Wash SPA, which cannot be avoided should this route option be taken forwards.

Non-Designated Sensitive Habitats

4.7.23 The offshore export cable route crosses the Docking Shoal sandbank which, whilst not designated or part of the IDBRNR SAC, is an extensive sandbank of environmental interest and impacts to this sandbank may have the potential to give rise to indirect effects to designated sites in the wider area.

4.7.24 Offshore export cable route option L4 also passes through the Banks herring ground. Whilst there is overlap with the historical spawning ground, recent data from the IHLS suggests that active spawning grounds are situated to the east and north of Flamborough Head. Nonetheless, any percussive piling from an ORCP if within the export cable route corridor, may lead to concerns over impacts on spawning herring.

4.7.25 Natural England have advised that other projects developed off this part of the Lincolnshire coast have identified extensive areas of geogenic reef within the nearshore region. It is possible that some reef would be recorded along the L4 export cable route option (within and outside the IDRBNR SAC). As habitats protected under the NERC Act (2008), best efforts would need to be made to avoid these habitats, both within and outside any designated sites, which could constrain the final export cable route. It is likely that some reef could be recorded along the L4 export cable route option; however, if identified, in most instances it should be possible to avoid through micrositing of the cable within the cable route corridor.

Other Marine Users

4.7.26 This offshore export cable route option requires a crossing of the Race Bank offshore windfarm cables on the Docking Shoal sandbank feature. Due to the shallow nature of this area, it is considered likely that this may pose a concern for navigational depth around the crossing, with a requirement to consult with MCA over any resulting navigational risk.

4.7.27 The proximity of the route to the Race Bank and Dudgeon Extension offshore windfarms also increases the likelihood of higher vessel traffic within the region.

4.7.28 The two more northerly landfall options (Landfall 32 and Landfall 19) would require relatively nearshore crossings of existing subsea cables (i.e., the Triton Knoll offshore windfarm export cables and the Viking Link subsea interconnector cables). For this reason, Landfall 9 and Landfall 10 are preferred.

Cable Installation and Technical Risks

4.7.29 The area south of the Project array area is generally less congested with wrecks and seabed obstructions and is therefore not so much a primary driver in the routing as most of the other routes developed. For the most part, the route has plenty of space to micro-site the cable within the broader route corridor.

4.7.30 The biggest risk for this export cable route is considered to be the occasional sections of relatively shallow water depths that may cause accessibility difficulties that will restrict cable installation vessel selection.

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CREYKE BECK
GRIMSBY WEST
LINCOLNSHIRE NODE
WESTON MARSH
LB
L4
Hornsea Project Four
Hornsea Project Two
Westermost Rough
Humber Gateway
Triton Knoll
Race Bank
Lincs
Inner Dowsing
Lynn
Dudgeon
Sheringham Shoal

Legend

- Array Area
- Onshore Substation
- Offshore ECC Area of Search
- Offshore Cable Route Options
- Landfall Sector
- Offshore Wind Farm
- Infrastructure Constraint
- Cable - Active
- Cable - Not In Use
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- Pipeline - Not In Use
- Pipeline - Abandoned
- Disposal Sites
- Aggregates - Production Agreement Area
- Aggregates - Exploration and Option Area
- Ships Routeing Measures Areas
- Sites of Special Scientific Interest
- Ramsar Site
- Marine Conservation Zone
- Areas of Outstanding Natural Beauty
- Special Protection Areas
- Special Areas of Conservation
- Herring Spawning Grounds (1998)
- Annex I Reef
- Annex I additional areas managed as reef
- Annex I Sandbank
- Wreck with 500m Buffer
- Subsea Obstruction

Coordinate System: WGS 1984 UTM Zone 31N

0 10 20 km

Scale: 1:500,000

Preliminary Environmental Information Report

Proposed Export Cable Route Option L4 Connecting to Landfall Sector LB

Figure 4.10

OUTER DOWSING OFFSHORE WIND

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Lincolnshire 5 (L5)

4.7.31 This offshore export cable route option was designed to reach a landfall which would be appropriate for an onwards routeing to a grid connection location at or in the vicinity of Weston Marsh. This offshore export cable route option (Figure 4.11) is up to approximately 85km in length and has a maximum water depth of approximately 35m.

Designated Sites

4.7.32 Offshore export cable route option L5 passes through the IDRBNR SAC. The route was designed to minimise cable route distances to reach the LA landfall sector; this offshore export cable route crosses the sandbank features of the SAC and passes through an area of known *S. spinulosa* reef in the nearshore region. Whilst it is currently assumed that much of this known reef could likely be avoided through micro-siting of the cable route, it is possible that, due to the density of the known reef combined with the potential for further reef areas to be identified in site characterisation surveys, it may not be possible to avoid cables installation through some reef features. Whilst *S. spinulosa* reef can recover within a relatively short timescale, installation through these features and particularly placement of cable protection where this was necessary, may give rise to a further risk of adverse effects and a requirement for derogation.

4.7.33 The landfall location (LA sector) for the L5 export cable route option is located within the Saltfleetby-Theddlethorpe Dunes and Gibraltar Point SAC, which is designated at Gibraltar Point for the extensive sand dune systems. These sand dunes will pose limitations on the offshore export cable installation method available at these landfalls, with the dune system at Gibraltar Point (the LA landfall) being hundreds of metres in length.

4.7.34 The L5 export cable route option also crosses the Greater Wash SPA, which cannot be avoided. The L5 export cable route option passes through an area recorded as supporting a medium to high density of common scoter and a high intensity area for red-throated diver.

Non-Designated Sensitive Habitats

4.7.35 Offshore export cable route option L5 also crosses the Docking Shoal sandbank which, whilst not designated as part of the IDBRNR SAC, is an extensive sandbank of wider environmental interest and impacts to this sandbank may have the potential to give rise to indirect effects to designated sites in the wider area.

Other Marine Users

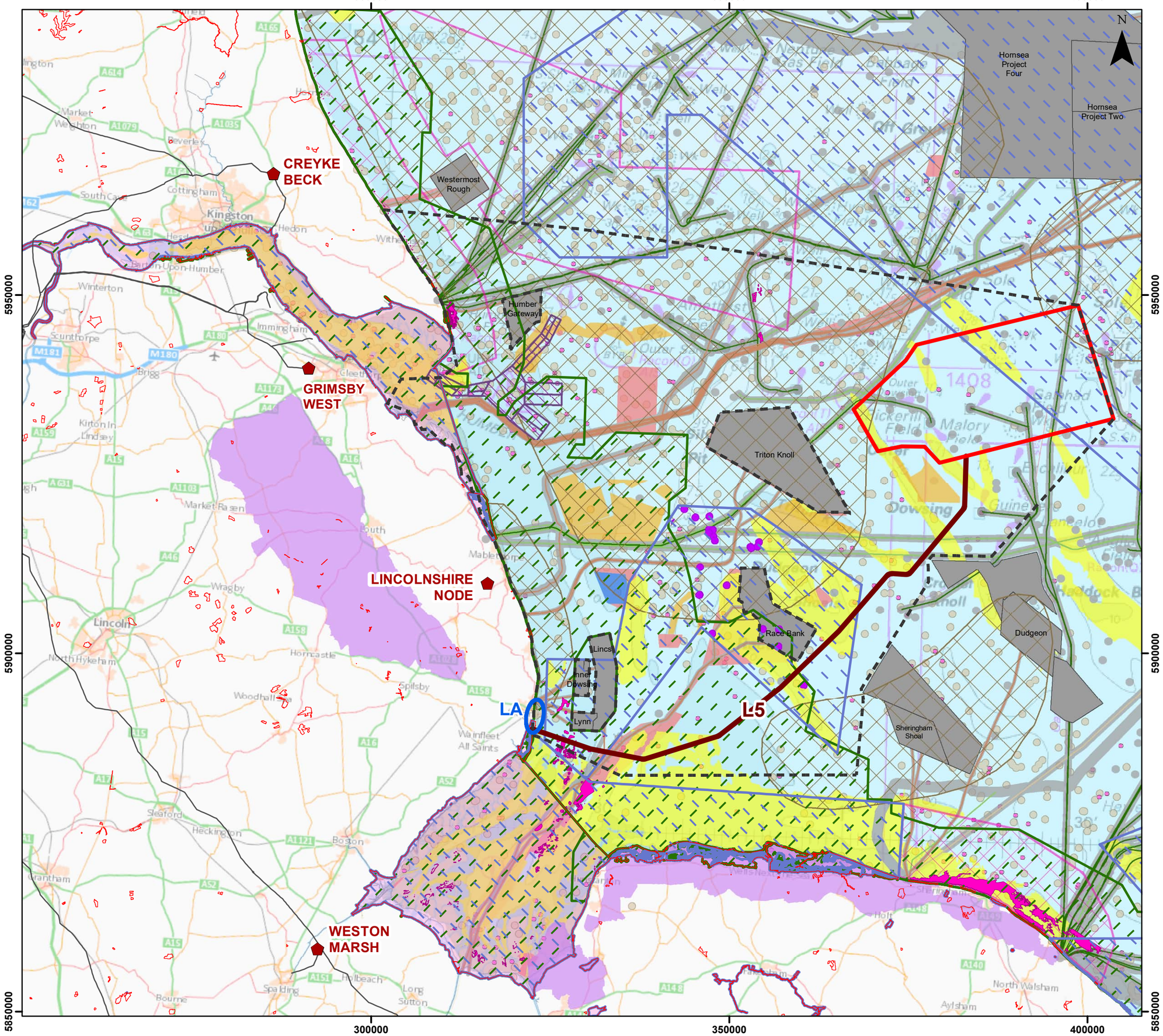
4.7.36 This export cable route option requires a crossing of the Race Bank offshore windfarm cables on the Docking Shoal feature. Due to the shallow nature of this area, it is considered likely that this may pose something of a concern for navigational depth around the crossing, with requirement to consult with MCA over resulting navigational risk.

4.7.37 The proximity of the offshore export cable route to the Race Bank and Dudgeon Extension offshore windfarms increases the likelihood of higher vessel traffic within the region.

Cable Installation and Technical Risks

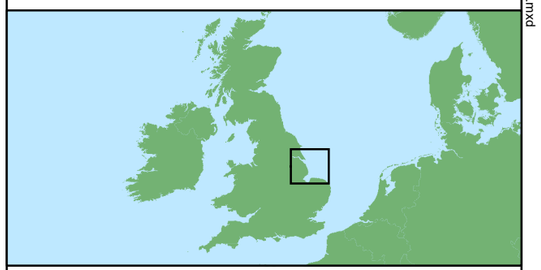
4.7.38 The area south of the Project site is generally less congested with wrecks and seabed obstructions and is therefore not so constrained in terms of offshore export cable routing compared to other route options.

4.7.39 The biggest risk for this offshore export cable route is the presence of shallow water depths, especially in the approaches to the landfall and at Burnham Flats. As a result large sections of the offshore export cable route are likely to need shallow draught vessels such as Cable Lay Barges (CLB) rather than more conventional cable laying vessels. Potentially, the vessel may also need to be able to ground at low tide which would severely limit the operating window for cable installation.



Legend

- Array Area
- Onshore Substation
- Offshore ECC Area of Search
- Offshore Cable Route Options
- Landfall Sector
- Offshore Wind Farm
- Infrastructure Constraint
- Cable - Active
- Cable - Not In Use
- Pipeline - Active
- Pipeline - Not In Use
- Pipeline - Abandoned
- Disposal Sites
- Aggregates - Production Agreement Area
- Aggregates - Exploration and Option Area
- Ships Routeing Measures Areas
- Sites of Special Scientific Interest
- Ramsar Site
- Marine Conservation Zone
- Areas of Outstanding Natural Beauty
- Special Protection Areas
- Special Areas of Conservation
- Herring Spawning Grounds (1998)
- Annex I Reef
- Annex I additional areas managed as reef
- Annex I Sandbank
- Wreck with 500m Buffer
- Subsea Obstruction



Coordinate System: WGS 1984 UTM Zone 31N

0 10 20 km

Scale: 1:500,000

Preliminary Environmental Information Report

Proposed Export Cable Route Option L5 Connecting to Landfall Sector LA

Figure 4.11

OUTER DOWSING OFFSHORE WIND

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Revision: 0.1

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Document Path: G:\GIS\GIS_Projects\0152 Outer Dowsing EIA\GIS\Figures\PEIR\Site Selection and Alternatives\ODOW_0152_Fig4.10_ECC_Option_L4_to_LB.mxd

Lincolnshire 6 (L6)

4.7.40 This offshore export cable route option was designed to reach a landfall which would be appropriate for an onwards routeing for a grid connection location at or in the vicinity of Weston Marsh. This offshore export cable route option (Figure 4.12) is up to approximately 95km in length and has a maximum water depth of approximately 35m.

Designated Sites

4.7.41 Offshore export cable route option L6 passes through the IDRBNR SAC. The offshore export cable route option was designed to avoid any sandbanks within the SAC by routing around the eastern edge of the SAC; however, it is not possible to avoid the nearshore area of known *S. spinulosa* reef at the southwestern extent of the SAC on the approach to the landfall. Whilst it is currently assumed that much of this known reef could likely be avoided through micro-siting of the cable route, it is possible that, due to the density of the known reef and combined with the potential for further reef areas to be identified during characterisation surveys, it may not be possible to avoid cable installation though areas of reef. Whilst *S. spinulosa* reef can recover within a relatively short timescale, installation through these features, including the necessity to deploy cable protection, may give rise to a further risk of adverse effects and a requirement for derogation.

4.7.42 The landfall location (LA sector) for the L6 export cable route option is located within the Saltfleetby-Theddlethorpe Dunes and Gibraltar Point SAC, which is designated at Gibraltar Point for the extensive sand dune systems. These sand dunes will pose limitations on the installation method available at these landfalls, with the dune system at Gibraltar Point (the LA landfall) being hundreds of metres in length.

4.7.43 The L6 offshore export cable route option also crosses the Greater Wash SPA, which cannot be avoided. The L6 export cable route option passes through an area supporting a medium to high density of common scoter and a high intensity area for red-throated diver.

Non-Designated Sensitive Habitats

4.7.44 Offshore export cable route option L6 also crosses the Docking Shoal sandbank which, whilst not designated or part of the IDBRNR SAC, is an extensive sandbank of environmental interest and impacts to this sandbank may give rise to indirect effects to designated sites in the wider area.

Other Marine Users

4.7.45 This offshore export cable route option also requires a crossing of the Race Bank offshore windfarm export cables on the Docking Shoal feature. Due to the shallow nature of this area, it is considered likely that this may pose something of a concern for navigational depth around the crossing, with requirement to consult with MCA over resulting navigational risk.

4.7.46 The proximity of the offshore export cable route to the Race Bank and Dudgeon Extension offshore windfarms also increases the likelihood of higher vessel traffic within the region.

Cable Installation and Technical Risks

4.7.47 The area south of the Project site is generally less congested with wrecks and seabed obstructions and is therefore not so constrained in terms of offshore export cable routing compared to other route options.

4.7.48 The biggest risk for this offshore export cable route is the presence of shallow water depths, especially in the approaches to the landfall and at Burnham Flats. As a result large sections of the offshore export cable route are likely to need shallow draught vessels such as Cable Lay Barges (CLB) rather than more conventional cable laying vessels. Potentially, the vessel may also need to be able to ground at low tide which would severely limit the operating window for cable installation.

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5850000

CREYKE BECK
GRIMSBY WEST
LINCOLNSHIRE NODE
WESTON MARSH
LA
L6
Westermost Rough
Humber Gateway
Triton Knoll
Hornsea Project Four
Hornsea Project Two
Race Bank
Lincs
Inner Dowsing
Lynn
Dudgeon
Sheringham Shoal

N

Legend

- Array Area
- Onshore Substation
- Offshore ECC Area of Search
- Offshore Cable Route Options
- Landfall Sector
- Offshore Wind Farm
- Infrastructure Constraint
- Cable - Active
- Cable - Not In Use
- Pipeline - Active
- Pipeline - Not In Use
- Pipeline - Abandoned
- Disposal Sites
- Aggregates - Production Agreement Area
- Aggregates - Exploration and Option Area
- Ships Routeing Measures Areas
- Sites of Special Scientific Interest
- Ramsar Site
- Marine Conservation Zone
- Areas of Outstanding Natural Beauty
- Special Protection Areas
- Special Areas of Conservation
- Herring Spawning Grounds (1998)
- Annex I Reef
- Annex I additional areas managed as reef
- Annex I Sandbank
- Wreck with 500m Buffer
- Subsea Obstruction

Coordinate System: WGS 1984 UTM Zone 31N

0 10 20 km

Scale: 1:500,000

Preliminary Environmental Information Report

Proposed Export Cable Route Option L6 Connecting to Landfall Sector LA

Figure 4.12

OUTER DOWSING OFFSHORE WIND

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Preferred Offshore Routes

4.7.49 Following the evaluation of the engineering and environmental constraints for the various identified offshore export cable routes, the potential offshore route corridors were compared to identify the preferred route options to each of the landfall sectors (and corresponding to the various grid connection options that were being considered by the HND at the time of the route evaluation process):

- Lincolnshire – LC sector:
  - Export cable route L1 was identified as the preferred option to the LC landfall options. However, the northerly deviation to the northerly landfalls was considered to be unviable due to the interaction with the Humber Estuary TSS. The deviations to the more southerly landfalls were deemed to be potentially viable, although the nearshore sections of the export cable routes were likely to be highly constrained due to the shallow bathymetry and the fact that the offshore export cable route would require a number of crossings of significant existing subsea infrastructure.
  - Export cable route L2a was considered not feasible as a route to the landfalls in the LC sector due to the technical challenges of routeing through the Inner Silver Pit.
- Lincolnshire – LB sector:
  - None of the identified export cable routes to the LB landfall sector avoid the IDRBNR SAC, however each has different degrees of overlap with the site and the various designated features.
  - Export cable route L2b passes through the centre of the Inner Silver Pit and was not considered feasible for cable installation; this route also passes through an area of known *S. spinulosa* reef within the IDRBNR SAC. Due to the engineering constraints within the Inner Silver Pit, export cable route L2b is not considered feasible.
  - Export cable routes L3 and L4 both pass directly through the IDRBNR SAC, crossing the sandbank features of the site to varying degrees. L3 provides for the shortest export cable route through the SAC and the least overlap with the sandbank features compared to L4. As such, L3 is considered to be the preferred offshore export cable route to landfall section LB, with the deviation to the southern landfall options (landfalls LB9 and LB10) being preferred due to this option avoiding any nearshore cable crossings. Landfall 10 is preferred over Landfall 9 due to the greater avoidance of the coastal SSSIs.
- Lincolnshire – LA sector:
  - Export cable route L6 is the preferred route to reach landfall sector LA due to the avoidance of any overlap with the sandbank features of the SAC, albeit that both L5 and L6 export cable routes unavoidably cross through a known area of *S. spinulosa* in the nearshore part of the SAC. The length of export cable route L5 and L6 may also restrict the transmission options for the Project and the crossing of the Race Bank offshore windfarm export cables on the Docking Shoal may also pose some risks. In addition, the landfall is significantly constrained by environmental designations at the coast.

4.8 Stage 5 – Identification of Proposed Onshore Substation (OnSS) Study Areas

Overview

4.8.1 As noted in Section 4, the location of grid connection options, and therefore the areas of search for the OnSS have been dictated by the preliminary results of the OTNR as published in the HND Report by National Grid ESO (NGESO, 2022). The Project has progressed the evaluation of substation sites in line with the connection options proposed by National Grid:

- Lincolnshire Node; northwest of the preferred Wolla Bank landfall (Landfall 10); or
- Weston Marsh; to the south of Boston.

Defining the OnSS Search Zones

4.8.2 Prior to reviewing potential sites, a number of key factors needed to be considered in order to first define appropriate search zones for each of the grid connection location options. The initial basis for this definition was based upon the information available with respect to each of the connection locations and the Maximum Design Parameters of the OnSS (See - PEIR Chapter 3 Project Description (Document 6.1.3)). Given the level of detail was different for each connection option with regard to location, the Project has had to approach each connection option independently, whilst applying the same key criteria to refine the search zones. Table 4.1 below outlines this key criteria for each of the grid connection options.

Table 4.1 Key Criteria relating to defining the OnSS Search zones

Key Information	Lincolnshire Node	Weston Marsh
Grid Connection Information available and basis of evaluation	Results of the HND "Lincolnshire Node", this connection point or transmission infrastructure does not yet exist. National Grid provided a "Search Area" for their OnSS.	Results of the HND and subsequent communications between ODOW and National Grid refer to the location "Weston Marsh" where there is existing overhead line Structures
Proximity to National Grid OnSS (NG OnSS) *To connect into the National Grid Transmission System, the Project's OnSS would first need to connect into the NG OnSS that would be sited at the confirmed grid connection location. This connection would be facilitated by 400Kv underground cables.*	Given the location of the NG OnSS is not yet known, the Project based their evaluation on the preliminary search area provided by National Grid to ensure the best possibility of the adopted location to feasibly connect to the NG OnSS.	The location of this connection point is more defined, and the understanding is that the Project would connect into the grid at a location in the vicinity of the "T Junction" of the overhead lines at Weston Marsh. The Project therefore adopted an initial search area metric of 3.5km[4] from this point which was determined by the need to design an economic and efficient system (as required by Schedule 9 of the Electricity Act 1989).

[4] The Project set a maximum distance of 400 kV underground cable required between the Project's OnSS and the proposed connection point, because extending the length of 400 kV cabling much further beyond 3.5 km would have a disproportionately large net cost impact and would also result in a suboptimal technical solution.

Flood Risk – Sequential Testing

4.8.3 As set out within the National Planning Policy Framework (NPPF) flood risk is a key consideration in the decision-making process for all types of development. When developing new infrastructure, projects must demonstrate that a sequential approach to site selection has been taken, i.e.: opportunities have been sought to move development away from areas of higher flood risk and into areas of lower flood risk. This process is known as the 'Sequential Test'.

4.8.4 Where this is not possible, it is necessary for the development to demonstrate that it can operate safely during flood conditions, for the whole of its design life, whilst not increasing the risk of flooding to other areas and including measures to reduce flood risk where possible. This process is known as the 'Exception Test'.

4.8.5 The location of the search areas for both the Lincolnshire Node and Weston Marsh substation search zones were first informed by the outcomes of the HND process (Table 4.1). Following the definition of these search zones as identified in Figure 4.13 and Figure 4.15 the Project were able to take a view on the flood risk for the potential sites.

4.8.6 The Lincolnshire Node search area is characterised by areas of Flood Risk Zones 1, 2 and 3. Due to a number of key environmental considerations and constraints the only sites considered viable to accommodate the OnSS in the search area were those identified in areas of higher flood risk. Therefore, the Project was not able to move the proposed development to areas of lower flood risk and a detailed Exceptions Test will be provided as part of the Environmental Statement at the DCO Application Stage.

4.8.7 The majority of the Weston Marsh search area is defined as Flood Risk Zone 3 with a number of small pockets of Flood Risk Zone 2. Upon review of these areas, their proximity to residential properties or their interface with other infrastructure such as overhead lines meant that they were unviable to accommodate the OnSS either partially or in its entirety. Therefore, the Project was not able to move the proposed development to areas of lower flood risk and a detailed Exceptions Test will be provided as part of the Environmental Statement at the DCO Application Stage.

4.8.8 A detailed Flood Risk Assessment (FRA) for the OnSS will be developed to support the ES and will be submitted with the DCO application.

Best and Most Versatile Agricultural Land

4.8.9 Planning policy also highlights the importance of food security in the UK, and the need to preserve the best and most versatile agricultural land.

4.8.10 The majority of the agricultural land within the vicinity of Lincolnshire Node search area is classified as ALC grade 3, with a number of small areas of ALC Grade 2 land. At an early stage, it was decided that all efforts, where possible, to develop the project on lower grade agricultural land would be made, as such, only the ALC grade 3 land was considered for potentially suitable OnSS sites at Lincolnshire Node.

4.8.11 At Weston Marsh, all land within a c.6km radius of the National Grid T-Junction is classified as ALC Grade 1, the highest and most valuable grading. As such, applying the 3.5km metric as described in Table 4.1 , all land is ALC grade 1 and therefore could not be avoided when identifying potential OnSS locations at Weston Marsh.

Lincolnshire Node

4.8.12 The Lincolnshire Node site is characterised by gently undulating agricultural land that is dissected by a series of field drains, including the Boy Grift Drain. The area does not currently host any National Grid infrastructure. This connection point is part of a future project by National Grid to reinforce transmission infrastructure around the east coast of Lincolnshire. This broader, future project has been introduced in response to general network reinforcement requirements identified prior to the Round 4 leasing Round. The details of this Project are not yet known however it is understood that this would include a new overhead lines from Grimsby continuing south to a connection point in south Lincolnshire.

4.8.13 This project (the name of which has not yet been confirmed by National Grid) would include the development of the Lincolnshire Node grid connection point, where National Grid would be required to construct a substation, that would connect into new overhead lines, into which a number of customer connections would be available, including potentially the connection for the Project.

4.8.14 The siting process for the Project's OnSS option that would connect to the Lincolnshire Node grid connection point was first informed by the indicative search area for the Lincolnshire Node connection location provided by National Grid as described in Table 4.1 and shown in Figure 4.13. It is not known where within this zone National Grid would site their substation, therefore, to ensure the best possibility of the Project identifying a site that can feasibly connect to the NG OnSS once developed, the NG OnSS search zone served as the initial search boundary. This was adopted as the search extent to the west as, taking consideration of the Project's landfall located at Wolla Bank, this would minimise the potential need to "double back" should National Grid site their OnSS at the far east of the national grid search zone. The Project then adopted the c.3.5 km buffer (Table 4.1) from the central eastern area with a view to ensuring a viable connection (Figure 4.13).

4.8.15 Once the initial search area was established based on the Requirements outlined in Table 4.1 . The next phase was to identify potentially developable sites that met the additional key criteria established by the Project:

- Providing an area of land large enough to meet the requirements of the Project OnSS (;18Ha);
- As far as possible, free from environmentally sensitive receptors; and
- Not within 200m of any occupied building.

4.8.16 Following application of the site selection criteria for the OnSS to the refined search zone, the potential OnSS locations shown in Figure 4.13 were identified and constituted the initial long list of possible sites. The Project team then undertook a two stage environmental constraints appraisal comprising two 'sifting workshops' with representatives from all of the relevant environmental specialisms, together with the consents team, engineers and land specialists. These workshops utilised professional judgement and review of publicly available data sets and site visits to publicly accessible land in the vicinity of the sites to ensure the key issues were considered. A number of sites were discounted following the first workshop due primarily to their proximity to residential areas, but also due to other key environmental considerations such as noise, traffic and heritage. The results of the second workshop are outlined in Table 4.2 and are provided in more detail in Annex A.

4.8.17 Having undertaken the environmental constraints appraisal and the ranking exercise for each of the OnSS options at Lincolnshire Node (Annex A – OnSS Site Refinement), the sum of each ranked category was used to establish an overall comparative ranking for each option to help inform which sites should be taken forward for further consideration.

4.8.18 It should be noted that while the ranking and sifting exercises help to highlight the key areas of consideration for each of the sites; the ultimate selection process intends to take a holistic view of the results of this analysis alongside site visits to ground truth and professional judgement. The workshops are therefore key to this process to ensure that the Project demonstrates due regard to the constraints and considerations for each site as a whole and in the wider context of the Project's overall footprint.

4.8.19 As shown in Table 4.2, the best scoring option was OnSS LN 9, which was ranked number one (jointly with OnSS Option 10), and OnSS option 4a was ranked third. As such and upon further review of these sites, it was decided that the preferred Lincolnshire Node OnSS study area, comprising land between both of these options, would be taken forward for assessment in the PEIR, as shown in Figure 4.14.

Table 4.2 Ranking of the "take forward" OnSS site options at Lincolnshire Node

OnSS Option	Rank	Air Quality	Archaeology and Cultural Heritage	Ecology and Ornithology	Geology and Ground Conditions	Hydrology and Flood Risk	Land Use	Noise and Vibration	Traffic and Transport	Landscape and Visual Assessment	Planning
OnSS LN 1a	4	2	6	6	1	1	9	2	3	1	1
OnSS LN 4	4	1	3	3	1	5	1	5	7	5	1
OnSS LN 4a	3	1	3	3	1	4	1	4	6	5	1
OnSS LN 7	7	1	7	6	1	2	9	3	1	3	1
OnSS LN 9	1	1	3	7	1	7	1	1	2	2	1
OnSS LN 10	1	1	1	1	1	3	1	7	4	6	1
OnSS LN 10a	4	1	1	2	1	6	2	6	5	7	1

545000

550000

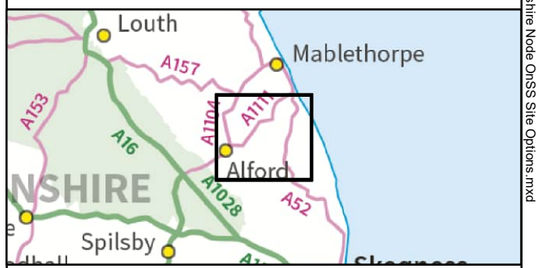
380000

375000

N

Legend

- Lincolnshire Node OnSS Search Zone
- Potential OnSS Location
- Potential OnSS Location - Excluded During Initial Sifting Workshop
- National Grid Preliminary Search Zone
- Lincolnshire Node Study Area



Coordinate System: British National Grid

0 1 2 km

Scale: 1:30,000

Preliminary Environmental Information Report

Lincolnshire Node OnSS Site Options

Figure 4.13

OUTER DOWSING OFFSHORE WIND

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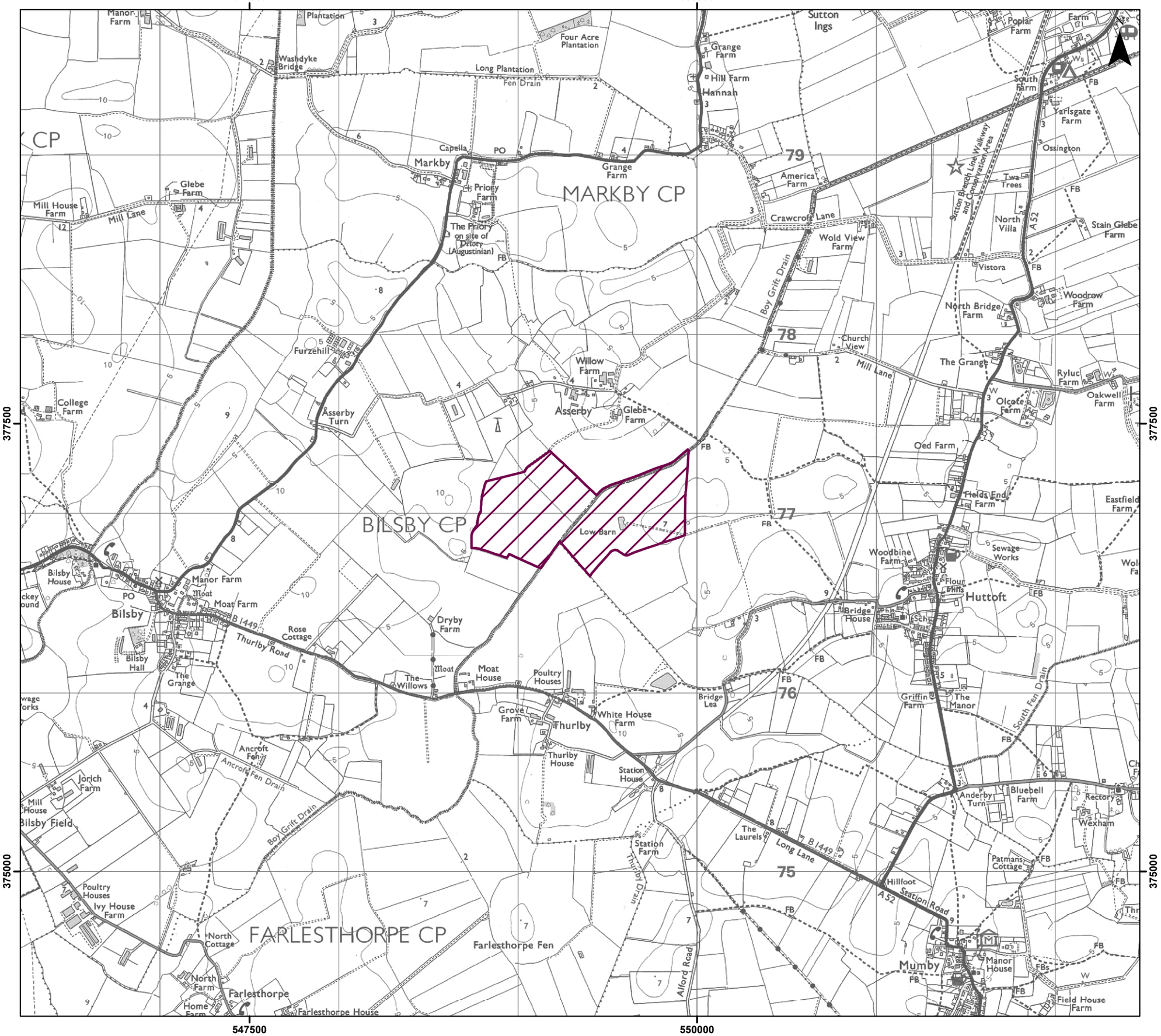

Legend

Lincolnshire Node OnSS Search Area

Coordinate System: British National Grid

0 0.5 1 km

Scale: 1:20,000

Preliminary Environmental Information Report

OnSS PEIR Study Area Considered at Lincolnshire Node

Figure 4.14

OUTER DOWSING OFFSHORE WIND

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Revision: 0.1

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Weston Marsh

4.8.20 Weston Marsh is an area defined by flat agricultural land to the south of Boston and to the northeast of Spalding. It is an area dominated by agriculture, with a series of tall 400kV National Grid transmission towers and overhead lines that pass across the area from the existing Bicker Fen Substation to the existing Walpole Substation, and also serving Spalding Power Station and 400kV Substation.

4.8.21 The criteria for identifying potential sites for the Weston Marsh study area were largely similar to those used for identifying sites for Lincolnshire Node and reported above, apart from the presence of existing National Grid infrastructure suggesting there should be a greater emphasis on siting the OnSS in close proximity to the existing overhead line infrastructure into which the Project would ultimately connect.

4.8.22 Having been directed by National Grid to a connection point within the vicinity of the existing 400kv overhead line T-Junction at Weston Marsh, the Project team then applied the 3.5km search radius to refine the search zone for the OnSS (as outlined in Table 4.1).

4.8.23 Having identified a long list of possible OnSS sites, the Project undertook the same approach for the refinement of these sites as described for Lincolnshire Node in 4.8.16.

4.8.24 Having undertaken the environmental constraints appraisal and the ranking exercise for each of the OnSS options at Weston Marsh (Annex A – OnSS Site Refinement), the sum of each ranked category was used to establish an overall comparative ranking for each option to help inform which sites should be taken forward for further consideration.

4.8.25 As shown in Table 4.3, the site that performed best in relation to the ranking exercise for siting of the Weston Marsh OnSS was option 10. Following application of the exercise and sifting workshops it was decided that this was the preferred Weston Marsh OnSS study area that would be taken forward for assessment in the PEIR, as shown in Figure 4.16.

Table 4.3 Table Ranking of OnSS site options at Weston Marsh

OnSS Option	Rank	Air Quality	Archaeology and Cultural	Ecology and Ornithology	Geology and Ground	Hydrology and Flood	Land Use	Noise and Vibration	Traffic and Transport	Landscape and Visual	Planning
OnSS WM 2	9	1	9	9	7	3	8	9	6	3	1
OnSS WM 2a	7	1	3	7	9	5	10	5	4	5	1
OnSS WM 2b	6	1	4	8	8	4	9	2	5	4	1
OnSS WM 3	3	1	5	3	1	6	1	1	3	6	1
OnSS WM 5	8	1	8	1	1	7	6	8	3	9	1
OnSS WM 5a	5	1	6	4	1	8	7	7	2	7	1
OnSS WM 5b	4	1	7	2	1	9	6	6	1	8	1
OnSS WM 10	1	1	1	5	1	1	2	4	7	1	5
OnSS WM 10a	2	1	2	6	1	2	2	3	8	1	5

4.8.26 Following this exercise and as shown in Figure 4.15, an additional site known to the Project as "Weston Marsh (WM) North" was identified (Navy blue). This was introduced following a technical study that highlighted that the Project could have the possibility of connecting to overhead lines a small distance from the T junction to increase the proximity to the strategic highway network (A16), have the ability to avoid crossing the River Welland, and further increase the proximity to the existing overhead line towers. The site was within the search zone as defined in Figure 4.15 and therefore aligned with the determining criteria highlighted throughout this section. At this stage, how National Grid would look to connect the Project to the National Grid Transmission system is not yet known, therefore despite the Weston Marsh north site performing better in relation to the aforementioned criteria, Site WM 10 (known to the Project as "Weston Marsh south") is still under consideration by the Project and is the preferred site for a connection at the T junction.

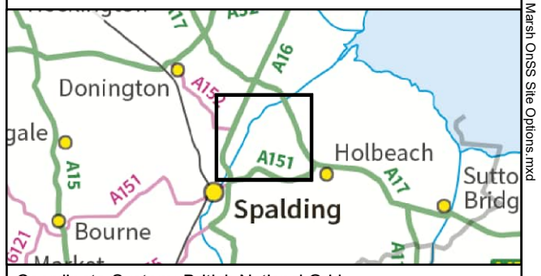
4.8.27 The two sites taken forward for the Weston Marsh connection option are shown in Figure 4.16.

527500 530000 532500

332500 330000 327500 325000

Legend

- Weston Marsh OnSS Search Zone
- Potential OnSS Location
- Potential OnSS Location - Excluded During Initial Sifting Workshop
- National Grid T Junction Tower Location
- National Grid 400 kV Overhead Line
- Weston Marsh North Study
- Weston Marsh South Study



Coordinate System: British National Grid

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Scale: 1:30,000

Preliminary Environmental Information Report

Weston Marsh OnSS Site Options

Figure 4.15

OUTER DOWSING OFFSHORE WIND

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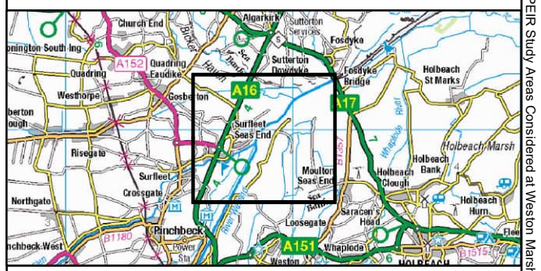
327500

Legend

- Weston Marsh North OnSS Search
- Weston Marsh South OnSS Search



Coordinate System: British National Grid

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Scale: 1:20,000

Preliminary Environmental Information Report

OnSS PEIR Study Areas Considered at Weston Marsh

Figure 4.16

OUTER DOWSING OFFSHORE WIND

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4.9 Stage 6 – Identification of the Onshore Export Cable Corridor (ECC)

Overview

4.9.1 Having undertaken the detailed landfall zone identification exercise prior to completion of the HND process, as described in Section 4.9 , the exercise identified a range of potentially suitable export cable landfall options along the South Yorkshire, Lincolnshire, and North Norfolk coasts. The process to identify the Onshore ECC commenced following the completion of the HND, once it had been established that the OnSS would be located at either Lincolnshire Node or Weston Marsh. As such, the process to identify the onshore ECC focused on establishing an ECC from the landfall at Wolla Bank (landfall section LB9 and LB10), with this landfall identified as the best overall landfall when also considering offshore cable routing and nearshore constraints, as this was considered the most appropriate to facilitate the connection at both of the OnSS locations provided by National Grid.

4.9.2 The guiding principles for locating the Project's onshore ECC was to identify an economic and efficient cable route corridor (i.e., as close as possible to the grid connection point and in as direct a line from the landfall to the grid connection point as possible) that does not, as far as possible, give rise to significant adverse environmental impacts.

4.9.3 The method for identifying the ECC utilised a two-stage process as follows:

- Step 1 - Manual GIS based mapping, followed by;
- Step 2 - Quantitative analytics, to provide each route option with a rank score.

4.9.4 Step 1 of the process involved the manual identification of potential centrelines of routes from the landfall to the OnSS study areas. These centrelines were informed with the use of mapped environmental constraints data (See Figure 4.18)[5] which was used to identify a number of paths between these constraints. The constraints data used covered the environmental assessment criterial of Archaeology and Cultural Heritage, Landscape and Visual, Noise and Vibration, Socio-economics, Traffic and Transport, Water Resources and Flood Risk, Ecology and HRA.

4.9.5 Using environmental constraints data as the basis of the routing process helped the Project to embed the minimisation of environmental effects as a key design principal of the Project at the earliest possible stage.

4.9.6 Having identified the potential routing centrelines, a GIS analytics mapping tool was utilised to quantify the environmental constraints within 150m of the centreline (creating a 300m wide ECC). Each constraint was quantified, either by total integer (e.g., number of listed buildings, number of watercourse crossings etc) or area within the ECC (e.g., total area in hectares of SSSIs). These values were then ranked by environmental discipline and aggregated to provide an overall environmental ranking to help inform the routing process

4.9.7 The process for this ranking exercise is illustrated in Figure 4.17 and the results are presented in Annex B – Onshore ECC Quantitative Analysis.

[5] A full list of environmental constraints data used in the routing can be found in Annex C – List of data sources used in ECC quantitative assessment.

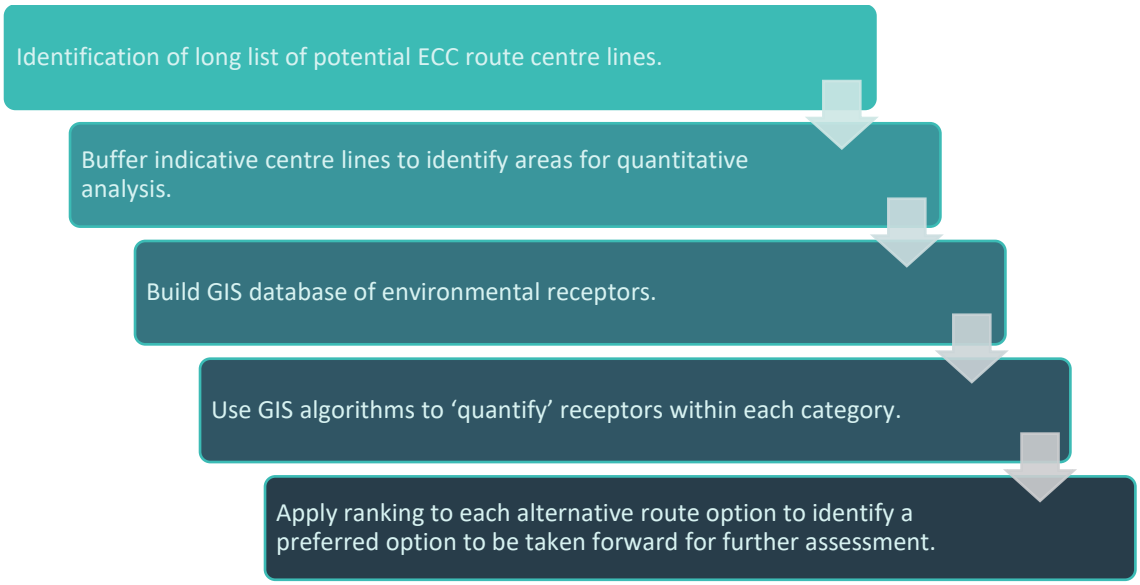


Figure 4.17: Process followed for ranking of ECC routes

Onshore ECC Options - Landfall to Weston Marsh

4.9.8 Having established the preferred broad landfall area on the East coast of Lincolnshire between Chapel St Leonards and Anderby Creek, a number of potential onshore ECCs were identified between this area of the coast and the preferred OnSS location at Weston Marsh.

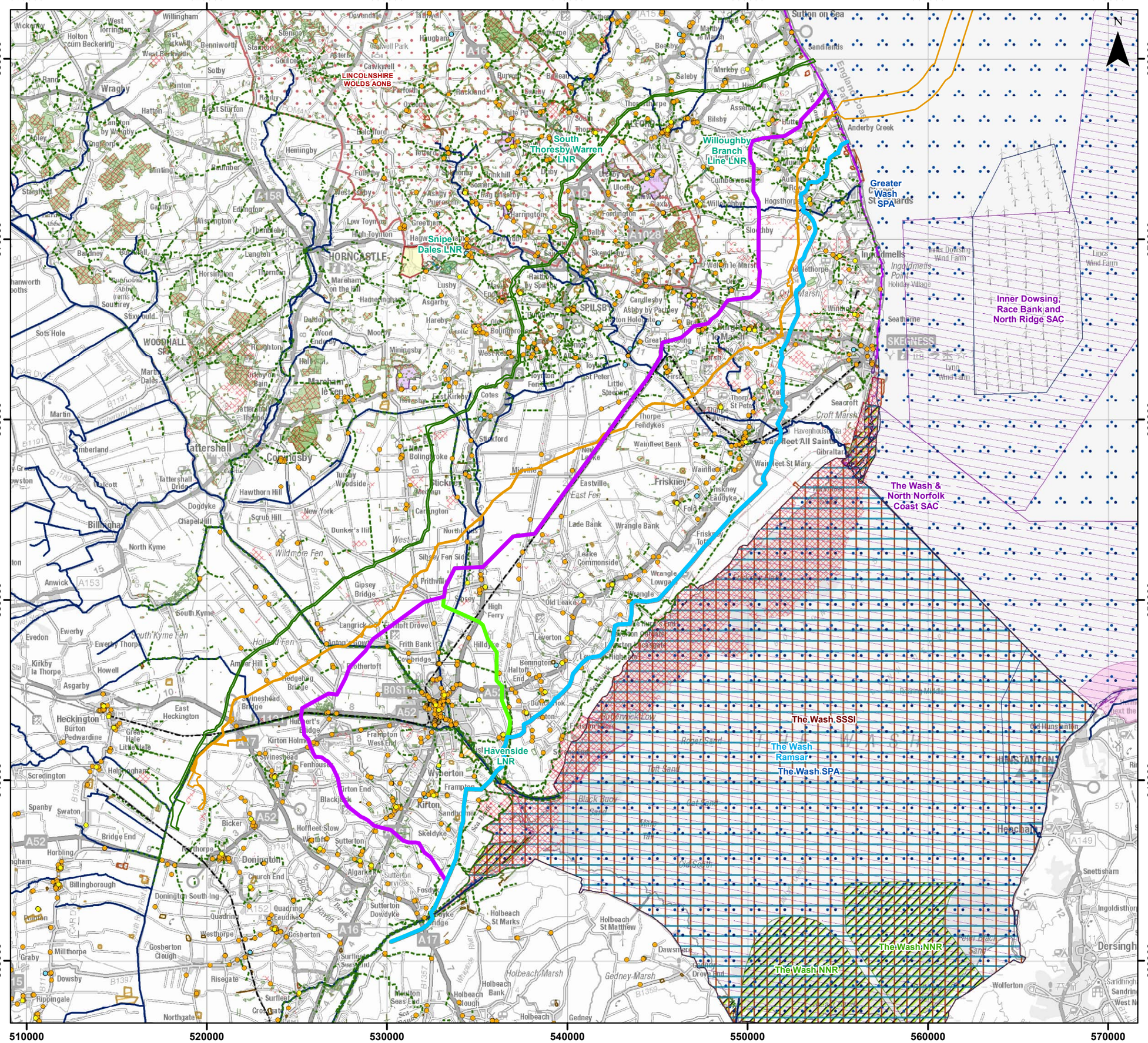
4.9.9 Three main route options that were identified and evaluated following the method described above, these are shown on Figure 4.18.

4.9.10 The first option (blue line on Figure 4.18) originates at the landfall location at Wolla Bank, south of Anderby Creek, and follows a southerly direction, to the east of Burgh Le Marsh and Wainfleet All Saints, before crossing agricultural land to the south of the A52. The ECC then passes to the south of Boston, crossing the Haven, River Welland and A17.

4.9.11 The second option (purple line on Figure 4.18) originates from the landfall point north of Anderby Creek and takes a more northerly direction to the northwest of Burgh Le Marsh. The ECC then runs in parallel to the Boston to Friskney rail line before passing around the north of Boston, and circumnavigating the town in an anticlockwise direction. This option then joins the ECC of option 1 to the north of Fosdyke.

4.9.12 The third option (green line on Figure 4.18) follows the same route as option 2 until it reaches Silsby, at which point the ECC turns southeast to circumnavigate Boston in a clockwise direction. This option runs to the west of the Hobhole Drain before joining the ECC of option 1 to the north of Fishtoft.

4.9.13 Detailed quantitative analysis of each of these options is presented in Annex B – Onshore ECC Quantitative Analysis. The analysis shows that option 1 (Wolla Bank to Weston Marsh) was the preferred option as it was likely to result in the fewest environmental effects.



Legend

High Level Route Options

- Huttoft Bank - Weston Marsh - Boston North (63.97 km)
- Huttoft Bank - Weston Marsh - Boston South (64.26 km)
- Wolla Bank - Weston Marsh (58.19 km)

Constraints

- Viking Link Limits of Deviation
- Triton Knoll Order Limits
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Ramsar
- Site of Special Scientific Interest (SSSI)
- National Nature Reserve (NNR)
- Local Nature Reserve (LNR)
- RSPB Reserve
- Ancient Woodland
- Designated Priority Habitat
- Scheduled Monument
- Grade I Listed Building
- Grade II Listed Building
- Grade II* Listed Building
- Registered Park and Garden
- Registered Battlefield
- Area of Outstanding Natural Beauty (AONB)
- Country Park
- Historic Landfill Site
- Non-Designated Woodland
- Public Right of Way
- Statutory Main River
- Railway

Coordinate System: British National Grid

0 5 10 km

Scale: 1:200,000

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Weston Marsh Initial ECC Options

Figure 4.18

OUTER DOWSING OFFSHORE WIND

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Landfall to Lincolnshire Node

4.9.14 Having established the preferred landfall location on the East coast of Lincolnshire between Chapel St Leonards and Sandilands, as for Weston Marsh above, a number of potential ECCs were identified between this area of the coast, and the preferred OnSS location at Lincolnshire Node.

4.9.15 These three options are shown on Figure 4.18.

4.9.16 Given the shorter distance between landfall and OnSS, and the relatively constrained nature of the options, it was not considered necessary to undertake a quantitative analysis as was the case for the Weston Marsh ECC options.

4.9.17 Through consideration of environmental and engineering constraints a number of limitations to the brown and purple routes were identified as follows:

- The number of properties along Sea Road between Anderby and Anderby Creek limited the options to route the ECC north across Sea Road;
- Routing north of Sea Lane would require construction works in close proximity to residential and holiday properties at Anderby Creek;
- The cluster of public rights of way (PRoW) to the northeast of the preferred OnSS location made a southerly approach preferable;
- The caravan park on Mumby Road makes a more direct route less favourable; and
- The Spendluffe Meadow Local Wildlife Site north of Long Lane makes a route south of Long Lane more environmentally compatible.

4.9.18 Having established these limitations and acknowledged the minor differences in route lengths between the options, it was decided that Option 3 would be taken forward for consultation.

550000

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Legend

High Level Route Options

- Wolla Bank to Lincolnshire Node - Option 1 (8.08 km)
- Wolla Bank to Lincolnshire Node - Option 2 (7.10 km)
- Wolla Bank to Lincolnshire Node - Option 3 (7.53 km)

Constraints

- Viking Link Limits of Deviation
- Triton Knoll Order Limits
- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Designated Priority Habitat
- Scheduled Monument
- Grade I Listed Building
- Grade II Listed Building
- Grade II* Listed Building
- Public Right of Way
- Statutory Main River
- Normal Watercourse
- England Coastal Path
- Surface Water Area
- Non-Designated Woodland
- Historic Landfill Site

Coordinate System: British National Grid

0 0.5 1 km

Scale: 1:25,000

Preliminary Environment Information Report

Lincolnshire Node Initial ECC Options

Figure 4.19

OUTER DOWSING OFFSHORE WIND

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4.10 Stage 7 – Onshore Refinement of the Project

Onshore ECC

Landfall to Weston Marsh

4.10.1 Following the Project's Phase 1 public consultation held in October 2022 (See Consultation Summary Report (document 5.1)), questions were raised by landowners and members of the public relating to the onshore ECC being routed across the agricultural land south of the A52.

4.10.2 These questions were related to:

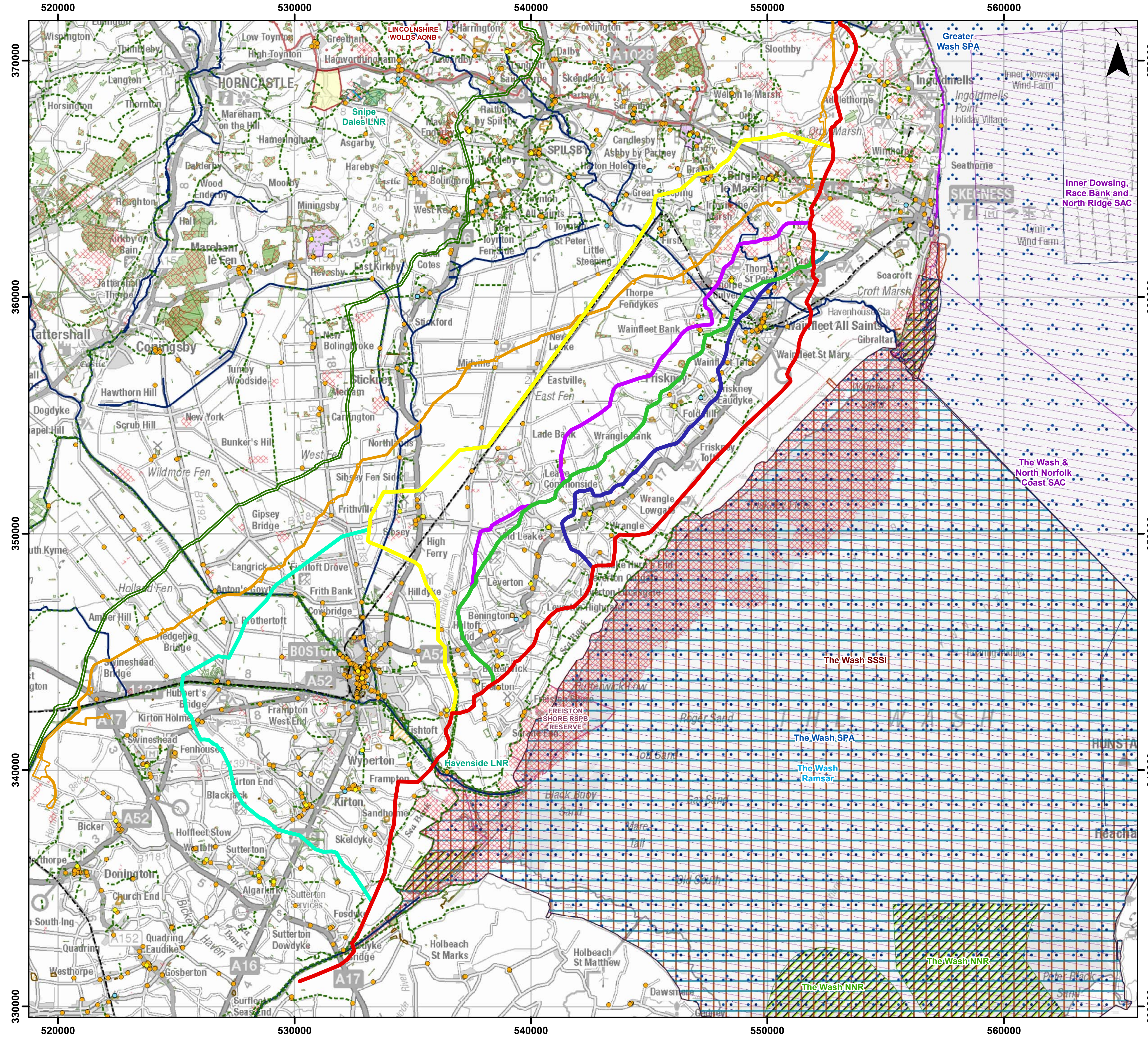
- Potential geotechnical complications due to the presence of 'running sands' which could affect the future depth of cover to the cable and ability to run heavy machinery across the area during construction;
- Drainage complications due to the presence of a large networks of agricultural field drains, and
- The potential economic effect from damage to high value crops.

4.10.3 A key criteria for the original search for the onshore ECC was adopting as direct a route as possible to minimise impacts. This feedback, however, resulted in the Project reviewing slightly less direct routes, west of the A52 to see if these constraints could be avoided. Following detailed review of this area the Project developed an alternative ECC route that looked to avoid these constraints where practicable and provided optionality to the Project. The Project proceeded to consult stakeholders on this alternative route (Consultation Summary Report (document 5.1)) and it was agreed to take both route options to a point of equivalence in terms of consultation, survey data and assessment to help inform which route should be adopted should the Weston Marsh connection option be confirmed for the project.

4.10.4 Figure 4.20 illustrates the "review" stage for further six route options that were considered when studying alternatives to the original ECC route south of the A52.

4.10.5 As with the original onshore ECC options (Section 4.9), these ECCs were subject to the same quantitative analysis as illustrated in Figure 4.17. The results of which are presented in Annex B – Onshore ECC Quantitative Analysis. The findings of this analysis are that ECC option 2 (Route Option 2 on Figure 4.20) is the preferred alternative to be taken forward into PEIR in addition to the original route (thereafter referred to as Route 1 and Route 1A) .

4.10.6 The onshore ECC boundaries for the landfall to Weston Marsh options taken forward to PEIR are illustrated in Figure 4.21.



Legend

Wolla Bank - Weston Marsh

Wolla Bank to Weston Marsh Alternative Options

- Route Option 1
- Route Option 2
- Route Option 3
- Route Option 4
- Route Option 5
- Route Option 6

Constraints

- Viking Link Limits of Deviation
- Triton Knoll Order Limits
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Ramsar
- Site of Special Scientific Interest (SSSI)
- National Nature Reserve (NNR)
- Local Nature Reserve (LNR)
- RSPB Reserve
- Ancient Woodland
- Designated Priority Habitat
- Scheduled Monument
- Grade I Listed Building
- Grade II Listed Building
- Grade II* Listed Building
- Registered Park and Garden
- Registered Battlefield
- Area of Outstanding Natural Beauty (AONB)
- Country Park
- Statutory Main River
- Non-Designated Woodland
- Public Right of Way
- Railway
- Historic Landfill Site

Coordinate System: British National Grid

0 5 10 km

Scale: 1:150,000

Preliminary Environment Information Report

Alternative Options for ECC to Weston Marsh

Figure 4.20

OUTER DOWSING OFFSHORE WIND

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520000 530000 540000 550000 560000 570000

380000 370000 360000 350000 340000 330000

N

Legend

PEIR Onshore ECC Boundaries

Sources:

Coordinate System: British National Grid

0 5 10 km

Scale: 1:200,000

Preliminary Environmental Information Report

PEIR Onshore ECC Boundaries

Figure 4.21

OUTER DOWSING OFFSHORE WIND

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4.11 Conclusions

Summary

4.11.1 The outcomes of the site selection process undertaken for the Project so far have defined the description of the Project for assessment throughout the PEIR, including the current engineering design, total area, and construction, operation and maintenance and decommissioning activities. Wherever possible and practicable, the Project has sought to accommodate preferences and concerns raised by stakeholders through the site selection process whether by adjustments to the development boundary, areas of works or designs being considered.

4.11.2 The site selection process and alternatives considered have been through a process of detailed analysis of environmental, social and engineering constraints, with key feasible alternatives taken forward for consultation.

4.11.3 As detailed in Volume 1, Chapter 3: Project Description, the Project has employed a Maximum Design Scenario (MDS) approach. Therefore, it is recognised that whilst the site selection process undertaken to date has included a number of refinements to the Project design envelope so far as practical, there remains some areas of flexibility in the final Project design.

Next Steps

4.11.4 Following the completion of the Project's Phase 2 consultation, this chapter will be updated to include information on the further refinement of the Project both onshore and offshore and will highlight any changes or revisions between the proposals as they are currently set out and assessed within the PEIR and those which are included in the final DCO submission. These may include, but not limited to:

- Refinement of the array area from 500km^2 to 300km^2 as per the AfL (as noted in Section 4.1);
- Confirmation of landfall location and proposed drilling compounds;
- Refinement of the offshore ECC;
- Selection of the OnSS location and associated temporary construction compound; and
- Confirmation and refinement of the onshore ECC.

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Annex A – OnSS Site Refinement

Lincolnshire Node

Table 4A.1: Lincolnshire Node short list of OnSS siting sifting (Please see Figure 4.13 for map of OnSS Options)

OnSS option		Air quality	Archaeology and cultural heritage	Ecology and ornithology	Geology and ground conditions	Hydrology and flood risk	Land use	Noise and vibration	Traffic and transport	Landscape and visual assessment	Planning
OnSS LN 1a	Brief description of topic specific environmental baseline / issues.	There is potential for construction traffic to route near to a local nature reserve. There is no real difference between options in terms of human receptors / Air Quality Management Areas (AQMAs).	Heritage: potentially within the setting of grade ii* Wellvale house (National Heritage List for England (NHLE) reference 1168883) and well hall grade ii registered park and garden (NHLE reference 1000992) although this is uncertain. Potential conflict with section 66 of the planning (listed buildings and conservation areas act) (1990). Potential conflict with paragraph 202 of the National Planning Policy Framework. Archaeology: no known potentially significant archaeology recorded in the immediate vicinity.	Willoughby branch line LNR within 885 m south and unlikely to be affected. No other designated sites or ancient woodland within 2km. No habitats identified on the priority habitat inventory or habitat networks overlap the site. Small areas of priority habitat and associated habitat networks are present between the site and the cable corridor so could be affected by revisions to the cable corridor to connect with option 1. Arable field with low value. Boy grift drain and tree line close to northern site boundary. Small, triangular woodland block near to south eastern corner of site.	Superficial geology tidal flat deposits - clay and silt, till and glaciofluvial deposits, Devensian. Bedrock geology Ferriby chalk formation - chalk and Welton chalk formation - chalk	Majority of site in flood zone 1. Low Surface Water Flood risk. No immediate constraints with any drains/watercourses within the site, however drainage channels do lie close to the option boundary.	Agricultural land, Agricultural Land Classification (ALC) grade 3. Approx 900m from historic Farlesthorpe brick yard	Located away from residential receptors (but closer than option 9), potentially good access from lady fen lane meaning vehicles would not be routed past further receptors.	No real differentiator other options, will depend on where the haul road would connect to.	No especially close properties or roads and some space around to implement mitigation planting. Settlements in surrounding area include Farlesthorpe approx. 0.7km to southwest, Thurlby approx. 1.6km to northeast and Alford approx. 2.3km to northwest. Also exposed in views from b1449 approx. 0.7km to north. Generally open and exposed landscape with some tree cover along northern boundary and at southeast corner. Farm developments including chicken sheds and pig sties evident to west and south.	No planning applications within close proximity
	Rank	2	6	6	1	1	9	2	3	1	1

OnSS option		Air quality	Archaeology and cultural heritage	Ecology and ornithology	Geology and ground conditions	Hydrology and flood risk	Land use	Noise and vibration	Traffic and transport	Landscape and visual assessment	Planning
OnSS LN 4	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human/ecological receptors and AQMAs.	Heritage: no obvious issues with the setting of designated heritage assets although assets at Marky priory may need to be considered. Archaeology: no known potentially significant archaeology recorded in the immediate vicinity.	No designated sites or ancient woodland within 2km. No habitats identified on the priority habitat inventory or habitat networks overlap the site. Very large arable field with low value and no field margins within the site. Small, triangular plantation outside boundary to the south.	Superficial geology tidal flat deposits - clay and silt and till. Bedrock geology Welton chalk formation - chalk	Half site lies within flood zone 3, other half in flood zone 1. Very low/low Surface Water Flood risk. No drains or watercourses within the site boundary. Lies ~30m from boy grift drain, potential for site to be flooded during high frequency - low magnitude Events. Proximity to watercourse means low freq. High mag. Events could also cause higher flood levels	Agricultural land, ALC grade 3.	Located relatively close to the village of Asserby; however further away from residential properties than options 10 and 10a	No real differentiator other options, will depend on where the haul road would connect to.	No close properties or roads with the exception of rural properties approx. 0.4km to north. Space to enable implementation of mitigation planting. Closest settlements are Huttoft approx. 1.6km to southeast and Thurlby approx. 1.2km to south, with b1149 also at this range in this direction. Open landscape and rounded landform will make substation a prominent feature in local landscape.	No planning applications within close proximity
	Rank	1	3	3	1	5	1	5	7	5	1
OnSS LN 4a	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human/ecological receptors and AQMAs.	Heritage: no obvious issues with the setting of designated heritage assets although assets at Marky priory may need to be considered. Archaeology: no known potentially significant archaeology recorded in the immediate vicinity.	No designated sites or ancient woodland within 2km. No habitats identified on the priority habitat inventory or habitat networks overlap the site. Very large arable field with low value and no field margins within the site. Small, triangular plantation outside boundary to the south.	Superficial geology tidal flat deposits - clay and silt and till. Bedrock geology Welton chalk formation - chalk	Upper half of the site lies within flood zone 3, with majority in flood zone 1. Very low/low Surface Water Flood risk. No drains/watercourses within the site boundary. Lies ~45m from boy grift drain, potential for site to be flooded during high frequency - low magnitude Events. Proximity to watercourse	Agricultural land, ALC grade 3.	Option 4 is, located relatively close to the village of Asserby; however further away from residential properties than options 10 and 10a	No real differentiator other options, will depend on where the haul road would connect to.	No close properties or roads with the exception of rural properties approx. 0.4km to north. Space to enable implementation of mitigation planting. Closest settlements are Huttoft approx. 1.1km to southeast and Thurlby approx. 1.1km to south, with b1149 also at this range in this direction. open landscape and	No planning applications within close proximity

OnSS option		Air quality	Archaeology and cultural heritage	Ecology and ornithology	Geology and ground conditions	Hydrology and flood risk	Land use	Noise and vibration	Traffic and transport	Landscape and visual assessment	Planning
						means low freq. High mag. Events could also cause higher flood levels				rounded landform will make substation a prominent feature in local landscape.	
	Rank	1	3	3	1	4	1	4	6	5	1
OnSS LN 7	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human/ecological receptors and AQMAs.	Heritage: potentially within the setting of designated assets at Marky priory including a grade ii* church, a grade ii priory and a scheduled monument (NHLE references 1063009, 1147252 & 1004987). Also, potentially within the setting of a grade ii listed farmhouse (NHLE reference 1063012). Potential conflict with section 66 of the planning (listed buildings and conservation areas act) (1990). Potential conflict with paragraph 202 of the National Planning Policy Framework. Archaeology: no known potentially significant archaeology recorded in the immediate vicinity.	No designated sites or ancient woodland within 2km. No habitats identified on the priority habitat inventory or habitat networks overlap the site. Lies within arable field of low value. Field bordered by hedgerow on all sides although this is beyond the site boundary. Wold Grift Drain and naturalised area of scrub and grassland on the eastern field boundary. Potential for greater impacts anticipated from extending cable route to this location.	Superficial geology till. Bedrock geology Welton chalk formation - chalk	Majority flood zone 1. Some areas of flood zone 2/3 to North East. Low Surface Water Flood risk. No drains/watercourses within the site boundary. Lies ~150m from wolf grift drain, potential for site to be flooded during high frequency - low magnitude Events.	Agricultural land, ALC grade 3. Approx 1.1km from historic landfill. 1.5km from historic Thoresthorpe brick pits	Surrounded by a number of residential receptors in all directions, though at a relatively large distances away, no obvious access route	Would impact on less residential properties / settlements	Not too close to properties and roads and space to implement mitigation planting. Potential effects on farms to north at approx. 0.4km and southwest at approx. 0.5km. Closest settlements Saleby approx. 0.9km to northwest and Bilsby approx. 1.1km to south and exposed in views from a1111. Open landscape will make substation a prominent feature in local landscape.	No planning applications within close proximity
	Rank	1	7	6	1	2	9	3	1	3	1

OnSS option		Air quality	Archaeology and cultural heritage	Ecology and ornithology	Geology and ground conditions	Hydrology and flood risk	Land use	Noise and vibration	Traffic and transport	Landscape and visual assessment	Planning
OnSS LN 9	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human/ecological receptors and AQMAs.	Heritage: no obvious issues with the setting of designated heritage assets although assets at Marky priory may need to be considered. Archaeology: no known potentially significant archaeology recorded in the immediate vicinity.	No designated sites or ancient woodland within 2km. No habitats identified on the priority habitat inventory but lies within a habitat network associated with lowland meadow and coastal and floodplain grassland habitats. Sits within arable field of low value with no field margins. South fen drain and boy grift drain immediately south east.	Superficial geology tidal flat deposits - clay and silt. Bedrock geology Welton chalk formation - chalk	Flood zone 3. Medium/high Surface Water Flood risk. Potential Surface Water Flood overland flow route. No drains or watercourses within the site boundary. Lies ~20m from boy grift drain, potential for site to be flooded during high frequency - low magnitude events.	Agricultural land, ALC grade 3.	Located away from residential receptors in all directions but no obvious access	Little difference between the options being considered, it will defend on where the haul road would connect to.	No especially close-range properties or roads and sufficient space for mitigation planting. Closest property approx. 0.4km to north and settlement of Thurlby and b1149 approx. 0.7km to south. Open landscape and rounded landform will make substation a prominent feature in local landscape.	No planning applications within close proximity
	Rank	1	3	7	1	7	1	1	2	2	1
OnSS LN 10	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human/ecological receptors and AQMAs.	Heritage: no obvious issues with the setting of designated heritage assets. Archaeology: no known potentially significant archaeology recorded in the immediate vicinity.	No designated sites or ancient woodland within 2km. No habitats identified on the priority habitat inventory or habitat networks overlap the site. Arable field of low value. Tree line and two properties (bat roost potential unknown) close to the south and west. Small, triangular plantation outside boundary to the north.	Superficial geology till. Bedrock geology Welton chalk formation - chalk	Majority flood zone 1. Some areas of flood zone 2/3 to nw. Medium Surface Water Flood risk. No immediate constraints with any drains or watercourses within the site, however do lie close to the option boundary.	Agricultural land, ALC grade 3.	Located closest to residential receptor, good access however off the track to the north of Hutton Road	Little difference between the options being considered, it will defend on where the haul road would connect to.	Too close to properties and minor road approx. 0.2km to south. Potential effects on Huttoft approx. 0.75km east. Space to implement mitigation planting. Open landscape and rounded landform will make substation a prominent feature in local landscape.	No planning applications within close proximity

OnSS option		Air quality	Archaeology and cultural heritage	Ecology and ornithology	Geology and ground conditions	Hydrology and flood risk	Land use	Noise and vibration	Traffic and transport	Landscape and visual assessment	Planning
	Rank	1	1	1	1	3	1	7	4	6	1
OnSS LN 10a	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human/ecological receptors and AQMAs.	Heritage: no obvious issues with the setting of designated heritage assets. Archaeology: no known potentially significant archaeology recorded in the immediate vicinity.	No designated sites or ancient woodland within 2km. No habitats identified on the priority habitat inventory or habitat networks overlap the site. Arable field of low value with drainage ditch at the centre. Tree line and two properties (bat roost potential unknown) close to the south and west. Small, triangular plantation outside boundary to the north.	Superficial geology till. Bedrock geology Welton chalk formation - chalk	Majority flood zone 1. Some limited areas of flood zone 2/3 to nw. Medium Surface Water Flood risk. One minor drain bisects the site from south to north and other drains do lie close to the option boundary.	Agricultural land, ALC grade 3. Proximity to prow footpath	As option 10 really, located close to receptors to the south good access however off the track to the north of Hutton Road	Little difference between the options being considered, it will defend on where the haul road would connect to.	Too close to properties and minor road approx. 0.2km to south. Potential effects on Huttoft approx. 0.75km east. Space to implement mitigation planting. Open landscape and rounded landform will make substation a prominent feature in local landscape.	No planning applications within close proximity
	Rank	1	1	2	1	6	2	6	5	7	1

Weston Marsh

Table 4A.2: Weston Marsh short list of OnSS site sifting (Please see Figure 4.15 for map of OnSS Options)

OnSS option		Air quality	Archaeology and cultural heritage	Ecology and ornithology	Geology and ground conditions	Hydrology and flood risk	Land use	Noise and vibration	Traffic and transport	Landscape and visual assessment	Planning
OnSS WM 2	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human/ecological receptors and AQMAs.	Heritage: Located in the setting of a Grade II listed farmhouse (NHLE 1147603). Potential conflict with section 66 of the Planning (Listed Buildings and Conservation Areas Act) (1990). Potential conflict with paragraph 202 of the NPPF. Archaeology: potential: Located in proximity to a post medieval farmstead indicative of localised higher potential (HER reference MLI122913)	No designated sites or ancient woodland within 2km. No habitats identified on the priority habitat inventory overlap the site, although several (all associated with the River Welland) lie within 110m. Lies within the centre of a habitat network associated with the relevant priority habitats. Arable field of low value. Tree-lined field boundary to southwest which would potentially be lost. Tree line provides link between River Welland and triangular woodland block to the southeast.	Superficial geology tidal flat deposits - clay and silt. Bedrock geology oxford clay. In close proximity to River Welland flood bank.	Flood Zone 3. Very Low Surface Water Flood risk. No drains/watercourses s within the site boundary. Lies ~125m from River Welland to the northwest, potential for site to be flooded during high frequency - low magnitude events. Proximity to watercourse means low freq. high mag. events could also cause higher flood levels.	Agricultural land with hedgerow boundaries. ALC Grade 1. Proximity to bridleway along the River Welland flood bank	Located close to properties on Carrington Road and Hall Gate - Away from major Noise Source (A17).	Sixth closest to the highway	Fairly well recessed from settlements and roads. Some local enclosure from hedgerows, tree cover and river embankment but insufficient as screen. Comparatively closer to residential properties when compared to other options.	No Planning Issues
	Rank	1	9	9	7	3	8	9	6	3	1
OnSS WM 2a	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human / ecological receptors and AQMAs.	Heritage: Screening to listed buildings approximately 1,500m to the southwest provided by vegetated field margins. Archaeology: No known potentially significant archaeology recorded in the immediate vicinity – former footprint of tramway along southern boundary would not be a significant constraint.	No designated sites or ancient woodland within 2km. No habitats identified on the priority habitat inventory overlap the site, although several (all associated with the River Welland) lie within 45m. Lies within the centre of a habitat network associated with the relevant priority habitats. Arable field of low value. Hedgerow at centre of site. Borders a field ditch to the south.	Superficial geology tidal flat deposits - clay and silt. Bedrock geology oxford clay. Very close proximity / overlapping with River Welland flood bank.	Flood Zone 3. Very Low Surface Water Flood risk. No drains / watercourses within the site boundary. Lies ~50m from River Welland to the northwest, potential for site to be flooded during high frequency - low magnitude events. Proximity to watercourse means low freq. high mag. events could also	Agricultural land with hedgerow boundaries. ALC Grade 1. Very close proximity / overlapping on bridleway along the River Welland flood bank	Located close to one residential property, good access off A17	Fourth closest to the highway	Fairly well recessed from settlements but likely to be visible from A17. Generally exposed landscape with some local cover from hedgerows, tree cover and river embankment to northwest although insufficient to form screen. Located 0.9km from A17 and 0.9km from properties at Fosdyke Bridge, where boat yard, trailer yard and garage present developed character. Farms and properties on northern side of	No Planning Issues

OnSS option		Air quality	Archaeology and cultural heritage	Ecology and ornithology	Geology and ground conditions	Hydrology and flood risk	Land use	Noise and vibration	Traffic and transport	Landscape and visual assessment	Planning
						cause higher flood levels.				Macmillan Way at approx. 0.45km.	
	Rank	1	3	7	9	5	10	5	4	5	1
OnSS WM 2b	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human/ecological receptors and AQMAs.	Heritage: Screening to listed buildings to south provided by bridleway. Archaeology: No known potentially significant archaeology recorded in the immediate vicinity – former footprint of tramway along southern boundary would not be a significant constraint.	No designated sites or ancient woodland within 2km. No habitats identified on the priority habitat inventory overlap the site, although several (all associated with the River Welland) lie within 90m. Lies within the centre of a habitat network associated with the relevant priority habitats. Arable field of low value. Hedgerow and field ditch in southern half of the site with small number of trees also present.	Superficial geology tidal flat deposits - clay and silt. Bedrock geology oxford clay. Very close proximity to River Welland flood bank.	Flood Zone 3. Very Low Surface Water Flood risk. No drains/watercourses within the site boundary. Lies ~100m from River Welland to the northwest, potential for site to be flooded during high frequency - low magnitude events. Proximity to watercourse means low freq. high mag. events could also cause higher flood levels.	Agricultural land with hedgerow boundaries. ALC Grade 1. Very close proximity to bridleway along the River Welland flood bank	Located further away from the residential property associated with 2a, good access off A17	Fifth closest to the highway	Fairly well recessed from settlements but likely to be visible from A17. Generally exposed landscape with some local cover from hedgerows, tree cover and river embankment to northwest although insufficient to form screen. Located 1.1km from A17 and 1km from properties at Fosdyke Bridge, where boat yard, trailer yard and garage present developed character. Farms and properties on northern side of Macmillan Way at approx. 0.55km.	No Planning Issues
	Rank	1	4	8	8	4	9	2	5	4	1

OnSS option		Air quality	Archaeology and cultural heritage	Ecology and ornithology	Geology and ground conditions	Hydrology and flood risk	Land use	Noise and vibration	Traffic and transport	Landscape and visual assessment	Planning
OnSS WM 3	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human/ecological receptors and AQMAs.	Heritage: No obvious issues with the setting of designated heritage assets albeit open landscape towards Bank House Farm in the distance. Archaeology: No known potentially significant archaeology recorded in the immediate vicinity.	No designated sites or ancient woodland within 2km, although (along with Options 2a, 5, 5b) it is the closest site to The Wash SSSI, SPA, SAC and Ramsar (albeit over 3km away). No habitats identified on the priority habitat inventory overlap the site, although the site lies within a habitat network associated with the River Welland. Arable field of low value with no field boundaries within site. Hedgerow and Moulton River plus tributaries close by but not within the site itself. Shorter cable route required with fewer potential ecological receptors present, although crosses large drainage ditch.	Superficial geology tidal flat deposits - clay and silt. Bedrock geology oxford clay. No known constraints.	Flood Zone 3. Very Low Surface Water Flood risk. No drains/watercourses within the site boundary. Lies ~100m from Moulton River, potential for site to be flooded during high frequency - low magnitude events. Proximity to watercourse means low freq. high mag. events could also cause higher flood levels.	Agricultural land with some hedgerow boundaries. ALC Grade 1.	Located close to major noise source A17 also easy/good access for construction traffic (no need for 'noisy' haul route); only located close to one residential property.	Limited differentiation between this option and Option 5	This location would appear prominent from A17 owing to exposed nature of the agricultural landscape and lack of screening. Reasonable separation from surrounding properties and roads which would reduce perceived scale and allow space for mitigation planting. Still issue of visibility from properties approx. 0.5km to south and A17 approx. 0.75km to east.	No Planning Issues
	Rank	1	5	3	1	6	1	1	3	6	1

OnSS option		Air quality	Archaeology and cultural heritage	Ecology and ornithology	Geology and ground conditions	Hydrology and flood risk	Land use	Noise and vibration	Traffic and transport	Landscape and visual assessment	Planning
OnSS WM 5	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human/ecological receptors and AQMAs.	Heritage: Located in the setting of a Grade II listed farmhouse (NHLE reference 1064503). Potential conflict with section 66 of the Planning (Listed Buildings and Conservation Areas Act) (1990). Potential conflict with paragraph 202 of the NPPF. Archaeology: No known potentially significant archaeology recorded in the immediate vicinity.	No designated sites or ancient woodland within 2km, although (along with Options 2a, 3, 5b) it is the closest site to The Wash SSSI, SPA, SAC and Ramsar (albeit over 3km away). No habitats identified on the priority habitat inventory or habitat networks overlap the site. Large arable field of low ecological / biodiversity value with no field boundaries. Shorter cable route potentially required to substation with potentially fewest ecological receptors present on the way.	Superficial geology tidal flat deposits - clay and silt. Bedrock geology oxford clay. No known constraints.	Flood Zone 3. Very Low/Low Surface Water Flood risk. No drains/watercourses within the site boundary. Lies ~135m from Moulton River to the north, with a drain located on the western boundary. Potential for site to be flooded during high frequency - low magnitude events. Proximity to watercourse means low freq. high mag. events could also cause higher flood levels.	Agricultural land with hedgerow boundaries. ALC Grade 1. Very close proximity to bridleway to the south along the farm track.	Located Close to Bank House Farm but Close to major noise source (A17)	Thirst closest to the highway	This location would appear prominent from B1357 and A17 owing to exposed nature of the agricultural landscape and lack of screening. Too close to B1357 and A17 at approx. 0.4km to east. Too close to farm approx. 0.25km to southeast. Some space for mitigation planting.	No Planning Issues
	Rank	1	8	1	1	7	6	8	3	9	1
OnSS WM 5a	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human/ecological receptors and AQMAs.	Heritage: Located in the setting of a Grade II listed farmhouse (NHLE reference 1064503). Potential conflict with section 66 of the Planning (Listed Buildings and Conservation Areas Act) (1990). Potential conflict with paragraph 202 of the NPPF. Archaeology: No known potentially significant archaeology recorded in the immediate vicinity.	No designated sites or ancient woodland within 2km, although (after Options 2a, 3, 5, 5b) it is second closest to The Wash SSSI, SPA, SAC and Ramsar (albeit over 3km away). No habitats identified on the priority habitat inventory or habitat networks overlap the site. Large arable fields, one field ditch. Borders Moulton River. Shorter cable route potentially required to substation with potentially fewer ecological receptors present on the way.	Superficial geology tidal flat deposits - clay and silt. Bedrock geology oxford clay. No known constraints.	Flood Zone 3. Very Low/Low Surface Water Flood risk. Lies adjacent to upper reach of Moulton River to the west with a tributary extending east into the site on the northern boundary. Potential for site to be flooded during high frequency - low magnitude events. Proximity to watercourse means low freq. high mag. events could also	Agricultural land with hedgerow boundaries. ALC Grade 1. Directly adjacent to bridleway to the south along the farm track.	Located further away from Bank House Farm than option 5 but Closer to properties on Carrington Road than option 5. Haul route would have to go past to Bank House Farm.	Closest to the highway	Too close to B1357 and A17 at approx. 0.8km to east. Closest property at approx. 0.45km to southwest with farm at approx. 0.75km to southeast. Some space for mitigation planting. Generally, an open and exposed landscape with no screening and prominent position in local views.	No Planning Issues

OnSS option		Air quality	Archaeology and cultural heritage	Ecology and ornithology	Geology and ground conditions	Hydrology and flood risk	Land use	Noise and vibration	Traffic and transport	Landscape and visual assessment	Planning
						cause higher flood levels.					
	Rank	1	6	4	1	8	7	7	2	7	1
OnSS WM 5b	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human/ecological receptors and AQMAs.	Heritage: Located in the setting of a Grade II listed farmhouse (NHLE reference 1064503). Potential conflict with section 66 of the Planning (Listed Buildings and Conservation Areas Act) (1990). Potential conflict with paragraph 202 of the NPPF. Archaeology: No known potentially significant archaeology recorded in the immediate vicinity.	No designated sites or ancient woodland within 2km, although (along with Options 2a, 3, 5) it is closer to The Wash SSSI, SPA, SAC and Ramsar (albeit over 3km away). No habitats identified on the priority habitat inventory or habitat networks overlap the site. Large arable fields, one field ditch. Shorter cable route potentially required to substation with potentially fewest ecological receptors present on the way.	Superficial geology tidal flat deposits - clay and silt. Bedrock geology oxford clay. No known constraints.	Flood Zone 3. Very Low/Low Surface Water Flood risk. Lies ~85m from upper reach of Moulton River to the west with a tributary extending into the western part of the site. Potential for site to be flooded during high frequency - low magnitude events. Proximity to watercourse means low freq. high mag. events could also cause higher flood levels.	Agricultural land with hedgerow boundaries. ALC Grade 1. Very close proximity to bridleway to the south along the farm track.	Similar to option 5a. Located further away from Bank House Farm than option 5 but Closer to properties on Carrington Road than option 5. Haul route would have to go past to Bank House Farm.	Second closets to the highway	Relatively close to B1357 and A17 at approx. 0.65km to east. Closest property at approx. 0.5km to southwest with farm at approx. 0.5km to southeast. Some space for mitigation planting. Generally an open and exposed landscape with no screening and prominent position in local views.	No Planning Issues
	Rank	1	7	2	1	9	6	6	1	8	1

OnSS option		Air quality	Archaeology and cultural heritage	Ecology and ornithology	Geology and ground conditions	Hydrology and flood risk	Land use	Noise and vibration	Traffic and transport	Landscape and visual assessment	Planning
OnSS WM 10	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human/ecological receptors and AQMAs.	Heritage: No obvious issues with the setting of designated heritage assets. Archaeology: No known potentially significant archaeology recorded in the immediate vicinity.	No designated sites or ancient woodland within 2km. No habitats identified on the priority habitat inventory or habitat networks overlap the site. Corners of two arable fields of low value with 170m of hedge. Greatest distance from cable route to travel meaning potential for greater impacts associated with cable route.	Superficial geology tidal flat deposits - clay and silt. Bedrock geology oxford clay. No known constraints.	Flood Zone 3. Very Low/Low Surface Water Flood risk. No drains/watercourses within the site boundary. Lies ~360m from Lord's Drain to the east with tributary on western boundary. Potential for site to be flooded during high frequency - low magnitude events. Proximity to watercourse means low freq. high mag. events could also cause higher flood levels.	Agricultural land with some hedgerow boundaries. ALC Grade 1. adjacent to farm/fields track. Adjacent to existing steel OHL	Only located close to two residential properties - away from major noise sources (A17 and A16).	Would require a watercourse crossing, PRoW and rural lane, furthest from suitable highway access	Reasonable separation from surrounding properties and roads which would reduce perceived scale and allow space for mitigation planting. Proximity to intersection of OHPLs would present association with existing energy infrastructure. This site would appear prominent owing to open landscape.	Falls within planning application boundary of gas pipeline
	Rank	1	1	5	1	1	2	4	7	1	5
OnSS v10a	Brief description of topic specific environmental baseline / issues.	No real difference between options for air quality - in terms of human / ecological receptors and AQMAs.	Heritage: No obvious issues with the setting of designated heritage assets. Archaeology: No known potentially significant archaeology recorded in the immediate vicinity. Only scored second to 10 based on bigger footprint although if this meant more room for avoidance rather than a greater footprint of disturbance then could be '1'	No designated sites or ancient woodland within 2km. No habitats identified on the priority habitat inventory or habitat networks overlap the site. Covers one large field and parts of three others with few field margins. 170m of hedge. Largest land take and greatest distance for cable route to travel meaning potentially greater impacts associated with cable route.	Superficial geology tidal flat deposits - clay and silt. Bedrock geology oxford clay. No known constraints.	Flood Zone 3. Very Low/Low Surface Water Flood risk. No drains / watercourses within the site boundary. Lies ~160m from Lord's Drain to the east with tributary on western boundary. Potential for site to be flooded during high frequency - low magnitude events. Proximity to watercourse means low frequency / high magnitude events	Agricultural land with some hedgerow boundaries. ALC Grade 1. Existing farm / field access track passes through the centre of the site. Adjacent to existing steel overhead lines.	Similar to option 10, only located close to two residential properties - away from major noise sources (A17 and A16).	Would require a watercourse crossing, PRoW and rural lane, furthest from suitable highway access	Reasonable separation from surrounding properties and roads which would reduce perceived scale and allow space for mitigation planting. Proximity to intersection of OHPLs would present association with existing energy infrastructure. This site would appear prominent owing to open landscape.	Falls within planning application boundary of gas pipeline

OnSS option		Air quality	Archaeology and cultural heritage	Ecology and ornithology	Geology and ground conditions	Hydrology and flood risk	Land use	Noise and vibration	Traffic and transport	Landscape and visual assessment	Planning
						could also cause higher flood levels.					
	Rank	1	2	6	1	2	2	3	8	1	5

Annex B – Onshore ECC Quantitative Analysis

Table 4B.1: Quantitative analysis of environmental constraints along each initial 300m wide Weston Marsh ECC route option (absolute values and ranks)

EIA Environmental Constraints	Topic			Huttoft Bank Weston Marsh (Boston Northern Option)	Huttoft Bank Weston Marsh (Boston Southern Option)	Walla Bank - Weston Marsh	Huttoft Bank Weston Marsh (Boston Northern Option)	Huttoft Bank Weston Marsh (Boston Southern Option)	Walla Bank - Weston Marsh
Ground Conditions and Contaminated Land	Historic Landfills	Area	ha	0	0	0	1	1	1
Ground Conditions and Contaminated Land		Average of ranks within topic:		1		1		1	
Archaeology and Cultural Heritage	Listed Buildings (England)	1	1	1	0	0	1	1	1
	Registered Battlefields	1	1	1	0	0	1	1	1
	Registered Parks and Gardens	1	1	1	0	0	1	1	1
	Scheduled Monuments	1	1	1	0	0	1	1	1
	World Heritage Sites (England)†	1	1	1	0	0	1	1	1
	Heritage Coast	1	1	1	0	0	1	1	1
Archaeology and Cultural Heritage		Average of ranks within topic:		1		1		1	
Landscape and Visual	PROW	Area	km	8	6.2	3.4	3	2	1
	National Trails (England)	Area	km	0	0	0	1	1	1
	Areas of Outstanding Natural Beauty (England)†	Area	ha	0	0	0	1	1	1
	National Parks	Area	ha	0	0	0	1	1	1
Landscape and Visual		Average of ranks within topic:		1.50		1.25		1.00	
Noise and Vibration	Potential Sensitive Receptors	Number	No	125	104	52	3	2	1
Noise and Vibration		Average of ranks within topic:		3		2		1	
Socio-economics	Potential Sensitive Receptors	Number	No	125	104	52	3	2	1
	Agricultural Land Classification - Provisional (England)	Area of 1	ha	445.5	435.9	862.6	2	1	3
		Area of 2	ha	367.9	476.6	0	2	3	1
		Area of 3	ha	466.7	466.7	0	2	3	1
	Felling Licence Agreements (England)	Area	ha	1.1	1.1	0.2	2	2	1
	England Coast Path Route	Length	km	0.2	0.2	0	2	2	1
	PROW	Length	km	8	6.2	3.4	3	2	1
	Forest Plans (England)	Area	ha	0	0	0	1	1	1
	National Trust Always Open Land	Area	ha	0	0	0	1	1	1
	National Trust Limited Access Land	Area	ha	0	0	0	1	1	1
	Allotments or Community Growing Spaces	Number	No	0	0	0	1	1	1
		Area	ha	0	0	0	1	1	1
	Golf Course	Number	No	0	1	1	1	2	2
		Area	ha	0	1.4	3.4	1	2	3
	Religious Grounds	Number	No	0	0	0	1	1	1
		Area	ha	0	0	0	1	1	1
	Cemeteries	Number	No	0	0	0	1	1	1

EIA Environmental Constraints Topic				Huttoft Bank Weston Marsh (Boston Northern Option)		Huttoft Bank Weston Marsh (Boston Southern Option)		Walla Bank - Weston Marsh		Huttoft Bank Weston Marsh (Boston Northern Option)		Huttoft Bank Weston Marsh (Boston Southern Option)		Walla Bank - Weston Marsh	
		Area	ha	0		0		0		1		1		1	
Socio-economics		Average of ranks within topic:		1.58				1.58				1.26			
Traffic and Transport	Roads	Length	km	1.2		1.5		0.2		2		3		1	
	Railway	Length	km	11		11.1		0		2		3		1	
	Sustrans Cycle Routes	Length	km	0		0.2		0		1		3		1	
	Reclassified Cycle Routes	Length	km	0.3		0.7		0.3		1		3		1	
Traffic and Transport		Average of ranks within topic:		1.50				3				1			
Water Resources and Flood Risk	Flood Zones 2 and 3	Area	ha	1108.6		1210.7		868.1		2		3		1	
	Source Protection Zones (Total Areas)	Area	ha	0		367.1		0		1		3		1	
	Drinking Water Safeguard Zones (Surface Water)	Area	ha	0		0		0		1		1		1	
	Statutory Main Rivers	Count	No	5		6		3		2		3		1	
		Length	km	1.3		1.3		0.6		2		3		1	
	Ordinary Watercourses	Count	No	161		160		45		3		2		1	
		Length	km	19.9		19.7		5.4		3		2		1	
	Waterbodies	Area	ha	19.1		21.6		13.5		2		3		1	
Water Resources and Flood Risk		Average of ranks within topic:		1.75				2.57				1.00			
Ecology and HRA	Ancient Woodland	Area	ha	0		0		0		1		1		1	
	Conservation and Enhancement Agreements (England)	Area	ha	0		0		0		1		1		1	
	Country Parks (England)	Area	ha	0		0		0		1		1		1	
	Countryside Stewardship Agreement Management Areas (England)	Area	ha	0		0		0		1		1		1	
	Great Crested Newt Class Survey Licence Returns (England)	Number	No	0		0		0		1		1		1	
	Higher Level Stewardship Target Areas (England)	Area	ha	0		0		0		1		1		1	
	Important Bird Areas (GB)	Area	ha	0		0		0		1		1		1	
	Local Nature Reserves	Area	ha	0.8		0		0.8		2		1		2	
	National Nature Reserves	Area	ha	0		0		0.6		1		1		3	
	Non-Designated Woodland	Area	ha	6.6		8.9		2		2		3		1	
	Priority Habitat Inventory (Total of all Areas)	Area	ha	34		31.5		12.6		3		2		1	
	Ramsar Sites	Area	ha	0		0		0.6		1		1		3	
	RSPB Reserves	Area	ha	0		0		0		1		1		1	
	Sites of Special Scientific Interest	Area	ha	0		0		5.1		1		1		3	
	Special Areas of Conservation	Area	ha	0		0		5.1		1		1		3	
	Special Protection Areas	Area	ha	0		0		0.6		1		2		3	
	Wild Bird General Licence Exclusion Zone (England)	Area	ha	0		0		0		1		1		1	
Ecology and HRA		Average of ranks within topic:		1.24				1.24				1.65			
Totalled Average Rank Score		6.99				7.61				5.92					
Total Ranking		2				3				1					

Note: Rank orders are from lowest to highest, where the lowest number of potential receptors will be given the lowest rank (1) and the highest number of potential receptors is given the highest rank (3).

Table 4B.2: Quantitative analysis of environmental constraints along each alternative 300m wide Weston Marsh ECC route option (absolute values and ranks)

EIA Topic / Environmental Constraints				Absolute Values						Ranks					
				Baseline Route	Route Option 1M	Route Option 2A	Route Option 3Q	Route Option 4	Route Option 5	Baseline Route	Route Option 1M	Route Option 2A	Route Option 3Q	Route Option 4	Route Option 5
Ground Conditions and Contaminated Land	Historic Landfills	Area	ha	0	0	0.06	0	0	0	1	1	6	1	1	1
Ground Conditions and Contaminated Land				Average of ranks within topic:						1	1	6	1	1	1
Archaeology and Cultural Heritage	Listed Buildings (England)	No	No	0	2	0	1	1	2	1	5	1	3	3	5
	Registered Battlefields	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Registered Parks and Gardens	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Scheduled Monuments	Area	ha	0.35	2.22	1.53	0.35	0.35	0	2	6	5	2	2	1
	World Heritage Sites (England)†	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Heritage Coast	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
Archaeology and Cultural Heritage				Average of ranks within topic:						1.14	2.29	2.29	1.43	1.43	1.57
Landscape and Visual	PROW	Length	km	5.23	4.75	5.51	9.42	7.41	0.381	3	2	4	6	5	1
		Count	No	18	15	20	30	24	15	3	1	4	6	5	1
	National Trails (England)	Area	km	0	0	0	0	0	0	1	1	1	1	1	1
	Areas of Outstanding Natural Beauty (England)†	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	National Parks	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
Landscape and Visual Average				Average of ranks within topic:						1.80	1.20	2.20	3	2.60	1
Noise and Vibration	Potential Sensitive Receptors	No	No	19	116	108	228	201	184	1	3	2	6	5	4
Noise and Vibration				Average of ranks within topic:						1	3	2	6	5	4
Socio-economics	Potential Sensitive Receptors	No	No	19	116	108	228	201	184	1	3	2	6	5	4
	Agricultural Land Classification - Provisional (England)	Area of 1	ha	1047	534	544	930	520	517.03	6	3	4	5	2	1
		Area of 2	ha	73	502	578	232	551	714.84	1	3	5	2	4	6
		Area of 3	ha	120	285	166	153	353	353.067	1	4	3	2	5	5
	Felling Licence Agreements (England)	Area	ha	0.2	0	0	0	3	3.317	4	1	1	1	5	5
	England Coast Path Route	Length	km	0	0	0	0	0	0	1	1	1	1	1	1
	PROW	Length	km	5	4	5	9	7	0.3	3	2	4	6	5	1
		Number	No	18	15	20	30	24	15	3	1	4	6	5	1
	Forest Plans (England)	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	National Trust Always Open Land	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	National Trust Limited Access Land	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Allotments or Community Growing Spaces	No	No	0	0	0	0	0	0	1	1	1	1	1	1
		Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Golf Course	No	No	0	0	0	0	0	1	1	1	1	1	1	6
		Area	ha	0	0	0	0	0	2.605	1	1	1	1	1	6
	Religious Grounds	No	No	0	1	0	0	0	0	1	6	1	1	1	1
		Area	ha	0	0.8	0	0	0	0	1	6	1	1	1	1
	Cemeteries	No	No	0	0	0	0	0	0	1	1	1	1	1	1
		Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
Socio-economics Average				Average of ranks within topic						1.60	2.10	1.85	2.30	2.40	2.45
Traffic and Transport	Roads	Count	No	67	102	109	118	103	90	1	3	5	6	4	2
		Length	km	15	20	24	23	20	20	1	2	6	5	4	3
	Railway	Count	No	1	1	2	3	15	15	1	1	3	4	5	5
		Length	km	0.29	0.3	0.3	0.32	11	11	1	2	2	4	5	6
	Sustrans Cycle Routes	Count	No	0	0	0	0	0	1	1	1	1	1	1	6
		Length	km	0	0	0	0	0	0.34	1	1	1	1	1	6
	Reclassified Cycle Routes	Count	No	0	0	0	0	0	1	1	1	1	1	1	6
		Length	km	0	0	0	0	0	0.34	1	1	1	1	1	6
Traffic and Transport Average				Average of ranks within topic						1	1.50	2.50	2.88	2.75	5
Water Resources	Flood Zones	Area of Zone 2 and 3	ha	1236	1316	1284	1309	1188	1344	2	5	3	4	1	6

EIA Topic / Environmental Constraints				Absolute Values						Ranks					
				Baseline Route	Route Option 1M	Route Option 2A	Route Option 3Q	Route Option 4	Route Option 5	Baseline Route	Route Option 1M	Route Option 2A	Route Option 3Q	Route Option 4	Route Option 5
and Flood Risk	Source Protection Zones (Total Areas)	Area	ha	122	153	143	139	151	151	1	6	3	2	4	4
	Drinking Water Safeguard Zones (Surface Water)	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Statutory Main Rivers	Count	No	2	4	5	4	12	14	1	2	4	2	5	6
		Length	km	0.73	1.35	1.28	1.39	1.94	2.72	1	3	2	4	5	6
	Ordinary Watercourses	Count	No	11	8	9	9	11	11	4	1	2	2	4	4
		Length	km	5.16	3.77	3.7	3.87	5.58	3.26	5	3	2	4	6	1
	Waterbodies	Area	ha	24	28	27	26	27	30	1	5	3	2	4	6
	IDB Drains	Count	No	10	10	10	10	10	14	1	1	1	1	1	6
		Length	km	5	5	5	5	5	5.2	1	1	1	1	1	6
	IDB Sewers	Count	No	36	48	51	43	40	33	2	5	6	4	3	1
		Length	km	13	18	20	15	16	10	2	5	6	3	4	1
	IMDB Piped Lengths	Count	No	0	1	1	0	7	7	1	3	3	1	5	5
		Length	km	0	0.06	0.11	0	0.2	0.2	1	3	4	1	5	5
	IDB Maintained Watercourses	Count	No	24	18	20	17	12	12	6	4	5	3	1	1
		Length	km	9.93	6.48	8.21	8.5	5.15	5.15	6	3	4	5	1	1
Hydrology Average								Average of ranks within topic		2.18	3.06	3	2.41	3.06	3.59
Ecology and HRA	Ancient Woodland	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Conservation and Enhancement Agreements (England)	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Country Parks (England)	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Countryside Stewardship Agreement Management Areas (England)	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Great Crested Newt Class Survey Licence Returns (England)	No	No	0	0	0	0	2	2	1	1	1	1	5	5
	Higher Level Stewardship Target Areas (England)	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Important Bird Areas (GB)	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Local Nature Reserves	Area	ha	1.12	1.12	1.12	1.12	1.12	1.12	1	1	1	1	1	1
	National Nature Reserves	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Non-Designated Woodland	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Priority Habitat Inventory (Total of all Areas)	Area	ha	9.6	50.53	28	7	23.1	18.19	1	6	5	4	3	2
	Ramsar Sites	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	RSPB Reserves	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Sites of Special Scientific Interest	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Special Areas of Conservation	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Special Protection Areas	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Wild Bird General Licence Exclusion Zone (England)	Area	ha	0	0	0	0	0	0	1	1	1	1	1	1
	Local Wildlife Sites	Area	ha	7.6	7.79	7.79	7.6	13.3	7.6	1	4	4	1	6	1
Ecology Average								Average of ranks within topic		1	1.44	1.39	1.17	1.61	1.28
									Sum	8.72	14.14	13.84	15.02	17.24	19.61
									Overall Route Area Ranking	1	3	2	4	5	6

Annex C – List of data sources used in ECC quantitative assessment

Table 4C. 1: List of data sources used in ECC quantitative assessment

Environmental Discipline	Dataset
Archaeology and Cultural Heritage	Listed Buildings (England)
	Registered Battlefields
	Registered Parks and Gardens
	Scheduled Monuments
	World Heritage Sites (England)†
	Heritage Coast
Landscape and Visual	PROW
	National Trails (England)
	Areas of Outstanding Natural Beauty (England)†
	National Parks
Noise and Vibration	Potential Sensitive Receptors
Socio-economics	Potential Sensitive Receptors
	Agricultural Land Classification - Provisional (England)
	Felling Licence Agreements (England)
	England Coast Path Route
	PROW
	Forest Plans (England)
	National Trust Always Open Land
	National Trust Limited Access Land
	Allotments or Community Growing Spaces
	Golf Course
	Religious Grounds
	Cemeteries
Traffic and Transport	Roads
	Railway
	Sustrans Cycle Routes
	Reclassified Cycle Routes
Water Resources and Flood Risk	Flood Zones 2 and 3
	Source Protection Zones (Total Areas)
	Drinking Water Safeguard Zones (Surface Water)
	Statutory Main Rivers
	Ordinary Watercourses
	Waterbodies
Ecology and HRA	Ancient Woodland
	Conservation and Enhancement Agreements (England)
	Country Parks (England)

Environmental Discipline	Dataset
	Countryside Stewardship Agreement Management Areas (England)
	Great Crested Newt Class Survey Licence Returns (England)
	Higher Level Stewardship Target Areas (England)
	Important Bird Areas (GB)
	Local Nature Reserves
	National Nature Reserves
	Non-Designated Woodland
	Priority Habitat Inventory (Total of all Areas)
	Ramsar Sites
	RSPB Reserves
	Sites of Special Scientific Interest
	Special Areas of Conservation
	Special Protection Areas
	Wild Bird General Licence Exclusion Zone (England)