Morecambe Offshore Windfarm: Generation Assets

Development Consent Order Documents

Volume 4

Design Statement (Tracked)

PINS Document Reference: 4.3.1

APFP Regulation: 5(2)(q)

Rev 03~~2~~

Document History

Doc No	MOR001-AEC-01-CON-ENV-RPT-0004	Rev	032
Alt Doc No	n/a		
Document Status	Approved for Use	Doc Date	18 February 2025 11 March 2025
PINS Doc Ref	4.34.3.1	APFP Ref	5(2)(q)

Rev	Date	Doc Status	Originator	Reviewer	Approver	Modifications
01	May 2024	Approved for Use	Amos Ellis Consulting	Morecambe Offshore Windfarm Ltd	Morecambe Offshore Windfarm Ltd	n/a
02	18 February 2025	Approved for Use	Infrastructure Matters	Morecambe Offshore Windfarm Ltd	Morecambe Offshore Windfarm Ltd	Update to clarify how the Project will achieve 'good design' post-consent
03	11 March 2025	Approved for Use	Infrastructure Matters	Morecambe Offshore Windfarm Ltd	Morecambe Offshore Windfarm Ltd	Amended to align with dDCO update at D5

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Glossary of Acronyms

AC	Alternating Current
AfL	Agreement for Lease
APFP	The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009
CA1	Calder Platform
CBRA	Cable Burial Risk Assessment
CEA	Cumulative Effects Assessment
CMS	Construction Method Statement
CPC	South Morecambe Central Processing Complex
DC	Design Code
DCO	Development Consent Order
DML	Deemed Marine Licence
DESNZ	Department for Energy Security and Net Zero
DP3	South Morecambe DP3 Platform
EIA	Environmental Impact Assessment
ES	Environmental Statement
GHG	Greenhouse Gas Emissions
HAT	Highest Astronomical Tide
HNDR	Holistic Network Design Review
HSEQ	Health, Safety, Environment and Quality
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
LAT	Lowest Astronomical Tide
MCA~~(1)~~	The Maritime and Coastguard Agency
~~MCA(2)~~	~~Marine Character Area~~
MGN	Marine Guidance Note
MMO	Marine Management Organisation

NIC	National Infrastructure Commission
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OREI	Offshore Renewable Energy Installations
OSP(s)	Offshore substation platform(s)
OTNR	Offshore Transmission Network Review
OWF	Offshore Windfarm
PDE	Project Design Envelope
PEIR	Preliminary Environmental Information Report
PEXA	Practice and Exercise Areas
PINS	Planning Inspectorate
SAR	Search and Rescue
SPA	Special Protection Area
TCE	The Crown Estate
TSS	Traffic Separation Scheme
UK	United Kingdom
WSI	Written Scheme of Investigation
WTG	Wind turbine generator

Glossary of Unit Terms

°	degree
km	kilometre
km^2	square kilometre
kV	kilovolt
m	metre
m^2	square metre
MW	Megawatt
nm	nautical mile

Glossary of Terminology

Applicant	Morecambe Offshore Windfarm Ltd
Application	This refers to the Applicant's application for a Development Consent Order (DCO). An application consists of a series of documents and plans which are published on the Planning Inspectorate's (PINS) website.
Agreement for Lease (AfL)	Agreements under which seabed rights are awarded following the completion of The Crown Estate (TCE) tender process.
Climate change impact	An impact from a climate hazard which affects the ability of the receptor to maintain its functions or purpose.
Climate change resilience	The ability of a project and its receptors to prepare for, respond to, recover from and adapt to changes in the climate in a manner that ensures it retains much of its original function and purpose.
Dead wreck	Wrecks which have not been detected by repeated surveys and are therefore considered not to exist
Generation Assets (the Project)	Generation assets associated with the Morecambe Offshore Windfarm. This is infrastructure in connection with electricity production, namely the fixed foundation wind turbine generators (WTGs), inter-array cables, offshore substation platform(s) (OSP(s))[1] and possible platform link cables to connect OSPs.
Holocene	The Holocene is the current geological epoch. It began approximately 11,650 calibrated years Before Present (c. 9700 BCE), after the Last Glacial Period, which concluded with the Holocene glacial retreat.
Inter-array cables	Cables which link the WTGs to each other and the OSP(s).
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The transmission assets for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. This includes the offshore substation platforms (OSP(s))[2], interconnector cables, Morgan offshore booster station, offshore export cables, landfall site, onshore export cables, onshore substations, 400 kilovolts (kV) cables and associated grid connection infrastructure such as circuit breaker infrastructure. Also referred to in this document as the Transmission Assets, for ease of reading.
Nacelle	The part of the turbine that houses all of the generating components.
Offshore export cables	The cables which would bring electricity from the offshore substation platform to the landfall.

[1] At the time of writing the Environmental Statement (ES), a decision had been taken that the Offshore Substation Platforms (OSPs) would remain solely within the Generation Assets application and would not be included within the Development Consent Order (DCO) application for the Transmission Assets. This decision post-dated the Preliminary Environmental Information Report (PEIR) that was prepared for the Transmission Assets. The OSPs are still included in the description of the Transmission Assets for the purposes of this DCO document as the Cumulative Effects Assessment (CEA) carried out in respect of the Generation/Transmission Assets is based on the information available from the Transmission Assets PEIR.

Offshore substation platform(s)	A fixed structure located within the windfarm site, containing electrical equipment to aggregate the power from the WTGs and convert it into a more suitable form for export to shore.
Platform link cable	An electrical cable which links OSPs.
Safety Zone	An area around a structure or vessel which should be avoided, as set out in Section 95 of the Energy Act 2004 and the Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007.
Study area	This is an area which is defined for each Environmental Impact Assessment (EIA) topic which includes the offshore development area as well as potential spatial and temporal considerations of the impacts on relevant receptors. The study area for each EIA topic is intended to cover the area within which an effect can be reasonably expected.
Windfarm site	The area within which the WTGs, inter-array cables, OSP(s) and platform link cables will be present.
Wind turbine generator (WTG)	A fixed structure located within the windfarm site that converts the kinetic energy of wind into electrical energy.

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1 Introduction

1.1 About the Applicant

1. The Applicant is Morecambe Offshore Windfarm Ltd, a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company), and Flotation Energy Ltd (Flotation Energy).

2. With 80 years of experience, Cobra is a historically significant Group in the development of industrial infrastructure and service provision, and one of the key players in the renewable energy sector in Spain and Latin America. The Group possesses the capacity and determination to develop, build, and operate industrial and energy infrastructures that demand a high level of service, grounded in excellence in integration, technological innovation, and financial robustness. Their unrivalled knowledge and understanding of floating offshore wind developments is a significant advantage in delivering high quality and efficient projects, coupled with their commitment to environmental stewardship. Their experience as a major player in offshore wind is based on a 50MW project in operation and over 11.2GW under development.

3. Flotation Energy, headquartered in Edinburgh, Scotland, sits at the heart of the energy transition. It's determined to support the big switch to sustainable, clean and affordable energy through the application of innovative offshore wind technology. An ambitious offshore wind developer, Flotation Energy has a 13GW portfolio that covers both fixed and floating developments globally, with projects in the United Kingdom (UK), Ireland, Taiwan, Japan and Australia. Whilst Flotation Energy develops projects independently, it also recognises the strategic value of partnership and collaboration to deliver proven, cost- effective solutions.

1.2 Purpose of this document

4. This document, Design Statement (Document Reference ~~4.3~~4.3.1), forms part of the Development Consent Order (DCO) application for the proposed Project. This document is also secured by Part 2, Condition 9a of the Deemed Marine Licence (DML) and is a certified document in the draft DCO (Document Reference 3.1).

5. This document has been prepared pursuant to Regulation 5(2)(q) of The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 and forms part of a suite of supporting documents for the DCO application.

6. This document sets out how the Applicant has embedded good design principles throughout the development of the Project including how it has:

- Addressed the need for good design as set out in the National Policy Statements (NPSs) EN-1, EN-3 and EN-5
- Established a set of design principles to guide the design process from the outset of the Project
- Considered site constraints and consultation responses
- Embedded good design during the iterative process of selecting sites and refining the site boundary
- Championed good design across multiple disciplines
- Will ensure the principles of good design are maintained post-consent and throughout the detailed design process.

7. This document should be read in conjunction with **Chapter 4 Site Selection and Assessment of Alternatives** (Document Reference 5.1.4) and **Chapter 5 Project Description** (Document Reference 5.1.5) of the Environmental Statement (ES) and the **Draft DCO** (Document Reference 3.1).

1.3 Document structure

8. An outline of the structure of this Design Statement document is set out below:

- **Site analysis:** analyses the environmental and physical characteristics of the Project site and surrounding area **(Section 2)**
- **Good Design Policy Context:** sets out the relevant policies, criteria for good design and guidance when planning for offshore renewable energy infrastructure **(Section 3)**
- **Design Framework:** establishes the framework within which good design of the Project has been established, including the Project vision, the Project's objectives and its design principles **(Section 4)**
- **Design Approach and Evolution:** demonstrates how the design of the Project has been developed in accordance with the NPS policy requirements, Design Framework, the site analysis and consultation feedback **(Section 5)**
- **Securing Good Design Post-Consent**: demonstrates how good design will be maintained in the post-consent detailed design stage **(Section 6)**.

1.4 Project overview

9. The Project is located entirely offshore in the Eastern Irish Sea and, when fully operational, the Project is anticipated to generate a nominal capacity of 480MW. It is located approximately 30km from the nearest point of the site to the Lancashire Coast, 58km from the coastline of the Isle of Man, 37km from the UK and the Isle of Man's jurisdiction boundary, and 50km from the north coast of Wales. The Project is therefore located entirely beyond the 12 nautical mile (nm) limit of UK territorial waters and is wholly within the UK's Exclusive Economic Zone (EEZ). **Figure 1.1~~Figure 1.1~~** shows the location of the Project.

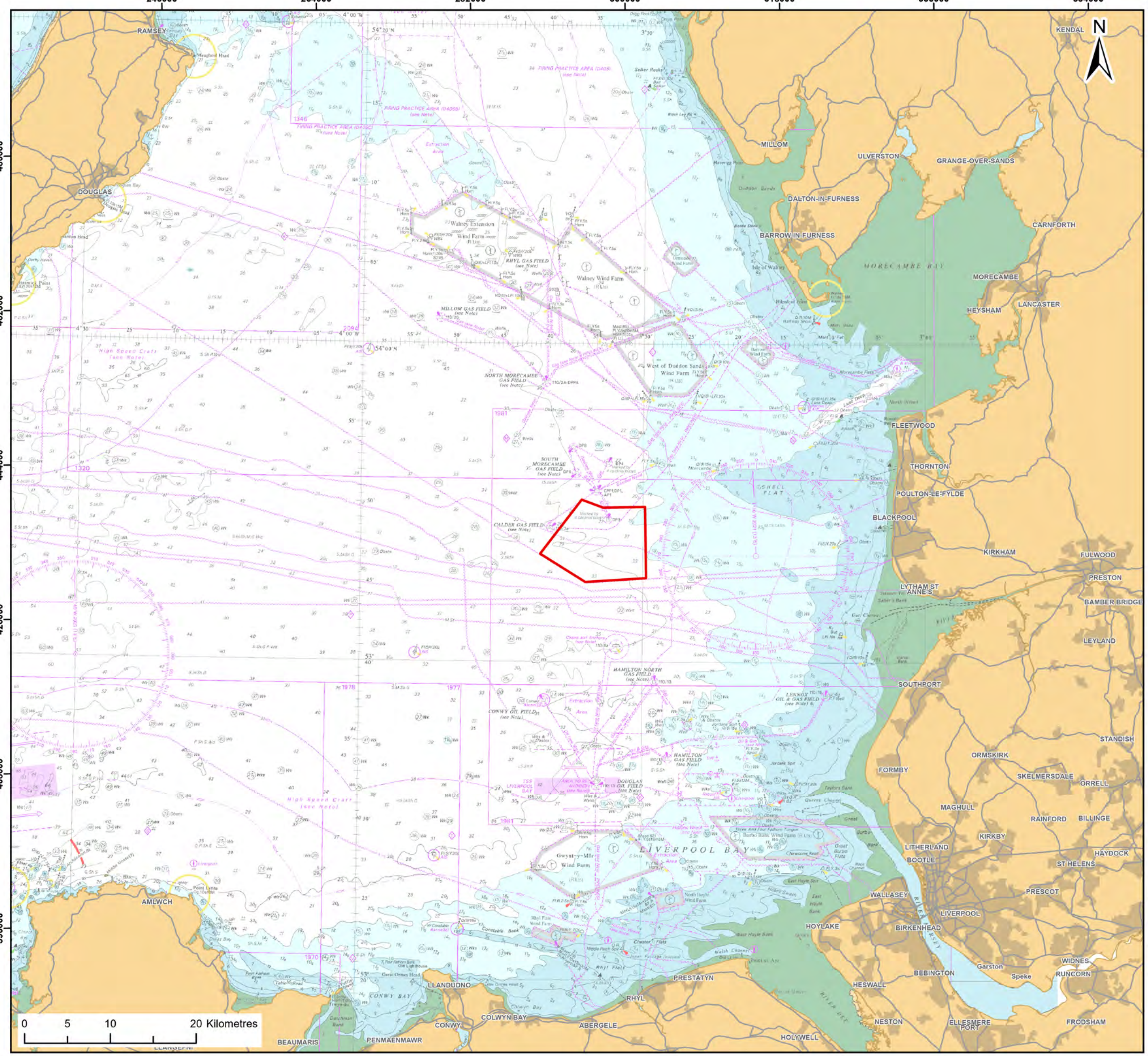
10. The Project relates only to the Generation Assets of the Morecambe Offshore Windfarm (including wind turbine generators, inter-array cables, offshore substation platform(s) (OSPs), and possible platform link cables to connect offshore substation platforms). A separate DCO consent for the Transmission Assets associated with the Morecambe Offshore Windfarm and the Morgan Offshore Wind Project (another proposed windfarm to be located in the Irish Sea) is being sought, as explained below.

1.5 Morgan and Morecambe Offshore Wind Farms: Transmission Assets DCO Application

11. Both the Morecambe Offshore Windfarm and the Morgan Offshore Wind Project have been scoped into the Pathways to 2030 workstream, under the Offshore Transmission Network Review (OTNR). Under the OTNR, the National Grid Electricity System Operator is responsible for conducting a Holistic Network Design Review (HNDR) to assess options to improve the coordination of offshore wind generation connections and transmission networks. In July 2022, the UK Government published the Pathway to 2030 Holistic Network Design documents, which set out the approach to connecting 50GW of offshore wind to the UK electricity network (National Grid ESO, 2022). The output of this process concluded that the Morecambe Offshore Windfarm and the Morgan Offshore Wind Project should work collaboratively in connecting the windfarms to the National Grid at Penwortham in Lancashire. The Applicant was involved in this process and supports this decision.

12. The Transmission Assets, which will enable export of electricity from both the Morecambe Offshore Windfarm and the Morgan Offshore Wind Project to the National Grid connection point, will be subject to consent under a separate DCO Application. The Transmission Assets comprise OSPs for both the Morecambe Offshore Windfarm and the Morgan Offshore Wind Project[3], shared offshore export cable corridors, their landfall arrangements, shared onshore export cable corridors to new onshore substation(s), and onward connection to the National Grid electricity transmission network at Penwortham, Lancashire. The coordination of the Project with other projects and the benefits that secures, is key to delivering on the stated "*Coordination*" objective (4) of the Project and reducing environmental impacts in accordance with the aims of the NPS and the Pathway to 2030 Holistic Network Design.

[3] At the time of writing, a decision had been taken that the OSPs would remain solely within the Generation Assets application and would not be included within the DCO application for the Transmission Assets. This decision post-dated the Preliminary Environmental Information Report (PEIR) that was prepared for the Transmission Assets. The OSPs are still included in the description of the Transmission Assets for the purposes of this document as the Cumulative Effects Assessment (CEA) carried out in respect of the Generation/Transmission Assets is based on the information available from the Transmission Assets PEIR.



Legend:

Morecambe Offshore Windfarm Site

Report: Morecambe Offshore Windfarm: Generation Assets Design Statement

Title: Location of Morecambe Offshore Windfarm in the Irish Sea

Figure: 1.1

Drawing No: PC1165-RHD-ES-OF-DG-Z-0145

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	01/05/2024	SB	GC	A3	1:450,000
P02	18/02/2025	SM	MI	A3	1:450,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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13. Plate 1.1~~Plate 1.1~~ illustrates the schematic components of this Project (Generation Assets) in blue and the components for the Transmission Assets in green (which will be subject of a separate DCO application).

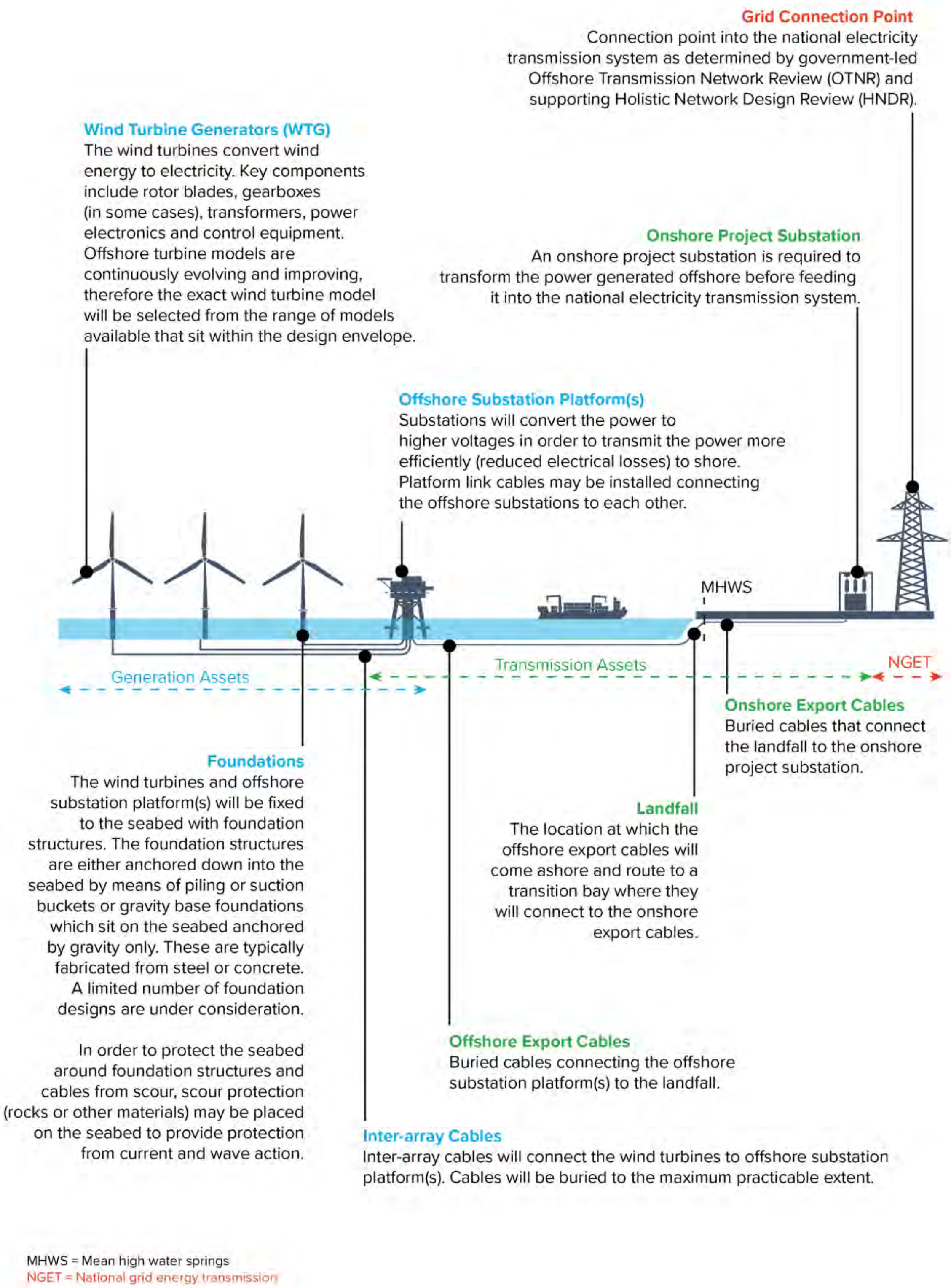


Plate 1.1 Components of Morecambe Offshore Windfarm Generation Assets ('the Project') are in blue. The components of Morgan and Morecambe Offshore Wind Farm: Transmission Assets ('Transmission Assets') are in green.

1.6 Project description and Design Envelope Approach

14. **Chapter 5 Project Description** of the Environmental Statement (ES) (Document Reference 5.1.5) describes the key components and activities of the Project during the pre-construction, construction, operation and maintenance, and decommissioning phases. The design parameters of the Project are also secured in Schedule 2 of the draft DCO (Document Reference 3.1). The key components of the Project, to be located entirely offshore within the windfarm site, comprise:

- Wind turbine generators (WTGs)
- Offshore substation platform(s) (OSP(s))
- Subsea cables (inter-array cables connecting the WTGs and OSPs, and platform link cables connecting OSPs).

15. The detailed design of these components will be determined post-consent in accordance with this document, the DML, and the draft DCO (Document Reference 3.1). This will allow the latest technology, most up-to-date regulations and the most cost-effective solutions to be considered and employed at that later stage to achieve good design.

16. Given that specific design details are not yet defined, a Project Design Envelope Approach (PDE Approach) has been adopted in the Project ES to determine maximum and minimum design parameters (design envelope) of the Project. This PDE Approach is usually adopted for offshore windfarm projects and has been recognised as being consistent with planning law[4] and by the Nationally Significant Infrastructure Projects (NSIP) (PINS) Advice Note Nine: Rochdale Envelope (V3, 2018).

17. The PDE Approach allows realistic worst-case scenarios to be identified and assessed in the ES for each potential impact, based on the maximum parameters which the Project could be built out under the proposed consent. This maintains design flexibility and ensures that, provided the final design remains within the design envelope, its environmental effects have been fully assessed and the impacts will be no worse than those considered in the decision-making process. Please see **Chapter 6 EIA Methodology** of the ES (Document Reference 5.1.6) for further details and **Chapter 5 Project Description** (Document Reference 5.1.5) for the full range of PDE parameters and how they were developed for the Project.

[4] The approach is also known as the Rochdale envelope approach set out by the judgement in R v Rochdale MBC Ex p. Tew [2000] Env.L.R.1 which established that while it is not necessary or possible in every case to specify the precise details of development, the information contained in the ES should be sufficient to fully assess the project's impact on the environment and establish clearly defined worst case parameters for the assessment.

2 Good design policy context

18. In the UK, Government legislation and policy to secure good design for national infrastructure is embedded in National Policy Statements (NPS) and at paragraph 14 of the National Infrastructure Planning Guidance published by Government in April 2024. The Planning Inspectorate also issued advice pages on Good Design for Nationally Significant Infrastructure Projects in October 2024 (PINS, 2024). Together this provides a comprehensive policy context for consideration of good design.

19. The Planning Act 2008 requires the Secretary of State to have regard, in designating an NPS and in determining applications for development consent, to the desirability of good design.

20. The relevant NPS to the Project, and which set out policies for good design are Overarching National Policy Statement for energy (EN-1), National Policy Statement for renewable energy infrastructure (EN-3) and National Policy Statement for electricity networks infrastructure (EN-5).

21. EN-1 sets out the criteria for good design that should be applied to all energy infrastructure and EN-3 explains that, 'Proposals for renewable energy infrastructure should demonstrate good design, particularly in respect of landscape and visual amenity, opportunities for co-existence/co-location with other marine and terrestrial uses, and in the design of the project to mitigate impacts such as noise and effects on ecology and heritage.'

22. EN-5 further notes, 'However, the Secretary of State should bear in mind that electricity networks infrastructure must in the first instance be safe and secure, and that the functional design constraints of safety and security may limit an applicant's ability to influence the aesthetic appearance of that infrastructure.'

23. The Planning Act 2008: Pre-application stage for Nationally Significant Infrastructure Projects (Pre-application guidance) explains how good design should be considered across the Project design process, *'Good design is not simply about the look of a project; it is about the whole process of putting a project together so that it achieves the elements of good design including choice of location, vision, narrative, design principles and consultation programme.'*

24. The Planning Inspectorate advice pages on good design are intended to complement the legislation, regulations and guidance issued by government and is produced under section 51 of the Planning Act. The advice explains why good design is important, what success might look like and how it might be delivered in applications for NSIPs. While the advice note was issued after the submission of this application, the advice has been considered in this document and will be considered through the detailed design post consent process.

25. Table 2.1Table 2.1 sets out the context of good design in the NPS and the relevant good design NPS policies considered in this document.

26. In addition Paragraph 4.7.5 of EN-1 and the Pre-application guidance requires design principles to take into account any national guidance on infrastructure design such as the Design Principles for National Infrastructure published by the National Infrastructure Commission (NIC), the National Design Guide and National Model Design Code, as well as any local design policies and standards. The NIC are an executive agency who advise the Government on all sectors of economic infrastructure, defined as: energy, transport, water and wastewater (drainage and sewerage), waste, flood risk management and digital communications.

27. The NIC's Design Principles for Good Infrastructure are intended to guide the planning and delivery of major infrastructure projects. The design principles include climate, people, places and value. How the Project has considered the NIC design principles is set out in **Section 2.4**.

28. The MGN654 Offshore Renewable Energy Installations (OREI) – Guidance on UK Navigational Practice, Safety and Emergency Response applies to the Project. How it has been considered in the design process is explained in **Section 2.5**.

2.1 National policy statements

29. Section 4.7 of EN-1 sets out generic fundamental principles of good design in a DCO application. NPS for Renewable Energy (EN-3) sets out specific design policies for offshore windfarms. NPS for Electricity Infrastructure (EN-5) provides policy on projects involving electricity grid infrastructure.

Table 2.1 NPS Policy on Good Design

NPS	Relevant Text	Section where is this addressed
EN-1 4.7.1	*"The visual appearance of a building, structure, or piece of infrastructure, and how it relates to the landscape it sits within, is sometimes considered to be the most important factor in good design. But high quality and inclusive design goes far beyond aesthetic considerations. The functionality of an object – be it a building"*	4.3 Design Principles & 6.4 Post-consent Design Code
EN-1 4.7.5	*"a project board level design champion could be appointed, and a representative design panel used to maximise the value provided by the infrastructure."*	6.1 Post-consent design process and governance 6.2 Design Champion
EN-1 4.7.5	*"Design principles should be established from the outset of the project to guide the development from conception to operation"*	4.3 Design Principles

NPS	Relevant Text	Section where is this addressed
EN-1 4.7.5	"*Applicants should consider how their design principles can be applied post-consent*"	6.1 Post-consent design process and governance
EN-1 4.7.7	"*Applicants must demonstrate in their application documents how the design process was conducted and how the proposed design evolved.*"	5. Design approach and evolution
EN-1 4.7.10	"*In the light of the above and given the importance which the Planning Act 2008 places on good design and sustainability, the Secretary of State needs to be satisfied that energy infrastructure developments are sustainable and, having regard to regulatory and other constraints, are as attractive, durable, and adaptable (including taking account of natural hazards such as flooding) as they can be.*"	4.3 Design Principles & 6 Securing good design post-consent
EN-1 4.7.11	"*In doing so, the Secretary of State needs to be satisfied that the applicant has considered both functionality (including fitness for purpose and sustainability) and aesthetics (including its contribution to the quality of the area in which it would be located, any potential amenity benefits, and visual impacts on the landscape or seascape) as far as possible.*"	4.3 Design Principles & 6 Securing good design post-consent
EN-1 4.7.12	"*In considering applications, the Secretary of State should take into account the ultimate purpose of the infrastructure and bear in mind the operational, safety and security requirements which the design has to satisfy. Many of the wider impacts of a development, such as landscape and environmental impacts, will be important factors in the design process.*"	4.3 Design Principles & 6 Securing good design post-consent
EN-3 2.3.5	"*In general, the government does not seek to direct applicants to particular sites for renewable energy infrastructure. In specific circumstances it may be appropriate to provide some direction or guidance, for example to areas of search or areas to avoid through Marine Plans, Strategic Environmental Assessments (SEAs) or The Crown Estate Leasing Rounds, in respect of marine renewable technology.*"	5. Design approach and evolution
EN-3 2.8.13	"*The specific criteria considered by applicants, and the role that they play in site selection, will vary from project to project*"	5. Design approach and evolution

NPS	Relevant Text	Section where is this addressed
EN-3 2.8.25	"*Individual project lease agreements from The Crown Estate often include limits on development (such as a maximum generation capacity), which are used by The Crown Estate as a proxy to establish environmental effects at the plan level. Consistent with the Government's objectives in this NPS, project developers should seek to maximise their capacity within the technological, environmental, and other constraints of the project….*"	4.3 Design Principles & 6.4 Post-consent Design Code
EN-3 2.8.31	"*Water depth, bathymetry and geological conditions are all important considerations for the selection of sites and will affect the design of the foundations of the turbines, the layout of turbines within the site and the siting of the cables that will export the electricity.*"	5. Design approach and evolution
EN-5 2.12.14	*''As identified in EN-1, it is important that the network planning for offshore transmission is much more closely co-ordinated with the planning and development of the onshore transmission network than previously''*	5.5 Offshore Substation
EN-5 2.4.2	*''Applicants should consider the criteria for good design set out in EN1 Section 4.7 at an early stage when developing projects (An applicant should also consider principles outlined in EN-3 section 2.8 where relevant to offshore network)''.*	4.3 Design Principles for National Infrastructure
EN-5 2.4.4	*''– the functional performance of the infrastructure in respect of security of supply and public and occupational safety must not thereby be threatened''.*	5.3 Layout 5.4 Wind Turbine Generators 5.5 OSP(s)

2.2 Pre-application guidance

30. The Planning Inspectorate Pre-application guidance explains the important role of good design in the pre-application process for NSIPs. It notes:

"Applicants should involve a diverse range of people including where appropriate, planners, environmental specialists, landscape architects, architects, engineers and community groups in informing the project vision, narrative, design principles, and project design process to support delivery of the outcomes of the project.

Applicants should explain how the design responds to the National Infrastructure Commission (NIC) design principles for national infrastructure: climate, people, places and value."

31. Further advice on how good design should be considered for NSIPs is in the Planning Inspectorate advice pages on good design below.

2.3 Good design advice page

32. The Good design advice page issued by the Planning Inspectorate provides a framework for NSIPs to establish good design through the pre-application phase to post-consent implementation. The Good design advice was issued in October 2024 after the submission of this DCO application. The Applicant has considered the Good design advice page since its release to ensure good design will be implemented in the detailed design process at post consent.

33. The advice page sets out how good design will be considered during Examination, Recommendation and Decision in the following paragraphs:

"Demonstrating a clear approach to good design, which has been consulted upon and has responded to comments is necessary to support an efficient examination of the NSIP. An appropriate level of design detail together with clarity over how future post-consent approvals will be assessed and are secured is also necessary. This is because it will result in efficiencies for examination time (written questions and hearings, where necessary), reduce the need for Secretaries of State to consult further and in the time needed for post-consent approvals.

Good design is one factor which ExAs need to consider when reporting on the planning balance and making any recommended changes to an applicant's final DCO. ExAs need to consider how successfully good design has been achieved in the recommendation on the project. If design matters are left unresolved, or without secured methods for future approvals (which may also include further independent design input and community consultation), ExAs will need to explore ways of ensuring that this does happen in their recommendations."

34. This Document sets out how design has been considered throughout the project evolution and how design will be secured post consent. The Site Context in Section 3 identifies the site context and characteristics during site selection and following the identification of the site. This section explains how these characteristics and constraints were considered in the design process. Section 4 sets out the Design Framework from project inception to post consent, Section 5 sets out the design approach and evolution process taken to date in accordance with the design framework and Section 6 explains how good design will be secured post consent.

2.4 Design Principles for National Infrastructure

35. The NIC has published Design Principles for National Infrastructure. The NIC believes that large scale infrastructure should be well designed because these "*Projects shape the landscape for decades, even centuries*" (page 4) and because "*Infrastructure can and should be a source of pride*" (page 4).

36. This document states that design is a process which should involve every person on the project and be embedded at every stage of its planning and delivery.

37. There are four NIC design principles for national infrastructure. The principles advocate everyone being involved by appreciating the wider context, engaging meaningfully and continuous measuring and improvement when applying all four principles.

- **Climate**: mitigate Greenhouse Gas (GHG) emissions and adapt to climate change
- **People**: reflect what society wants and share benefits widely
- **Places**: provide a sense of identity and improve our environment
- **Values**: achieve benefits and solve problems well.

2.5 MGN654 Offshore Renewable Energy Installations (OREI) – Guidance on UK Navigational Practice, Safety and Emergency Response

38. The Maritime and Coastguard Agency (~~MCA(1)~~MCA) is a statutory consultee for the Project's DCO application. Its Marine Guidance Note (MGN654) provides guidelines on safeguarding navigational safety, emergency response and Search and Rescue (SAR). These guidelines, whilst intended for navigation, have implications for the practical layout of a windfarm.

39. Paragraph 6.2b of MGN654 states that multiple lines of orientation in straight rows and columns yield the safest arrangement, with particular regard to SAR considerations, "*Multiple lines of orientation provide alternative options for passage planning and for vessels and aircraft to counter the environmental effects on maneuvering i.e. sea state, tides, currents, weather, and visibility. OREI structures (turbines, substations, platforms, and any other structure within the OREI site) that are aligned in straight rows and columns are considered the safest layout arrangement by UK navigation stakeholders and the ~~MCA(1)~~MCA contracted SAR helicopter pilots*".

40. Paragraph 6.2c of MGN654 objects to a single line of orientation without suitable justification and deems zero lines of orientation unacceptable in any case, *"The ~~MCA(1)~~MCA will not consider any layout proposals with just one line of orientation, without supporting documentation which fully justifies the proposed layout to the satisfaction of the ~~MCA(1)~~MCA. A layout with zero lines of orientation will not be acceptable to the ~~MCA(1)~~MCA".*

41. And finally, paragraph 6.2h of MGN654 insists that vessels and helicopters maintain continuous passage when traversing multiple OREI sites, *"Where multiple OREI sites have adjacent boundaries less than 1nm apart, including extensions to existing sites, due consideration must be given to the requirement for lines of orientation that allow a continuous passage for vessels and/or SAR helicopters through both sites, whilst maintaining plans for at least two lines of orientation as appropriate to the site-specific nature of that site".*

42. The abovementioned guidance must be followed when designing a layout for a windfarm site and is therefore incorporated as part of the Project Design Code and secured through the draft DCO (Document Reference 3.1) and signposted to within the Schedule of Mitigation (Document Reference 5.5).

3 Site context

43. This section provides an overview of the characteristics and constraints within and surrounding the site for the Project. The characteristics and constraints of the area influenced the site selection and design process of the Project during the Round 4 The Crown Estate (TCE) leasing process. The Applicant sought to avoid and provide appropriate spatial distances in highly constrained areas in the Irish Sea, where possible, during the site selection process.

44. Following the site selection process and the identification of the site, the Applicant has identified embedded mitigation through good design and avoided areas of the site that are highly constrained. A summary of the site context and surrounding Irish Sea area is provided below, which sets out the key characteristics and constraints considered by the Applicant.

45. Further information on the site selection process is set out in **Chapter 4 Site Selection and Assessment of Alternatives** (Document Reference 5.1.4).

3.1 The Irish Sea

46. The Irish Sea has numerous existing infrastructure and activities. Existing infrastructure and activities include shipping routes, operational offshore windfarms (OWFs), oil and gas operations, aggregate and disposal sites and existing subsea cable infrastructure. Objective 4 of the Project seeks to coordinate and coexist with other activities, developers and operators to use previously developed seabed (**Section 4.2**). Further information on the existing infrastructure and activities in the Project area is set out in **Chapter 17 Infrastructure and Other Users** (Document Reference 5.1.17).

47. Regular passenger ferry and cargo services cross the Irish Sea between Heysham, Liverpool and Belfast, Douglas, and Dublin.

3.1.1 Offshore wind

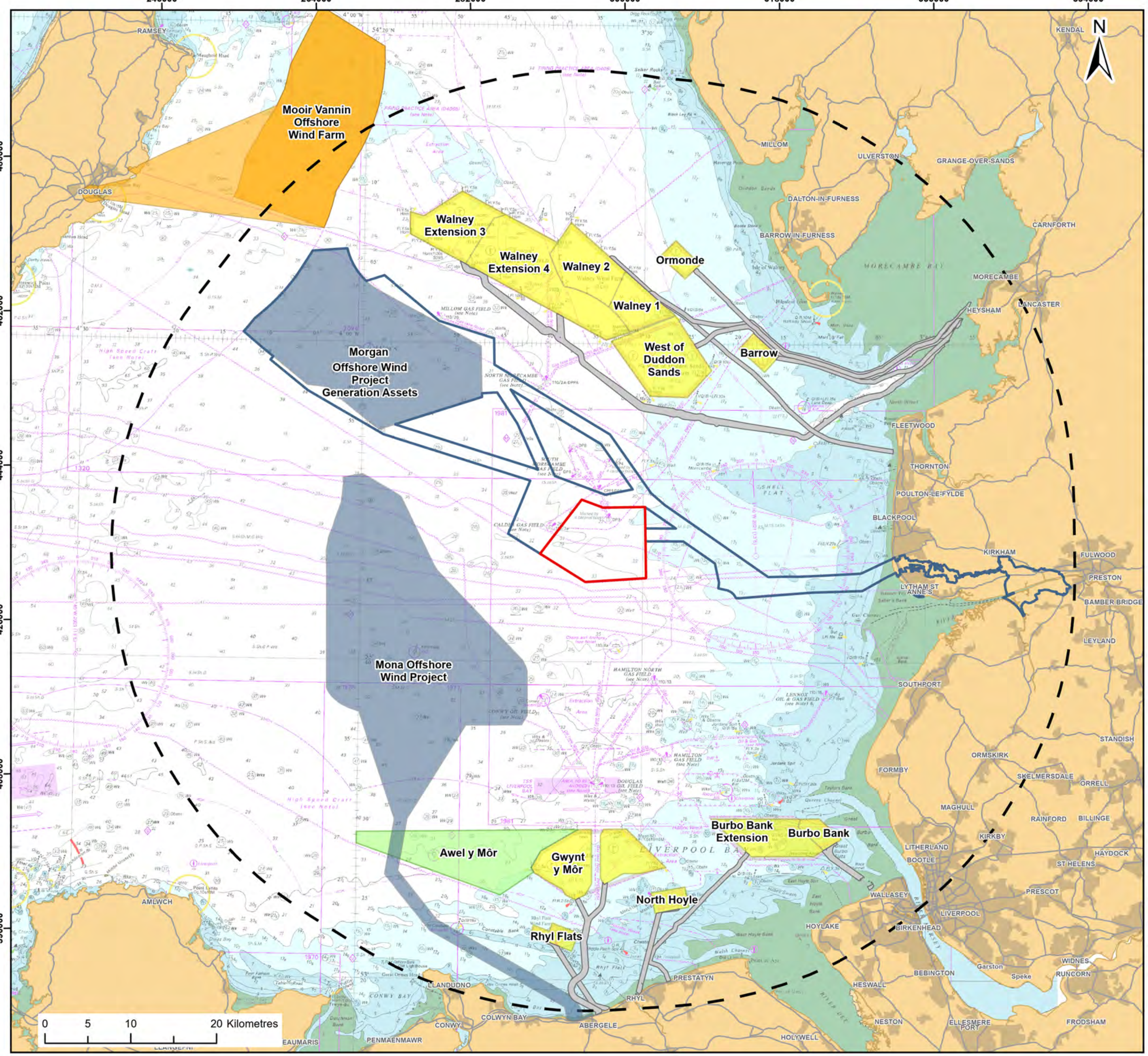
48. On a strategic level, established OWFs are closer to the coastline whereas newer and proposed OWFs are typically further offshore. Existing operational OWFs are located to the north and south of the Project windfarm site. West Duddon Sands and Walney 1 to 4 OWFs (including extensions) are between approximately 12km and to 20km north of the site respectively. Beyond West Duddon Sands OWF are Barrow and Ormonde OWFs, which are closer to the coastline of Barrow-In-Furness. The location of other windfarm sites is shown in Figure 3.1~~Figure 3.1~~.

49. Approximately 30-40km to the south of the Project, and beyond the coastline of Wales, are the operational Burbo Bank, Burbo Bank Extension, North Hoyle, Gwynt y Môr and Rhyl Flats OWFs.

50. Within 50km of the Project, five other offshore wind projects are either consented or planned. The locations of these projects are shown in Figure 5.2 of **Chapter 5 Project Description** (Document Reference 5.3.5) and Figure 3.1 below**.**

51. The first of these five projects are related to the Project, due to the separate DCO application made in relation to the Transmission Assets associated with the Project:

- Morgan and Morecambe Offshore Wind Farms: Transmission Assets
- Morgan Offshore Wind Project: Generation Assets
- Mona Offshore Wind Project
- Mooir Vannin Offshore Wind Farm
- Awel y Môr Offshore Wind Farm.



Legend:

- Morecambe Offshore Windfarm Site
- Morgan and Morecambe Offshore Wind Farms: Transmission Assets
- Morecambe Offshore Windfarm Site 50km buffer
- Offshore Wind Cable Agreements

Windfarm status

- Fully commissioned
- Consented
- In Planning
- Concept / Early planning

Report: Morecambe Offshore Windfarm: Generation Assets Design Statement

Title: Other existing and planned Offshore Windfarms in the Irish Sea

Figure: 3.1 | Drawing No: PC1165-RHD-ES-OF-DG-Z-0146

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	01/05/2024	SB	GC	A3	1:450,000
P02	18/02/2025	SM	MI	A3	1:450,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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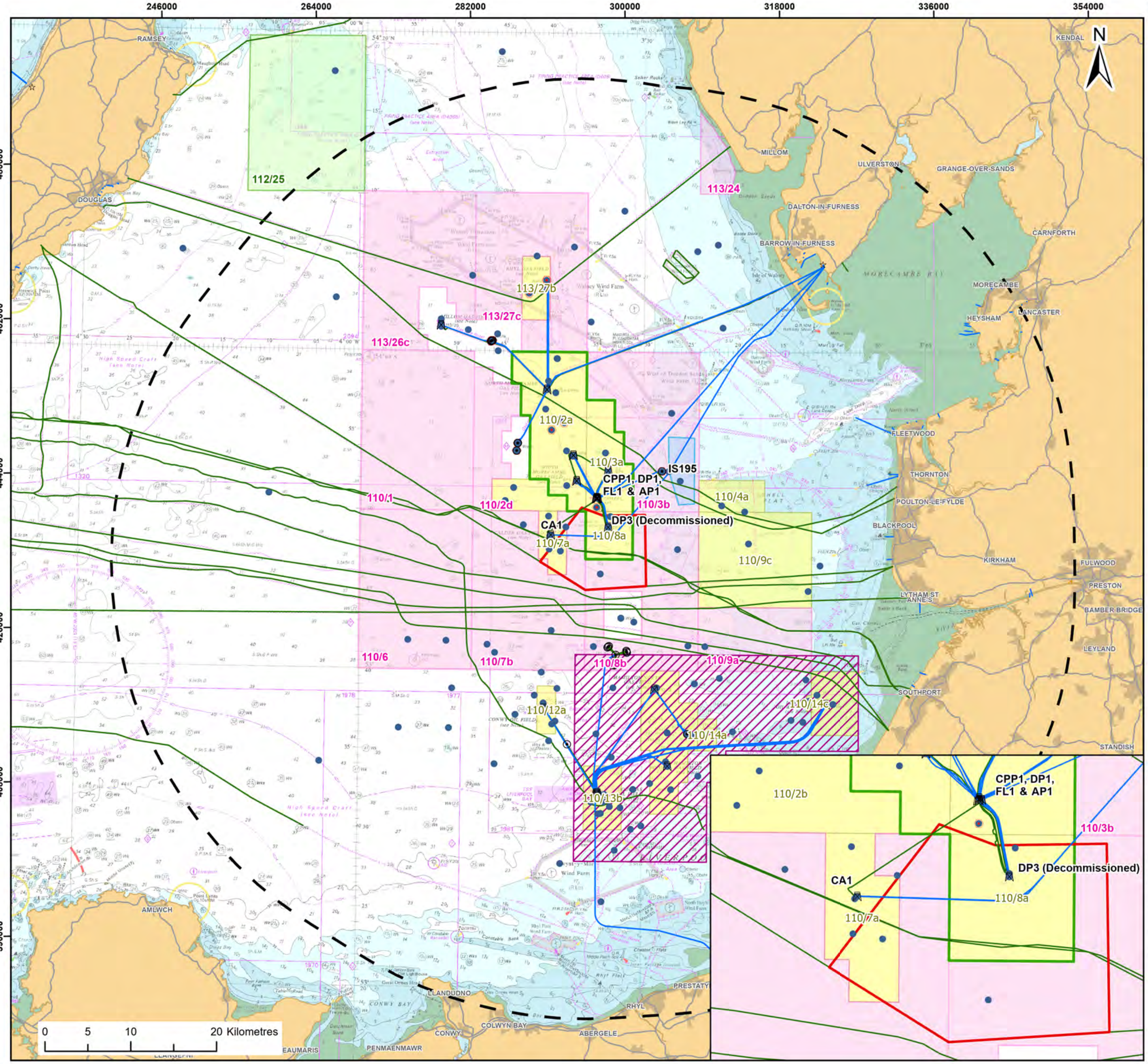
3.1.2 Oil and gas

52. The Irish Sea has a history of development of oil and gas reserves, with hydrocarbon licence blocks located to the north and south of the Project windfarm site. Two gas fields overlap with the windfarm site (the South Morecambe Gas Field and the Calder Gas Field). Both gas fields have been operating since the 1980's with associated platform, pipeline and cable infrastructure located within the vicinity of the windfarm site. The locations of hydrocarbon licence blocks and oil and gas infrastructure in the Irish Sea are shown in **Figure 3.2**~~**Figure 3.2**~~.

53. Carbon capture and storage licence areas are also located within the Irish Sea, with the East Irish Sea Area 1 located to the north and overlapping with the windfarm site (**Figure 3.2**~~**Figure 3.2**~~).



Legend:

- Morecambe Offshore Windfarm Site
- Morecambe Offshore Windfarm Site 50km buffer
- Gateway Gas Storage Project
- Carbon Capture Storage Licence (CS004)
- Carbon Capture Storage Area (EIS Area 1)
- UK Licensed Blocks
- Isle of Man Licensed Blocks
- Oil & Gas Licensed Blocks
- Subsea cable
- Fishing facility
- Harbour facility
- Oil barrier
- Pipeline
- Wells

Surface Infrastructure

- Platform
- Other (Including surface buoys)
- Terminal

Subsea Infrastructure

- Wellhead
- Other

Report: Morecambe Offshore Windfarm: Generation Assets Design Statement

Title: Location of Irish Sea hydrocarbon fields

Figure: 3.2 | Drawing No: PC1165-RHD-ES-OF-DG-Z-0147

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	01/05/2024	SB	GC	A3	1:450,000
P02	18/02/2025	SM	MI	A3	1:450,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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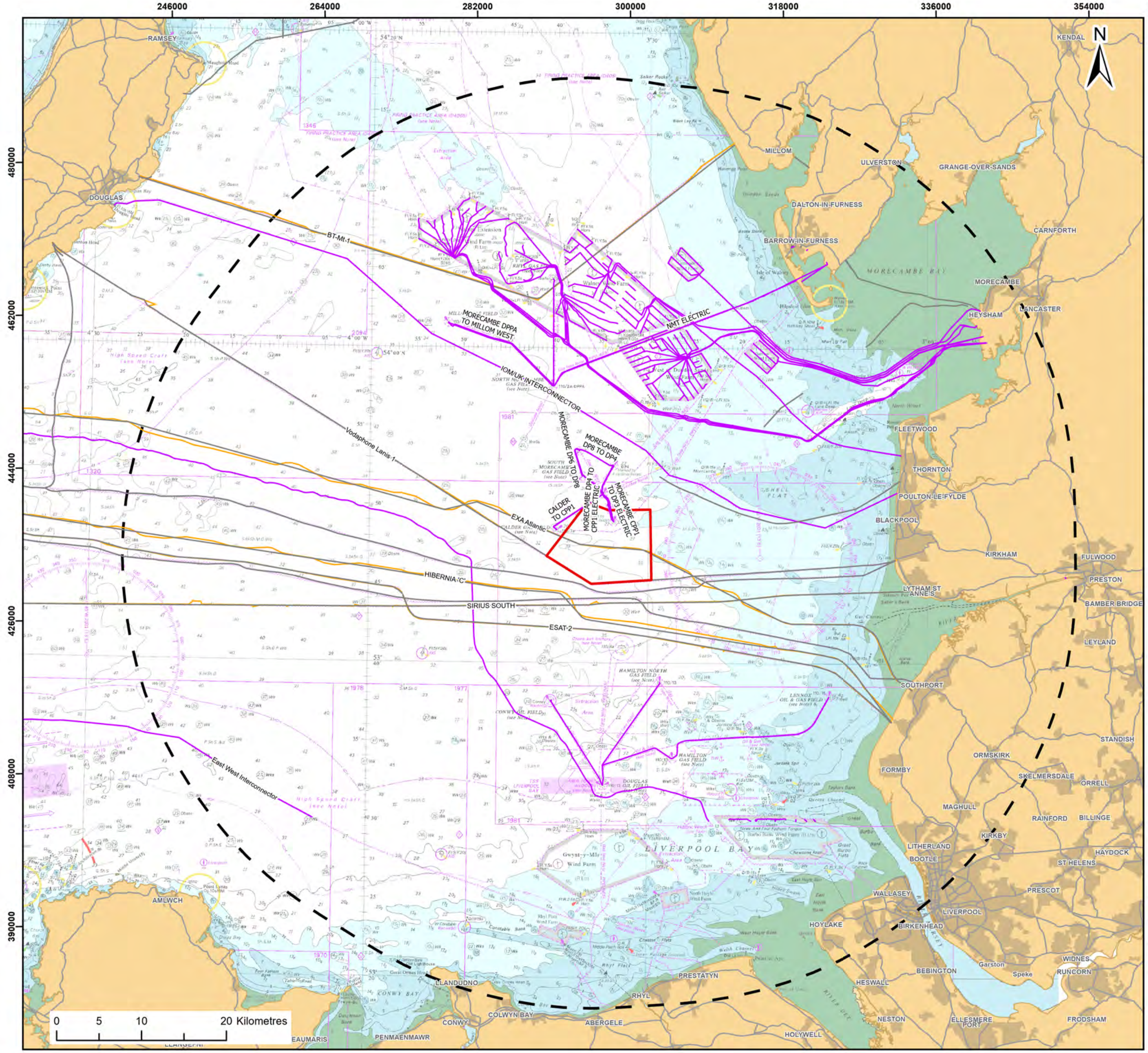
3.1.3 Subsea cables

54. Several subsea cables cross the Irish Sea, linking mainland UK with the Republic of Ireland, Northern Ireland and the Isle of Man. Power cables also exist between offshore oil and gas facilities and linking offshore wind projects to the UK. Interconnector cables provide electrical supply between mainland UK and the Isle of Man and Ireland. Future cable and interconnector projects could be developed in the Irish Sea in the future. The locations of subsea cables and interconnectors are shown in **Figure 3.3**~~**Figure 3.3**~~.



Legend:

- Morecambe Offshore Windfarm Site
- Morecambe Offshore Windfarm Site 50km buffer

Subsea Cable

- Power
- Telecom
- Undefined

Report: Morecambe Offshore Windfarm: Generation Assets Design Statement

Title: Locations of subsea cables and interconnectors

Figure: 3.3 | Drawing No: PC1165-RHD-ES-OF-DG-Z-0148

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	01/05/2024	SB	GC	A3	1:450,000
P02	18/02/2025	SM	MI	A3	1:450,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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3.2 Site overview

55. This section provides an overview of the site characteristics and how the Applicant responded to potential impacts through embedded good design.

56. The Project windfarm site covers an area of approximately 87km^2. The Project aims to maximise the use of previously developed seabed given parts of the seabed have been leased to other operators and natural resources have been explored in the past.

57. As noted in **Section 2.1.2** and **Figure 3.2~~Figure 3.2~~** the windfarm site overlaps with the existing South Morecambe Gas Field and the Calder Gas Field and is in proximity to existing infrastructure of platforms, pipelines, cables and wells of these fields. The South Morecambe DP3 platform (charted within the windfarm site) has been decommissioned and was fully removed in 2023. The Calder platform (CA1) is located 0.9km to the west of the Project windfarm site and the South Morecambe Central Processing Complex (CPC) is located 1.5km to the north.

58. An operational gas pipeline runs through the northern part of the windfarm site to connect the Calder platform to shore, whilst the telecommunication cable EXA Atlantic (formerly GTT Hibernia Atlantic) traverses the windfarm site in an east to west direction. The Lanis 1 cable, owned by Vodafone, runs along the southern edge of the windfarm site, defining the southern boundary.

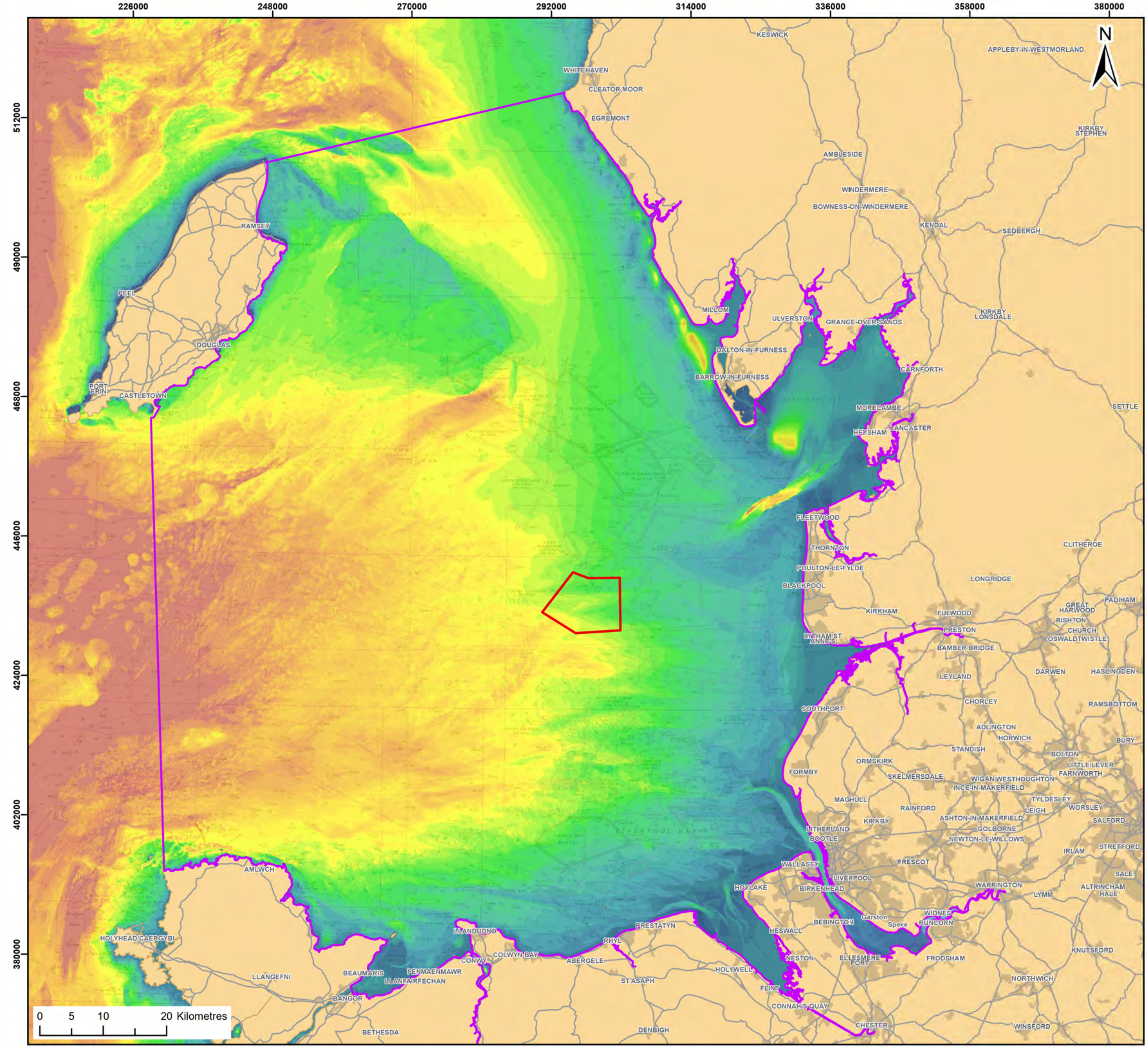
3.3 Bathymetry and geology

59. Water depths within the site range from 18m below the Lowest Astronomical Tide (LAT) in the eastern part of the windfarm site to 40m below LAT in the south-west of the windfarm site. The seabed gradient across the site is very gentle, with slopes of less than 1° across most of the site. The water depth of the Irish Sea is shown in **Figure 3.4~~Figure 3.4~~**.

60. The Irish Sea, over its history, has experienced periods of glaciation, resulting in a complex geology. There are five geological units (volumes of rock of known origin and age, based on the geological timescale) beneath the windfarm site, dating from the Pleistocene epoch (circa 2.6 million to 11,700 years ago). The thickness of these geological units is not uniform across the site.

61. The predominant surface sediment is sand in the northeast and southwest of the site, with clayey sand in the centre and gravelly sand to the east of the site.

62. How the Project responded to the bathymetry and geology site characteristics through good design is in Section 7.3.3 of the **Chapter 7 Marine Geology, Oceanography and Physical Processes** (Document Reference 5.1.7).



Legend:

- Morecambe Offshore Windfarm Site
- Physical Processes Study Area

Report: Morecambe Offshore Windfarm: Generation Assets Design Statement

Title: Water depth in the Irish Sea

Figure: 3.4 | Drawing No: PC1165-RHD-ES-OF-DG-Z-0149

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	01/05/2024	SB	GC	A3	1:600,000
P02	18/02/2025	SM	MI	A3	1:600,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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3.4 Seascape and landscape

63. The Project is located primarily within the expansive waters of the Marine Character Area (MCA(2)) 38 Irish Sea South. This part of the Irish Sea is a busy seascape, with multiple offshore activities including commercial fishing, main shipping routes, oil and gas extraction, dredging and numerous and extensive operational offshore windfarms.

64. The MCAs(2)Marine Character Areaa in the study area are shown in **Figure 18.9** of **Chapter 18 Seascape, Landscape and Visual Impact Assessment** (Document Reference 5.1.18) and include:

- Marine Character Area MCA(2)32 Walney Coastal Waters and Duddon Estuary – The windfarm site lies outside of MCA(2)32
- Marine Character Area MCA(2)34 Blackpool Coastal Waters and Ribble Estuary – The northeastern part of the windfarm site lies within MCA(2)34
- Marine Character Area MCA(2)38 Irish Sea South – The majority of the windfarm site lies within Marine Character Area MCA(2)38

65. When viewed from the coastline in the study area, many views of the Project are either distant or heavily influenced by the baseline influence of existing OWFs located to the north and south of the windfarm site.

66. Significant visual effects identified would be contained within the areas of the Fylde and Sefton coasts, where people have a high sensitivity to changes in the sea views, which are considered to be a fundamental part of the appeal of the coast and settlements at Blackpool, Lytham St Anne's and Southport. Although there would be localised significant effects on views from this section of coast, these visual effects would not result in significant effects on the perceived landscape character, which is extensively urbanised, and its urban/settled character would not be changed as a result of the Project.

67. Arnside & Silverdale and Forest of Bowland National Landscapes are located more than 50km away from the windfarm site. The effect of the Project on these National Landscapes would not be significant due to the separation distance and low frequency of visibility at such long range.

68. How the Project responded to the landscape and seascape characteristics through good design is in Section 18.3.3 of **Chapter 18 Seascape, Landscape and Visual Impact Assessment** (Document Reference 5.1.18).

3.5 Marine ecology and ornithology

69. The Project lies outside any environmentally designated sites (**Figure 3.5Figure 3.5**) and borders with the Liverpool Bay SPA along the Project's eastern boundary.

70. The seabed across the windfarm site is dominated by sands. The corresponding benthic communities are typical of these sandy sediment habitats in the wider Irish Sea area.

71. Fish and shellfish receptors in the Project study area include spawning grounds, nursery grounds, pelagic fish, demersal fish, diadromous fish, elasmobranchs, molluscs, crustaceans and designated sites. The windfarm site is generally unsuitable for sandeel and herring spawning, with the nearest herring spawning grounds located approximately 40km northwest of the Project. Potential species of conservation importance include ray and shark species, including basking shark and migratory fish species such as Atlantic salmon, sea trout, smelt and European eel.

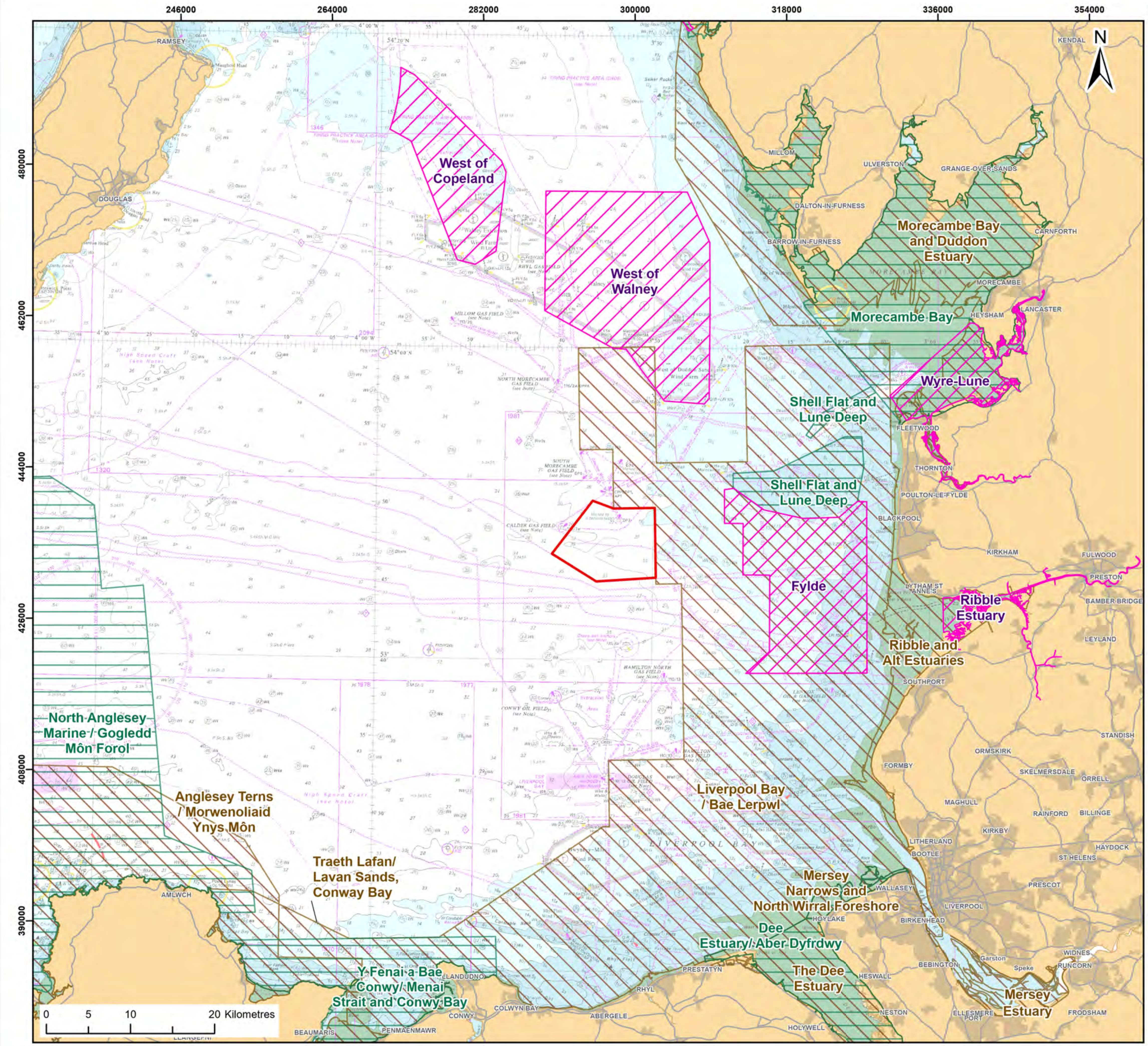
72. The windfarm site and surrounding buffer area was surveyed using high resolution digital aerial surveys over a period of 24 months to identify levels of marine mammals and seabird species present.

73. Marine mammal species present in the area include harbour porpoise, bottlenose dolphin, common dolphin, Risso's dolphin, white-beaked dolphin, minke whale, grey seal and harbour seal.

74. Twenty-two seabird species were recorded and key species included common scoter, gannet, guillemot, razorbill, kittiwake, lesser black-backed gull, Manx shearwater, red-throated diver and Sandwich tern. The windfarm site is located outside of areas known to support high concentrations of seabirds, and there are a limited number of large seabird colonies for key species within the respective mean maximum foraging ranges of the Project. The following sections of the ES set out the embedded mitigation incorporated into the design of the Project in response to the site characteristics and potential impacts relevant to each topic:

- Section 9.3.3 of ES **Chapter 9 Benthic Ecology** (Document Reference 5.1.9).
- Section 10.3.3 of ES **Chapter 10 Fish and Shellfish** (Document Reference 5.1.10).
- Section 11.3.3 of ES **Chapter 11 Marine Mammals** (Document Reference 5.1.11).
- Section 12.3.3 of ES **Chapter 12 Offshore Ornithology** (Document Reference 5.1.12).

75. Marine Conservation designations are shown in **Figure 3.5~~Figure 3.5~~**.



Legend:

- Morecambe Offshore Windfarm Site
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Marine Conservation Zone (MCZ)

Report: Morecambe Offshore Windfarm: Generation Assets Design Statement

Title: Statutory Sites for Nature Conservation

Figure: 3.5 | Drawing No: PC1165-RHD-ES-OF-DG-Z-0150

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P02	17/05/2024	SB	GC	A3	1:450,000
P03	18/02/2025	SM	MI	A3	1:450,000

Co-ordinate system: WGS 1984 UTM Zone 30N

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3.6 Historic environment

76. Within the Project windfarm site there are no heritage assets subject to statutory protection and no known submerged prehistoric sites.

77. There is some potential for palaeoenvironmental and prehistoric archaeological remains associated with deltaic sediments laid down after the Last Glacial Maximum and with channel features cut into the underlying glaciomarine/marine sediments and till. This potential is likely to have been reduced due to the effects of marine erosion during the Holocene transgression.

78. Geophysical survey has been conducted across the Project windfarm site and analysed. There are no known wrecks within the windfarm site and no geophysical anomalies of high potential to be of archaeological significance. Four medium potential anomalies within the windfarm site have been assigned Archaeological Exclusion Zones (AEZs). These are of anthropogenic origin and would require further investigation to establish their archaeological significance.

79. Seventeen low potential anomalies within the site (potentially of anthropogenic origin but unlikely to be of archaeological significance) would be avoided by means of micrositing during detailed project design, where possible.

80. Forty-five magnetic anomalies (items of metallic debris of uncertain archaeological interest) were also identified within the windfarm site, one of which has been assigned a Temporary Exclusion Zone due to its large size and greater potential to be of archaeological interest.

81. UK Hydrographic Office and Historic England maritime records within the windfarm site comprise only ‘fishermen’s’ fasteners’ (places where fishermen have snagged their fishing gear). Nothing has been seen at these recorded locations in the collected geophysical data.

82. Further detailed analysis of the existing environment is in **Chapter 15 Marine Archaeology and Cultural Heritage** (Document Reference 5.1.15) and on the Historic Environment Plan (Document Reference 2.7). How the Project responded to the marine archaeology and cultural heritage characteristics through good design is in Section 15.3.3 of **Chapter 15 Marine Archaeology and Cultural Heritage** (Document Reference 5.1.15).

3.7 Shipping and navigation

83. There are no internationally recognised sea lanes, including International Maritime Organisation (IMO) routeing/reporting measures or recommended channels in the Project windfarm site, the closest being the Liverpool Traffic Separation Scheme (TSS) 12.4nm to the south of the site.

84. The closest port/harbour is the Port of Barrow approximately 19nm northeast of the windfarm site.

85. Service vessels associated with existing OWFs and oil and gas infrastructure account for a large proportion of vessel movements within the Project study area.

86. Other vessels passing within the vicinity of the Project windfarm site are predominantly ferries and commercial cargo, with some passing through or adjacent to the site.

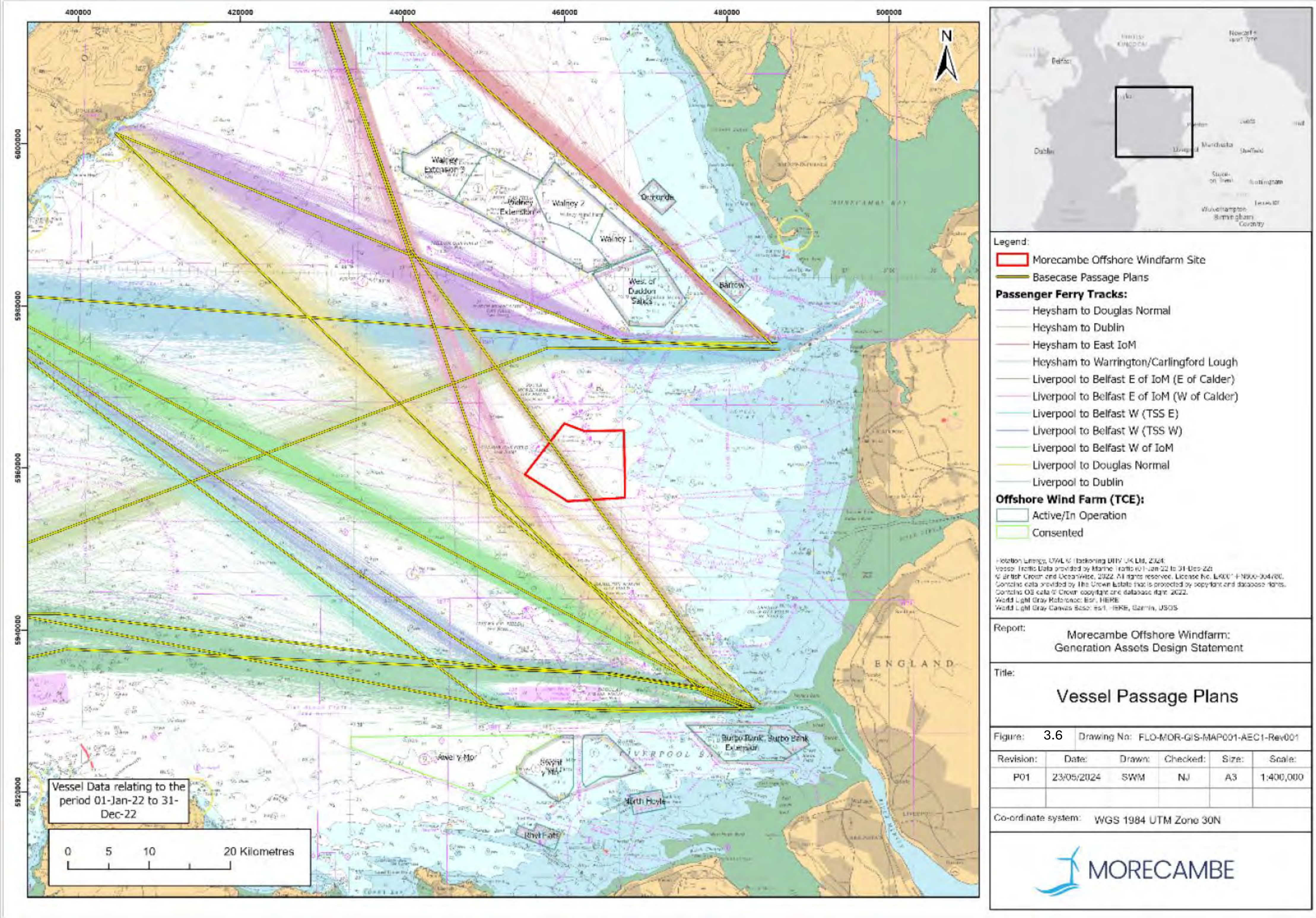
87. The Stena Line east of Isle of Man (east of Calder) route between Liverpool and Belfast passes northwest/southeast through the centre of the Project windfarm site, this is one of a number of routes used by Stena Line for that service. Both the Isle of Man Steam Packet Company route between Liverpool and Douglas and the Stena Line east of Isle of Man (west of Calder) route between Liverpool and Belfast pass to the southwestern corner of the windfarm site. Other ferry routes transit outside the Project windfarm site (**Figure 3.6**~~**Figure 3.6**~~). Analysis of adverse weather routeing shows that passenger vessels typically deviate from their usual routes to west of the study area.

88. Fishing activity occurs across the study area throughout the year, with the windfarm site predominantly used by vessels using static gear. The key fleets considered in the ES assessment were identified as the UK (and Isle of Man) and Irish scallop dredgers; UK (and Isle of Man) potters targeting shellfish (primarily whelk offshore, but also lobster and brown crab); UK and Belgian beam trawlers targeting sole, plaice and other demersal fish (fish species that live close to the sea bed), with localised inshore trawling targeting brown shrimp and UK inshore vessels under 10m in length targeting a variety of demersal species (e.g. bass) using nets and hooked gear.

89. Recreational vessels remain predominately along the coast, distant from the Project site, particularly along the entrance to Liverpool, and around Holyhead Douglas and Rhyl.

90. There are no military practice and exercise areas (PEXAs) or highly surveyed routes within the Project windfarm site.

91. Further detailed analysis of the existing environment is in **Chapter 14 Shipping and Navigation** (Document Reference 5.1.14). How the Project responded to the marine shipping and navigation constraints through good design is in Section 14.3.3 of **Chapter 14 Shipping and Navigation** (Document Reference 5.1.14)



400000
420000
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5920000
N
Walney Extension 3
Walney Extension 4
Walney 2
Walney 1
Ormonde
West of Duddon Sands
Barrow
Burbo Bank
Burbo Bank Extension
Awel y Mor
Gwynt y Mor
North Hoyle
Rhyl Flats
MORECAMBE BAY
LIVERPOOL BAY
ENGLAND
Vessel Data relating to the period 01-Jan-22 to 31-Dec-22
0 5 10 20 Kilometres
Belfast
Dublin
Liverpool
Manchester
Leeds
Sheffield
Nottingham
Birmingham
Legend:
Morecambe Offshore Windfarm Site
Basecase Passage Plans
Passenger Ferry Tracks:
Heysham to Douglas Normal
Heysham to Dublin
Heysham to East IoM
Heysham to Warrington/Carlingford Lough
Liverpool to Belfast E of IoM (E of Calder)
Liverpool to Belfast E of IoM (W of Calder)
Liverpool to Belfast W (TSS E)
Liverpool to Belfast W (TSS W)
Liverpool to Belfast W of IoM
Liverpool to Douglas Normal
Liverpool to Dublin
Offshore Wind Farm (TCE):
Active/In Operation
Consented
Report:
Morecambe Offshore Windfarm: Generation Assets Design Statement
Title:
Vessel Passage Plans
Figure: 3.6
Drawing No: FLO-MOR-GIS-MAP001-AEC1-Rev001
Revision: P01
Date: 23/05/2024
Drawn: SWM
Checked: NJ
Size: A3
Scale: 1:400,000
Co-ordinate system: WGS 1984 UTM Zone 30N
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4 Design framework

92. This section sets out the design framework for the Project. It describes the approach to good design in accordance with the NPS, the Nationally Significant Infrastructure Projects: Advice on Good Design and the NIC design principles.

93. This section sets out the vision for the project, project objectives, project design principles and how flexibility is proposed to be achieved.

94. The Design Framework in **Plate 4.1**~~**Plate 4.1**~~ shows how good design has been considered and implemented throughout the project inception, through pre-application and will be implemented through post-consent. It also shows at what points in the process each tier of design was developed to inform the relevant stage of the design process.

95. The project vision and objectives were developed at the project inception and Round 4 Leasing stage to steer the site selection process. Both the vision and project objectives have evolved throughout the design evolution of the project through the pre-application stage, and informing the preliminary design principles (**Section 4.3**).

96. The preliminary design principles were developed early in the pre-application stage in consideration of the NIC design principles, the NPS and characteristics of the site. They were the baseline to ensure mitigation through good design was embedded in the environmental assessment. The preliminary design principles evolved throughout the pre-application process to reflect new information or impacts identified through the design evolution and the environmental assessment.

97. The preliminary design principles, design evolution process and the embedded environmental impact assessment mitigation informed the PDE parameters and the more detailed design code set out in **Section 6.4**of this document.

98. The PDE parameters are explained in **Section 1.4** of this document and set out in the Project Description (Document Reference 5.1.5). They are also secured through the draft DCO (Document Reference 3.1).

99. Flexibility has been built into the design framework through the use of setting maximum PDE parameters for parts of the design that are known and the use of the design principles and design code for parts of the project that are subject to detailed design post consent.

100. The design code along with the whole design framework is secured through the DML and draft DCO (Document Reference 3.1) to ensure they are implemented post consent. **Section 6** of this document sets out how the design framework will be secured post consent.

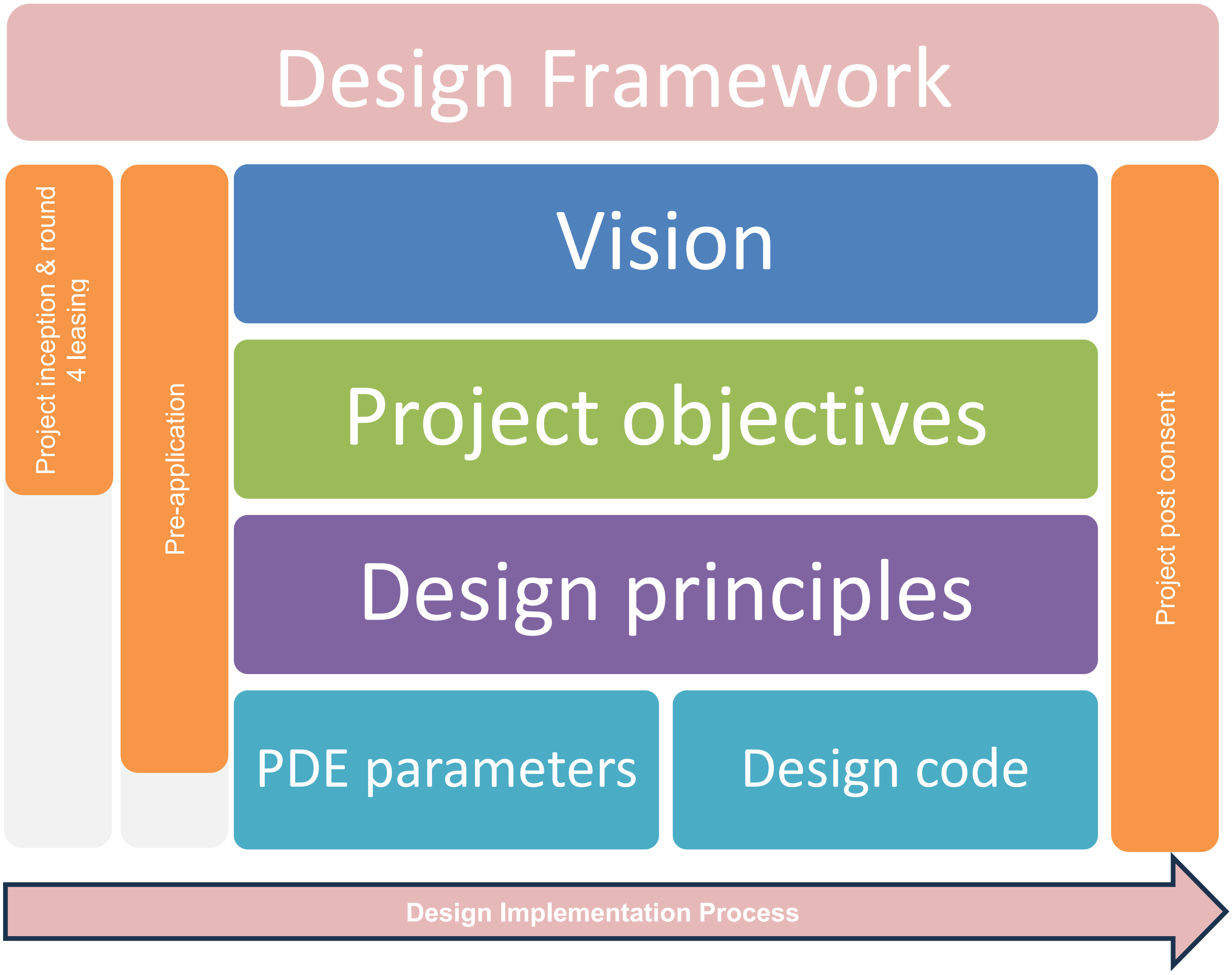


Plate 4.1 Design Framework

4.1 The Applicant's vision for the Project

101. The vision for the Project is:

> *"Renewable energy is central to supporting the UK's ambitions to lead the world in combatting climate change, reducing our reliance on fossil fuels and embracing a future where renewable energy powers our homes and businesses.*
>
> *Morecambe Offshore Windfarm has a nominal capacity of 480MW - enough to power over half a million households. It will also contribute to the UK Government's commitment to:*
>
> - *Generate 50GW of power from offshore wind by 2030*
> - *Reach net zero by 2050."*

102. Morecambe Offshore Windfarm will deliver safe, efficient and reliable clean energy to the UK, using new technologies where possible, minimising

environmental impacts through the use of already developed sea beds, coordination and coexistence with other activities and embedded good design."

103. The Project vision is reflected and will be achieved through the Project objectives and design principles in this document, which is secured by the draft DCO (Document Reference 3.1).

4.2 Project objectives

104. The Project's objectives were developed at the project inception and Round 4 Leasing stage of the Project and have been the forefront of the project evolution and design decisions:

- **Decarbonisation:** Generate around 480MW of low carbon electricity from an offshore windfarm, in support of the Net-Zero by 2050 target and UK Government ambition to deliver 50GW of offshore wind by 2030
- **Security of supply:** Provide significant electricity generation capacity within the UK to support commitments for offshore wind generation and security of supply
- **Affordability:** Maximise generation capacity at low cost to the consumer from viable, developable seabed within the constraints of available sites and grid infrastructure
- **Coordination:** Coordinate and coexist with other activities, developers and operators to use previously developed seabed to deliver the Project and its skills, employment and investment benefits in the Local Economic Area.

4.3 Design Principles

105. The Applicant developed four preliminary Design Principles early at the pre-application stage of the Project prior to the preliminary environmental impact assessment. The preliminary Design Principles informed design decisions in the project evolution (as set out in **Section 5**) and the environmental impact assessment embedded mitigation (as set out in **Table 4.1**~~**Table 4.1**~~). **Table 4.1**~~**Table 4.1**~~ also provides context to how each principle was formed and how the preliminary Design Principles for the Project align the Design Principles for National Infrastructure.

Table 4.1 Design Principles for the Project

National Infrastructure Commission Design Principle	Project Design Principle	Background
People	**Excellence in Safety**: a design which always respects the safety of people, communities and the environment, which meets UK statutory and regulatory requirements and current HSEQ (Health, Safety, Environment and Quality) and site environmental requirements	Both joint venture companies of the Applicant are founded on principles of safety and as part of the overall company missions. Section 4.13 of NPS EN-1 sets out the safety requirements applying to the Project and paragraph 4.7.12 acknowledges the safety and security requirements that projects must meet.
Value	**Functionality & Adaptability**: a design which recognises the advancing nature of technology and is efficient in its use of resources and energy generation throughout the life of the Project	Construction of offshore components and windfarms is inherently expensive and relies on the availability of a highly-skilled workforce, specialised equipment and vessels. Section 3.3 of NPS EN-1 requires the delivery of an affordable energy system.
Places	**Synergies & Reuse**: a design which through proactive and thorough coordination and collaboration with other users, maximises the use of previously developed seabed and the benefits of the Project	Since a key objective of the Project is to achieve synergies and re-use of previously developed seabed, its design will require close levels of cooperation and integration of marine uses in construction and operational phases. Section 2.8 of NPS EN-3 acknowledges the increasing demands for use of the marine area and requires higher levels of collaboration and coexistence in the siting and design of offshore windfarms in particular.
Climate	**Planet Positive**: a design which maximises renewable energy, is adapted for our changing climate, responds to its seascape and to views out to sea and where possible will enhance the environment and its biodiversity	Decarbonisation of the UK's energy supply features highly amongst the Project's objectives. Section 2 of NPS EN-1 sets out the climate change basis for NPS policy as a whole.

5 Design approach and evolution

5.1 Site selection

106. This section summarises the site selection process, including The Crown Estate (TCE) Leasing Round 4 process which identified the Agreement for Lease (AfL) area for the Project.

107. The criteria in the Round 4 bidding rules, which informed the site selection process, influenced the Applicant's decision to utilise previously developed seabed (reflected in the Coordination Project Objective). Furthermore, the complexity of the seabed and needs of other marine users helped shape the Project site boundary.

108. Further information on the site selection process is found in **Chapter 4 Site Selection and Assessment of Alternatives** (Document Reference 5.1.4).

109. TCE's Leasing Round 4 was supported by five objectives (TCE, 2019) that balanced the need for clean, reliable and low-cost power, whilst protecting the seas and the wider environment, such that any successful bid under it:

"Delivers a robust pipeline for low-cost offshore wind deployment

Offers an attractive, accessible and fair proposition to developers

Balances the range of interests in the marine environment

Makes efficient use of the seabed

Unlocks the commercial value of the seabed in line with The Crown Estate's statutory obligations"

110. TCE initially identified 18 Regions around the England, Wales and Northern Ireland that could potentially be developed for offshore wind in their Leasing Round 4. These 18 Regions are shown in **Plate 5.1Plate 5.1**.

111. The 18 potential Regions were reduced to four Bidding Areas (**Plate 5.2Plate 5.2**) in September 2019. The Project is located in Bidding Area 4 – Northern Wales & Irish Sea (comprising the North Wales region, Irish Sea region and the Anglesey region).

112. The Applicant selected Bidding Area 4 as the preferred Bidding Area, because it offered unique opportunities to coexist with existing users on a site located within oil and gas fields near the end of productive life.

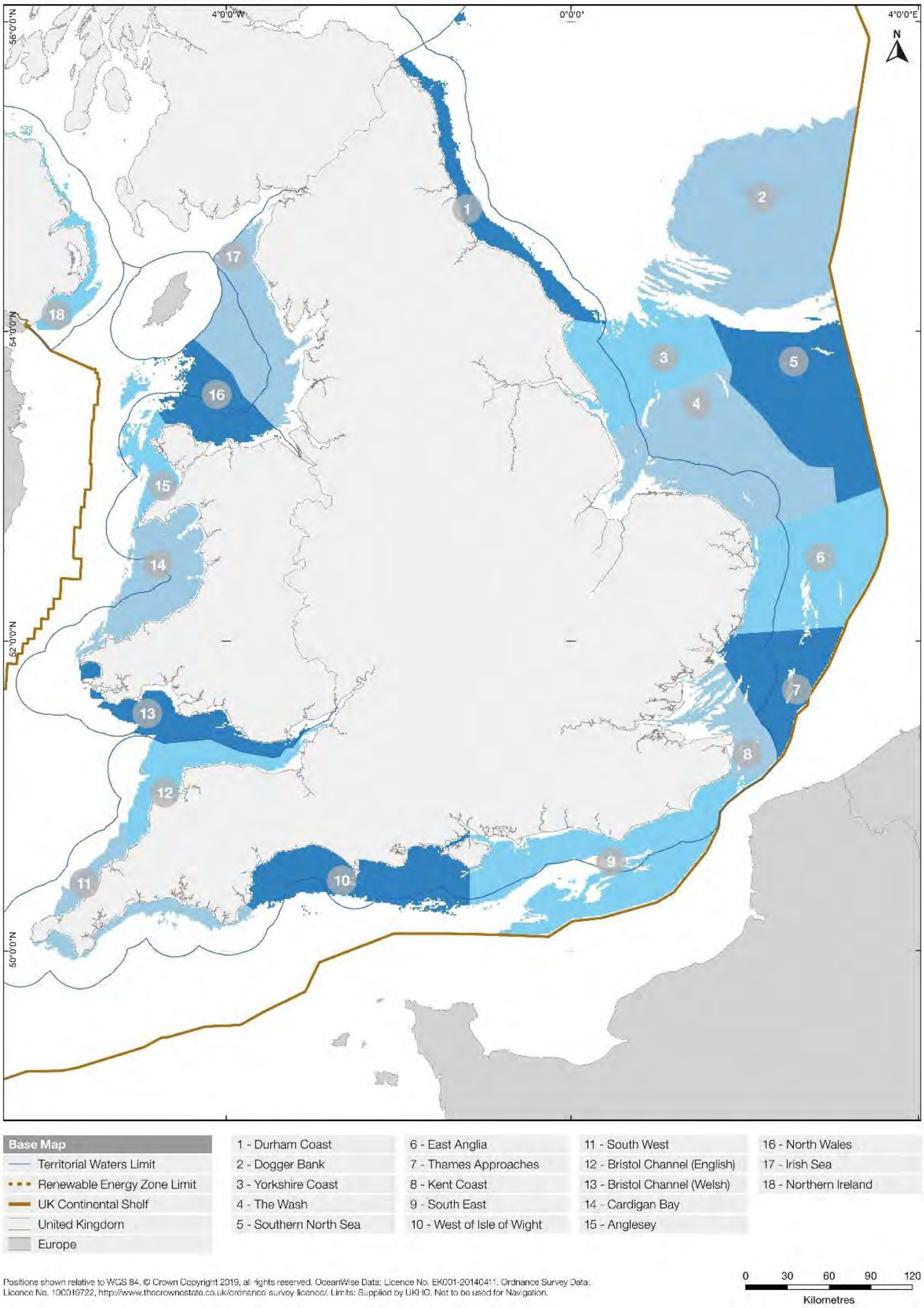


Plate 5.1 The 18 'characterisation areas' identified by TCE (November 2018)

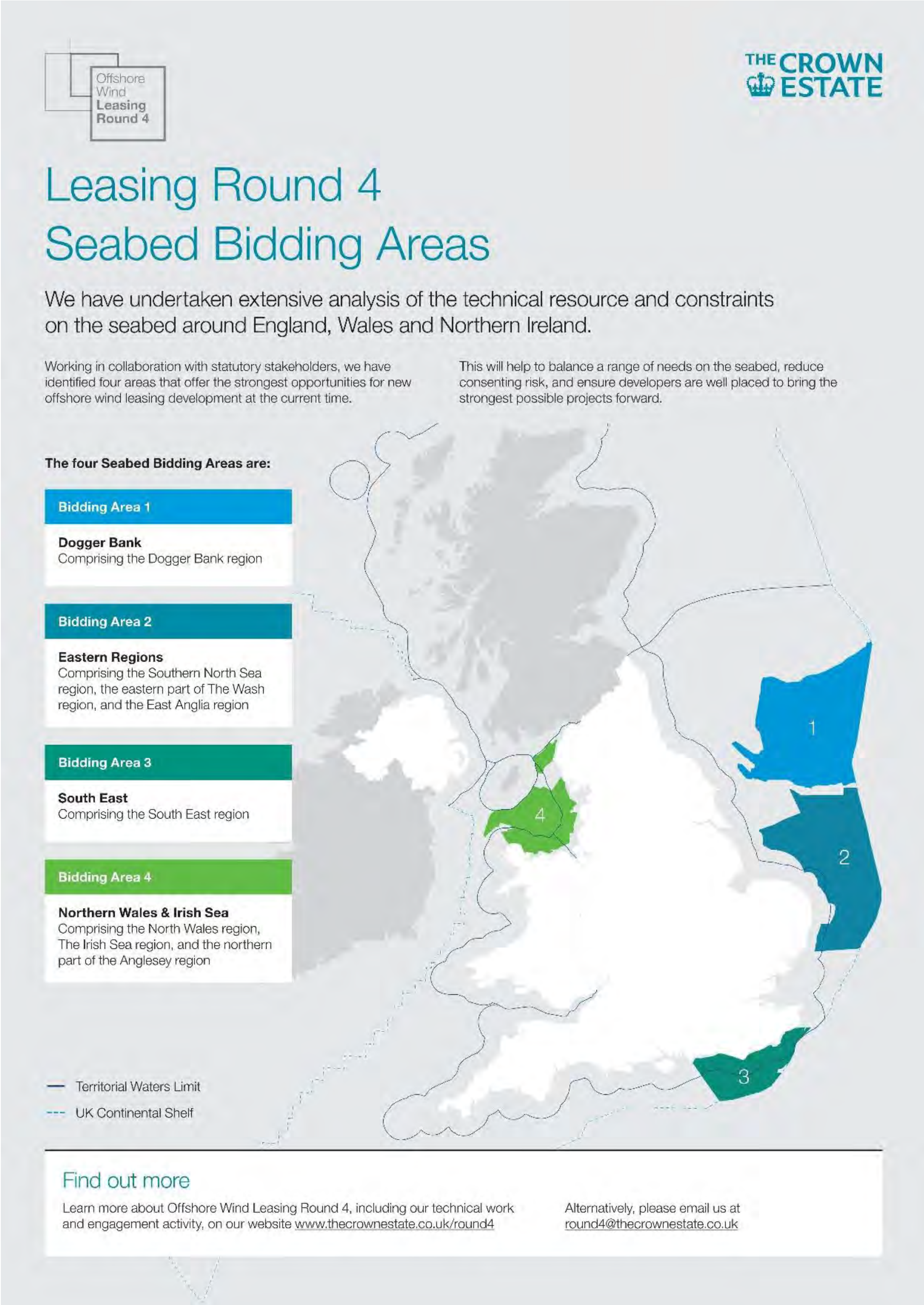


Plate 5.2 The final bidding areas identified by TCE (September 2019)

113. During the Round 4 bidding process an initial offshore zone within the Bidding Area 4 that had a lower number of constraints and higher potential for co-existence opportunities was identified for further site selection analysis (the Morecambe Zone) (Figure 5.1~~Figure 5.1~~). See **Chapter 4 Site Selection and Assessment of Alternatives** (Document Reference 5.1.4). Subsequent to this analysis, the Applicant made a bid with a nominal capacity of 480MW in a location within the vicinity of existing oil and gas assets. This was a balanced

decision on commercial viability and technical feasibility, as well as minimising the disturbance to existing sea users and stakeholders and minimising use of undeveloped areas of the Irish Sea.

114. In line with the Leasing Round 4 bidding rules, and in the interests of good design, the Applicant designed the boundary of the site to avoid:

- IMO TSSs
- existing offshore wind lease agreement areas
- deep water channels
- marine aggregate licence areas
- dredging areas.

In addition, the site would not overlap with

- disposal sites
- PEXAs
- environmentally designated sites, i.e. Liverpool Bay SPA.

115. The Applicant was selected by TCE as a preferred Round 4 bidder in 2021, and in January 2023, a Round 4 AfL was signed for the Project.

5.2 Site boundary refinement

116. The AfL area (125km^2) (Figure 5.1~~Figure 5.1~~) was taken forward to the pre-application stage of the DCO process and assessed in the Preliminary Environmental Impact Report (PEIR) . Subsequent to the statutory consultation on the PEIR, the spatial extent of the windfarm site was reduced eastward, such that the windfarm site now occupies 87km^2. As a consequence, the reduced spatial extent allows for a reduction in the apparent lateral spread of WTGs when viewed from the coast, particularly from the north and south. This refinement of the Project site to 87km^2 (as shown in Plate 5.3~~Plate 5.3~~) was based on the following criteria:

- Provision of greater sea room between the boundaries of this Project, the Morgan Offshore Wind Project Generation Assets and the Mona Offshore Wind Project, in order to mitigate impacts to existing ferry and other shipping routes between Liverpool, the Isle of Man and Belfast
- Reduction in interaction with the gas field operations, including vessel and helicopter approaches to the Calder CA1 platform (which following the boundary change now sits outside the Project site) and a commitment (secured by protective provisions in the draft DCO (Document Reference 3.1)) that no WTGs or OSPs would be located within a buffer zone of oil and gas platforms with active helidecks
- The exclusion of the area west of the Calder CA1 platform reduces the need for long inter-array cables, thus reducing disturbance to the seabed and helping to minimise installation cost and electrical losses

- Reduction in the presence of mega ripples and sandwaves, which can lead to a reduction in the level of seabed preparation required
- Although the Applicant has not altered the eastern boundary, the Project site has not been extended closer to the coastline, in part to ensure no overlap with Liverpool Bay SPA, or increased visual impacts on local communities

117. Further information on statutory consultation and how the Applicant responded to feedback is in the **Consultation Report** (Document Reference 4.1).

5.3 Layout

118. Once the extent of the Project site was established, the Applicant spent considerable time setting the parameters for the layout or siting of the individual WTGs which were derived from the range of designs, technologies, and methodologies under consideration. Each technical chapter (chapters 7 to 22) of the ES outlines the relevant realistic worst-case scenario of the Project, noting that this would vary depending on the receptor and impact being considered.

119. The Design Code (**Section 6.4**) establishes key control measures for the design of the final layout of the Project site. **Chapter 5 Project Description** (Document Reference 5.1.5) gives indicative details of the layout, which would follow a regular pattern, generally orientated perpendicular to the prevailing wind, or as close to this as is practicable. **Chapter 5 Project Description** (Document Reference 5.1.5) also explains how parameters for each component of the Project were formed throughout the Project design. The final layout would be determined post-consent, following a design exercise, which would include a balance between various objectives, including the commercial need to maximise energy production, sufficient space between individual WTGs for navigation and SAR, appropriate separation from existing cables, pipelines or other infrastructure, and consideration of ground conditions and other constraints (such as archaeological exclusion zones) in accordance with this document and the draft DCO (Document Reference 3.1).

120. For the Project, the proposed minimum intra-row distance between WTGs within a row of WTGs is 1,060m and the minimum inter-row distance between rows of WTGs is 1,410m. These minimum distances are defined by the smaller rotor diameter WTG in the Project design envelope and would give vessels and SAR sufficient room to manoeuvre per the advice in MGN654. The Applicant is proposing a maximum rotor diameter of 280m and, should this WTG be selected, the actual minimum separation distances may be greater, increasing navigational sea room as a consequence. These PDE parameters are secured in the draft DCO (Document Reference 3.1) as described in Item DC1 of the Design Code in **Table 6.1**~~Table 6.1~~.

121. The presence of existing marine infrastructure imposes restrictions on how the

layout would be arranged. There will be buffer zone centred around existing oil and gas platforms and on either side of existing cables and pipelines which traverse the Project site. WTGs or OSP(s) would not be located in these buffer zones in order to reduce interactions between different users in the area of the windfarm site. The Applicant is continuing to engage with relevant parties, but the buffer zones are secured in Protective Provisions included in the draft DCO (Document Reference 3.1) and set out in the Schedule of Mitigation ((Document Reference 5.5)).

122. There is a preference for overall alignment of WTGs to have a sense of regularity, with multiple lines of orientation, as per the advice in MGN654. A single line of orientation would not be considered without justification and associated supporting documentation provided to the satisfaction of the MCA(1)MCA. Zero lines of orientation would be unacceptable to the MCA(1)MCA in any case. The Applicant has committed in the Design Code (**Section 6.4**) to adopting two lines of orientation for the windfarm layout i.e. WTGs would be set out in a regular pattern such that they are aligned in two straight, intersecting rows. This commitment is in line with MGN654. and secured in the DML of the draft DCO (Document Reference 3.1).

123. Refining the WTG layout is an iterative design process and requires input from several technical disciplines including: energy assessment, geotechnical, the WTG team, cable engineering, marine, and foundation engineering. The final layout would be informed by these criteria, as well as results from further ground investigation and surveys.

124. For the construction phase (and any major maintenance works, which have been defined by Regulation 2 of The Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007) the Applicant intends to make an application for Safety Zones around the OREI (under the Energy Act 2004 and as provided for in the draft DCO (Document Reference 3.1), in order to ensure the safety of the windfarm infrastructure, individuals working thereon, construction vessels and other vessels navigating in the area whilst works take place. The Applicant does not currently foresee any specific need for Safety Zones to be established around the OREI during the operational phase, with the exception of during major maintenance activities, this aligns with the Project Design Principles of Synergy & Reuse and allows for increased levels of coexistence with other sea users. Further information on Safety Zones is provided in the Safety Zone Statement (Document Reference 4.5) and Other Consents and Licences Required (Document Reference 4.15).

5.4 Wind turbine generators

125. Each WTG is comprised of a tubular steel tower, atop a foundation structure. At the top of the tower is a nacelle, which hosts the electrical generator, and a hub connects the nacelle assembly to the rotor blades rotating around a

horizontal axis.

126. The final selection of the number, size, colouring, layout and type of WTGs would be determined post-consent and will be subject to approval in accordance with the Design Code in **Table 6.1**~~**Table 6.1**~~ and the DML Conditions in the draft DCO (Document Reference 3.1). All Project infrastructure, including location, WTGs and fixed substructures would be designed with sufficient safety margins for extreme weather events such as storm surges and high winds. The loads that the Project's marine infrastructure is designed to withstand are developed on the basis of meteorological hindcast datasets, which correlate a long-term series of wind and wave data with satellite observations and real-time measurements and then extrapolated to account for extreme events. At wind speeds above the design operational load limit, the WTGs would shut down, with the blades feathered and nacelle yawed to align to the wind direction, maintaining idle configuration to prevent structural damage during gusts or sustained high winds. Normal operations would resume once the wind speed returns below the cut-out speed. See **Chapter 21 Climate Change** (Document Reference 5.1.21)) for further information.

127. The layout of each WTG is subject to 55m micro siting in any direction in accordance with the draft DCO (Document Reference 3.1). This ensures the WTG are in two lines of orientation, but allows for some flexibility when it comes to construction to avoid any unexpected constraints.

128. The Applicant reduced the maximum number of WTGs from 40 at PEIR to a maximum of 35 WTGs (as defined in the Project design envelope in Chapter 5 Project Description (Document Reference 5.1.5)). This decision was influenced by the rapid development of larger WTG technology with increased generating capacity, meaning the Project nominal export capacity can be attained with fewer WTGs overall.

129. The maximum blade tip height is 310m above HAT and the maximum rotor diameter is 280m. This commitment defines the maximum height of WTGs that could be installed in accordance with the draft DCO (Document Reference 3.1). The maximum height of the WTGs was reduced from the 345m blade tip height considered in the PEIR, leading to a reduction in the Zone of Theoretical Visibility and apparent scale of the WTGs, thus helping reduce visual effects. The reduction in maximum blade tip height was influenced by the available WTG's and the practicalities and limitations of installing such turbines.

130. The proposed minimum WTG rotor clearance above sea level, also known as the "*air gap*", has been increased from 22m above HAT at PEIR to 25m above HAT in response to statutory consultation. The increase in air gap has been designed with the intention of reducing potential seabird collision impacts as set out in **Chapter 12 Offshore Ornithology** (Document Reference 5.1.12) and the Design Code in **Table 6.1**~~**Table 6.1**~~.

131. The final number of WTGs would be decided post-consent and could, for example, be up to 30 WTGs with larger rotor diameters or up to 35 WTGs with smaller rotor diameters to allow flexibility for the Applicant to consider new WTG technology options. The final design, size (one consistent size throughout the array) and number of WTGs would optimise the gross energy output from the windfarm site on a consistent basis as set out in **Chapter 5 Project Description** (Document Reference 5.1.5), the Design Code in Table 6.1~~Table 6.1~~ and the Draft DCO (Document Reference 3.1).

132. Since PEIR, the Applicant has reduced the range of foundation types provided for in the DCO Application. The decision to reduce the range of foundation types considered was influenced by initial survey findings and cost efficiency of the proposed options.

133. Fixed foundation types are suitable for the water depth across the windfarm site and four foundation types are being considered:

- Gravity based structure (GBS)
- Multi-legged pin-piled jacket (three-legged or four-legged jackets)
- Monopile
- Multi-legged suction bucket jacket (three-legged jackets).

134. The final foundation could be one type or a combination of foundation types. The decision would be informed by results of the pre-construction surveys, suitability of the ground conditions, water depths, procurement and the final WTG/OSP(s) design and in accordance with the Draft DCO (Document Reference 3.1) and the Design Code in Table 6.1~~Table 6.1~~.

135. Standard colours are used across offshore windfarms in the UK to ensure these structures are visible to different sea and air users under various meteorological conditions. Colours would be agreed with the relevant authorities. The foundation structures are expected to be coloured RAL 1023 (traffic yellow) from HAT to a minimum of 15m above HAT, as directed by Trinity House. Above this, the colour scheme for nacelles, blades and towers is expected to be RAL 7035 (light grey), unless otherwise specified.

136. Defining the number and size of WTGs is an iterative process, similar to the definition of the layout. The Design Code (Table 6.1~~Table 6.1~~) establishes key control measures for the number, size, colouring and type of WTGs to be deployed and is secured in the DML of the Draft DCO (Document Reference 3.1).

5.5 Offshore Substation Platform(s)

137. The Project will include up to two OSPs. The inter-array cables will collect the alternating current (AC) electrical power from the WTGs and will terminate at the OSP(s). The OSP(s) increase the voltage of the electricity generated by the

WTGs, via the use of transformer(s), which is then transported to shore via export cables. The export cables form part of the Transmission Asset infrastructure which is subject to a separate consent application as part of the Morgan and Morecambe Offshore Wind Farms: Transmission Assets project.

138. Since PEIR, the Applicant has reduced the dimension parameters of the OSP(s) and these are defined in the draft DCO (Document Reference 3.1). The OSP(s) would have a maximum length of 50m and a maximum width of 50m. Similarly, the highest point of the OSP(s) topside structure (excluding helideck and lightening protection) would be 50m above HAT. These amendments would help to reduce seascape and visual impacts when viewed from the shoreline and were influenced by early design and engineering.

139. The final location of the OSP(s) would be decided post-consent. However, as set out in the Design Code **Table 6.1**~~**Table 6.1**~~, the OSP(s) shall be located within the windfarm site, with the exact locations to be determined, with consideration of micro siting allowances agreed in consultation with the ~~MCA(1)~~MCA, including for seascape, landscape and visual impact reasons. The Design Code (**Table 6.1**~~**Table 6.1**~~**)** establishes key control measures for the final design of the OSP(s), which will be subject to approval by the Marine Management Organisation (MMO) under the DML in the draft DCO (Document Reference 3.1).

5.6 Inter-array cables and platform link cables

140. Inter-array cables will connect WTGs in strings, subsequently connecting to the OSP(s). The inter-array cables would be between 66kV and 132kV AC and have a maximum total length of up to 70km.

141. Platform link cables would be necessary if the final design demonstrates that two OSPs are required. The platform link cables would be used to connect the two OSPs and would allow the transfer of generated power to ensure optimal use of transmission capacity. The maximum length of platform link cables would be 10km. If only one OSP is to be constructed, then platform link cables would not be required.

142. The inter-array cables and platform link cables would typically be buried for protection purposes to a target depth of 1.5m, although depth of burial could be between 0.5 and 3m, depending on the ground conditions. The final burial depth would be determined post-consent as confirmed by the results of the Cable Burial Risk Assessment (CBRA) as required by the **DML** in the draft DCO draft DCO (Document Reference 3.1).

143. If burial of inter-array cables or platform link cables is not possible, for example due to unfavourable ground conditions, then cable protection measures would be deployed. Cable protection could include the use of rock placement (e.g. rock berms or gravel bags) or concrete mattresses as set out in the **Cable**

Statement ((Document Reference 5.1.15)). The type of protection to be used would be determined post-consent and is dependent on localised seabed conditions. Cable protection measures would also be deployed at cable crossings to protect cables. A detailed cable specification and installation plan for the authorised project, incorporating a cable burial risk assessment encompassing the identification of any cable protection is secured by the **DML** in the draft DCO (Document Reference 3.1).

144. The routing of the inter-array cables and platform link cables would be determined post-consent, depending on the seabed conditions and the location of WTGs and OSP(s). The Applicant would seek to use the most direct and efficient cable routes to minimise the amount of cabling. This approach is aimed to help minimise electrical losses, seabed and sediment disturbance and keep and installation costs as low as reasonably practicable.

145. The approach taken, as set out above, therefore demonstrates how good design, in the terms described in NPS EN-1 and EN-3, and the Project's Design Principles (Excellence in Safety, Functionality and Adaptability, Synergies and Re-use and Planet Positive considerations), have been brought to bear on design decisions from the outset of the Project and during its evolution.

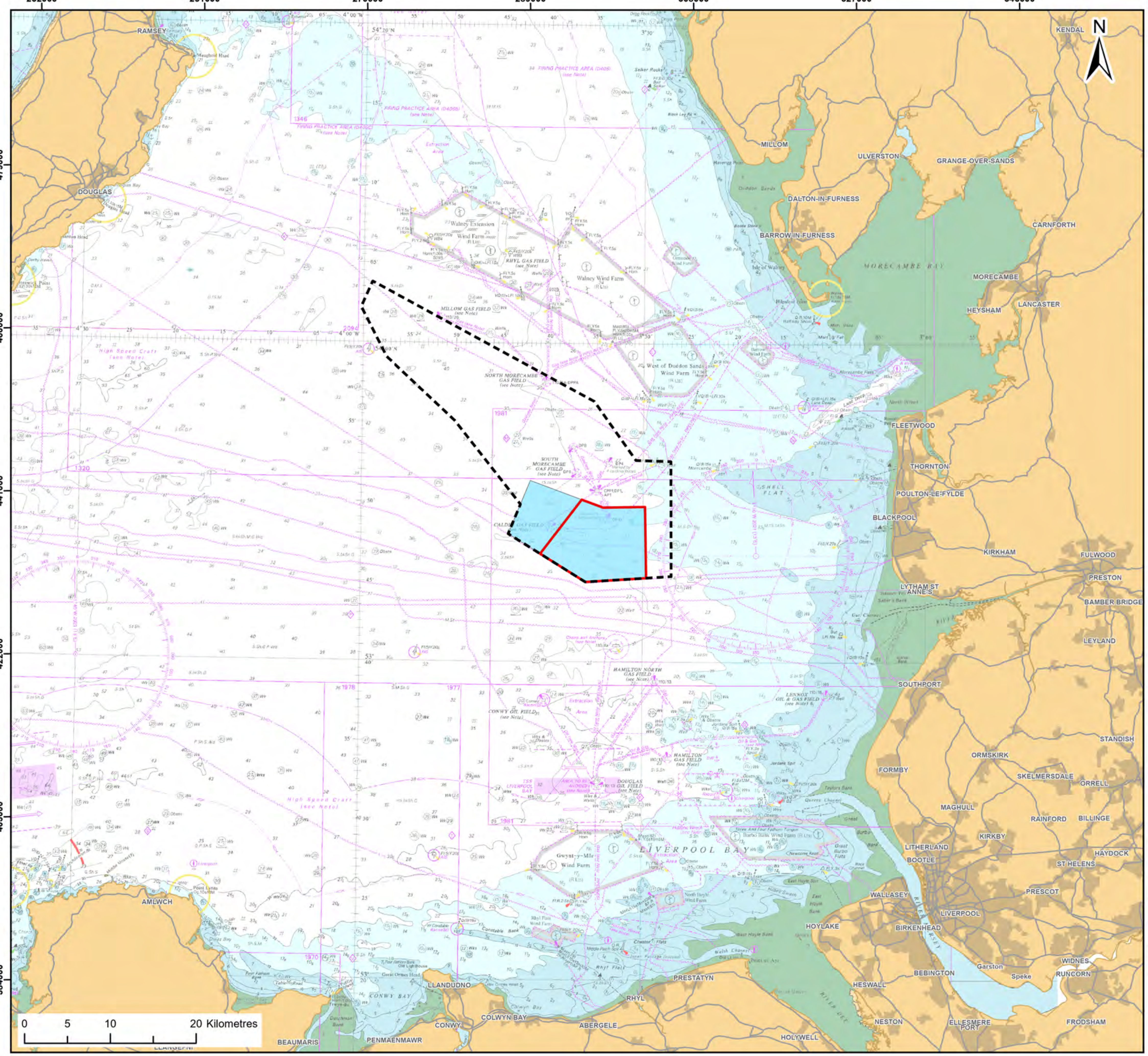
5.7 Shipping, navigation and aviation marking and lighting

146. The Project's design is required to comply with legal requirements with regards to shipping, navigation and aviation marking and lighting as set out in the **Commitments Register** (Document Reference 9.31) and secured by the DML and the Draft DCO (Document Reference 3.1). Marking and lighting of the Project would be undertaken in accordance with relevant industry guidance and as advised by relevant stakeholders. This commitment ensures compliance with lighting and marking requirements but also sets the relevant parameters for the SLVIA of the Project in relation to night-time effects assessment.

147. Marine navigational lights would be fitted at the platform level on significant peripheral structures, synchronised to display IALA (International Association of Marine Aids to Navigation and Lighthouse Authorities) '*special mark'* characteristic, flashing yellow, with a range not less than 5nm. A lighting scheme would be agreed for the aviation lighting of structures (WTGs and OSP(s)) with relevant authorities as set out in the Schedule of Mitigation (Document 5.5). This commitment provides for minimising lighting impacts as far as practicable, whilst ensuring compliance with legal requirements for lighting and marking the Project. Aviation warning lights would have reduced intensity at and below the horizontal and allow a further reduction in lighting intensity when the visibility in all directions from every WTG is more than 5km. These measures will also reduce impacts on bird species.

148. Further information on the legal requirements for shipping, navigation and

aviation marking and lighting is in the Outline Vessel Traffic Management Plan (Document Reference 6.9) and in **Chapter 14 Shipping and Navigation** ((Document Reference 5.1.14)).



Legend:

- Morecambe Offshore Windfarm Site
- Applicants Initial Morecambe Zone
- Morecambe Offshore Windfarm Agreement for Lease area

Report: Morecambe Offshore Windfarm: Generation Assets Design Statement

Title: Area Assessed

Figure: 5.1 | Drawing No: PC1165-RHD-ES-OF-DG-Z-0151

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	01/05/2024	SB	GC	A3	1:450,000
P02	18/02/2025	SM	MI	A3	1:450,000

Co-ordinate system: WGS 1984 UTM Zone 30N

MORECAMBE

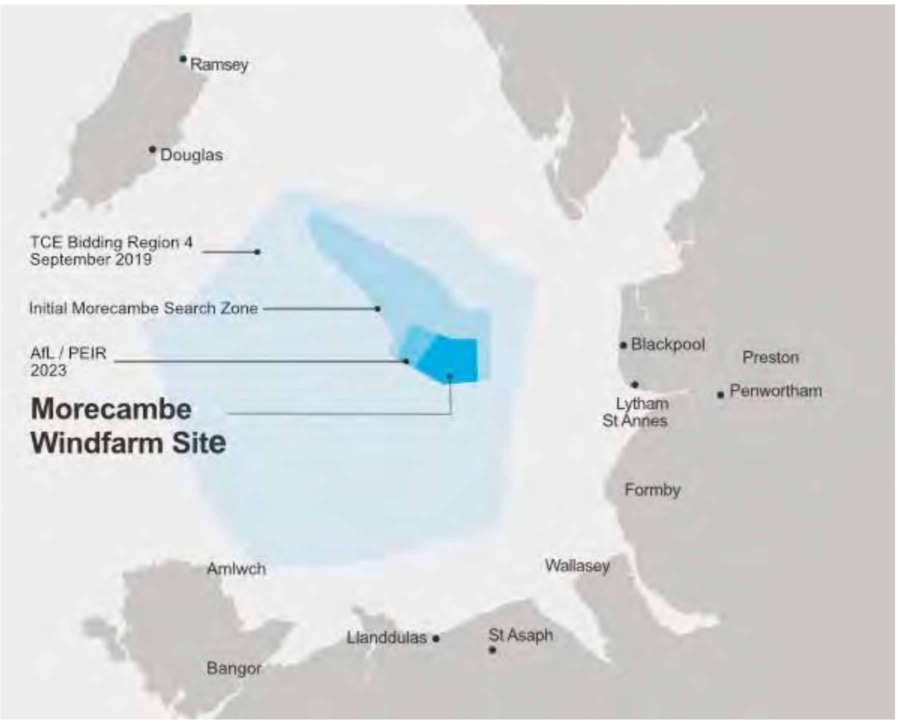


Plate 5.3 Refinement of final Morecambe Offshore Windfarm Site area

6 Securing good design post-consent

6.1 Post-consent design process and governance

149. The Nationally Significant Infrastructure Projects: Advice on Good Design sets out how good design is expected to be achieved post consent.

"The details of the NSIP considered during examination are often not the final as built infrastructure because further design input is required for the reasons set out above. The Examining Authority (ExA) therefore needs to be satisfied that there is evidence that applicants have engaged in and are committed to a process that can deliver good design outcomes, which are specific and proportionate to the type of infrastructure proposed. These need to be secured by the Development Consent Order (DCO) through requirements, conditions, management plans or other certified documents."

150. The DML within the draft DCO (Document Reference 3.1) requires design details to be submitted to and approved in accordance with this document by the MMO prior to the commencement of construction. Condition 9 of the DML in the draft DCO (Document Reference 3.1) specifically requires the Applicant to submit a detailed design plan with the below information in accordance with the Design Statement to the MMO for approval prior to the commencement of any licensed activities:

"(a) design plan (which accords with the design statement) at a scale of between 1:25,000 and 1:50,000, including detailed representation on the most suitably scaled admiralty chart, which is to be submitted at least six months before the intended commencement of licensed activities to be approved in writing by the MMO setting out proposed details of the authorised project,

including the:

number, dimensions, specification, foundation type(s) for each wind turbine generator and offshore substation platform;

the proposed layout of all wind turbine generators and offshore substation platforms (which shall ~~provide for two lines of orientation and otherwise~~ be in accordance with the recommendations for layout contained in MGN654 and its annexes), including grid coordinates of the centre point of the proposed location for each wind turbine generator and offshore substation platform and providing that such centre point is subject to up to 55m micro-siting in any direction unless otherwise agreed in writing with the MMO in consultation with the MCA and Trinity House;

proposed specification and layout of all cables;

location and specification of all other aspects of the authorised project; and

any archaeological exclusion zones or micro-siting requirements relating to any benthic habitats of conservation, ecological or economic importance constituting reef habitats of principal importance as listed under section 41 of the Natural Environment and Rural Communities Act 2006(a)

to ensure conformity with the description of Work No. 1 and Work No. 2 and compliance with conditions 1 and 2"

151. The Condition would also require submission and approval, post-consent, of:

- A construction programme
- A monitoring plan
- An offshore Construction Method Statement (CMS)
- An offshore Project Environmental Management Plan
- An offshore archaeological Written Scheme of Investigation (WSI)
- An Offshore Operations and Maintenance Plan
- An Aids to Navigation Maintenance Plan
- A Marine Mammals Mitigation Protocol
- A Vessle Traffic Management Plan
- Fisheies Liaison and Co-existence Plan.

152. This Design Statement is also a certified document in the draft DCO (Document Reference 3.1) and all parts of the Project will be constructed in accordance with this document.

153. The Project will continue the development of the design of all project elements, including inter-array cables and platform link cables, WTGs, OSP(s) and the layout of the Project windfarm site, in accordance with the PDE. All such design details would be submitted to the MMO for determination prior to commencement of construction.

6.2 Design Champion

154. The Project has appointed senior level executive and Project Director as the Project's design champion. The Design Champion is a Chartered Naval Architect with 20+ years of technical and project delivery experience. This includes the Kincardine OWF project, as well as numerous other projects in the offshore, utilities and renewables sectors. Their current role is to lead the delivery of the Morecambe Project and the other projects in England and the Republic of Ireland.

155. The Design Champion will oversee and advocate for the implementation of the design framework in this document throughout the post consent process.

156. The Design Champion is accountable for delivering good design and holds the project team to account to achieve the Project's vision, objectives, design principles and design code. The Design Champion will guide and champion an iterative design process. In the event that they leave the Project team, a replacement of similar level of seniority will take up the role.

6.3 Post-consent design implementation

157. In order to continue to ensure good design post-consent is embedded within the ongoing development of the Project design, and to guide and oversee this process, the Project will continue to use its design team, including qualified and chartered professional engineers, architects and landscape architects. The design team would continue to work closely as part of a multi-disciplinary team to progress the design in line with the Design Code and principles, including close interface with the supply chain, consenting, environmental, HSEQ and project management teams. This process will be overseen by the Design Champion to ensure good design is embedded within the development of the project design post-consent.

158. The Design Champion will work closely with Package Managers. Together they will ensure that design developed within each Work Package (i.e. foundation structures, WTGs, OSPs and inter-array cables) adheres to the Design Code and good design principles set out within this document.

6.4 Post-consent Design Code

159. The Design Code has been developed by the Project design team in order to provide a basis to maintain good design throughout the process of finalising the detailed design post-consent. Table 6.1 sets out the proposed Design Code items and corresponding Design Principles to which they give effect. All items in the Design code are secured by the draft DCO (Document Reference 3.1), including DML.

Table 6.1 Post-consent Design Code

No.	Project Element	Design Code Item	Measures secured in dDCO / considered in the Environmental Statement	Relevant Preliminary Design Principle(s)
DC1	General	The design of all elements of the Project shall comply with the parameters of the Authorised Development in Part 1 of Schedule 1, and Requirement 2 (Design Parameters) of Part 1 of Schedule 2 and all other provisions of the draft DCO (Document Reference 3.1), including DML, shall also apply.	Draft DCO (Document Reference 3.1)	*General*
DC2	Layout	Any tolerance / micro siting applied will not reduce SAR lanes below 500m minimum width and will remain consistent with the parameters of the DCO including the Order Limits) and in accordance with MGN654 and its Annex 4: Guidance: Offshore renewable energy installations: impact on shipping.	Part 2 of Schedule 6 of the draft DCO (Document Reference 3.1)	*Functionality & Adaptability*
DC3	Layout	The layout of WTGs shall be arranged in at least two consistent lines of orientation, and all parts of WTGs/OSP(s) shall be located within the windfarm, with the exact locations to be determined, with consideration of up to 55m micro siting allowances agreed in consultation with the ~~MCA(1)~~MCA and Trinity House~~, including for seascape, landscape and visual impact reasons~~. The spacing between these straight lines shall comply with MGN654 and its annexes (i.e. SAR lanes will be at least 500 metres in width tip to tip).	Part 2 of Schedule 6 of the draft DCO (Document Reference 3.1)	*Planet Positive*
DC4	Layout	The position of all structures along the perimeter will be arranged, per the standards set out in MGN654 and its annexes, in order to aid visual navigation and to avoid outliers as far as is practicable within the shape of the Project site boundary.	Part 2 of Schedule 6 of the draft DCO (Document Reference 3.1)	*Excellence in Safety*
DC5	OSP design	The OSP(s) provide a centralised connection point for the inter-array cable circuits and contain primary electrical equipment, and ancillary components, that are required to transform the voltage of the electricity generated at the WTGs to a higher voltage suitable for transporting power to the onshore electrical transmission network.	Part 1 of Schedule 6 of the draft DCO (Document Reference 3.1)	*Planet Positive*

No.	Project Element	Design Code Item	Measures secured in dDCO / considered in the Environmental Statement	Relevant Preliminary Design Principle(s)
DC6	WTG and OSP design	The design of WTGs and OSP(s) will adhere to safety and design standards set out in MGN654 and its Annex 4: Guidance: Offshore renewable energy installations: impact on shipping.	Part 2 of Schedule 6 of the draft DCO (Document Reference 3.1)	*Excellence in Safety*
DC7	WTG	The air gap between sea level conditions at HAT and WTG rotors shall not be less than 25 metres.	Schedule 2 of the draft DCO (Document Reference 3.1)	*Excellence in Safety* *Functionality & Adaptability* *Planet Positive*
DC8	WTG	The final WTG chosen will be consistent throughout the site (i.e. no mix of options selected for the final design).	Schedule 2 of the draft DCO (Document Reference 3.1)	*Synergies and reuse* *Planet Positive*
DC9	WTG	The WTG colour scheme for nacelles, blades and towers are to be in accordance with Trinity House requirements. Foundation colours are expected to be traffic yellow and in accordance with Trinity House requirements.	Part 2 of Schedule 6 of the draft DCO (Document Reference 3.1)	*Excellence in Safety*
DC10	Inter-array cables and platform link cables	Inter-array cables and platform link cables shall follow the most efficient route and minimise the use of cable protection as far as practicable.	**Chapter 5 Project Description** (Document Reference 5.1.5) Sections 5.5.4 & 5.5.6	*Functionality & Adaptability* *Planet Positive*
DC11	Marking and lighting	Marking and lighting of the Project would be undertaken in accordance with relevant industry guidance and as advised by relevant stakeholders.	**Chapter 5 Project Description** (Document Reference 5.1.5) Section 5.5.5	*Excellence in Safety*

No.	Project Element	Design Code Item	Measures secured in dDCO / considered in the Environmental Statement	Relevant Preliminary Design Principle(s)
DC12	Marking and lighting	Aviation warning lights would have reduced intensity at and below the horizontal and allow a further reduction in lighting intensity when the visibility in all directions from every WTG is more than 5km.	**Chapter 5 Project Description** (Document Reference 5.1.5) Section 5.5.5	*Excellence in Safety*
DC13	Marking and lighting	Marine navigational lights would be fitted at the platform level on significant peripheral structures, synchronised to display (International Association of Marine Aids to Navigation and Lighthouse Authorities) 'special mark' characteristic, flashing yellow, with a range not less than 5nm.	**Chapter 5 Project Description** (Document Reference 5.1.5) Section 5.5.5	*Excellence in Safety*
DC14	Cabling	Subsea cables are to be fully buried where feasible; where not, protection will be applied to ensure safety and stability	**Chapter 5 Project Description** (Document Reference 5.1.5) Section 5.5.4	*Excellence in Safety* *Functionality & Adaptability* *Planet Positive*
~~DC15~~	~~Cabling~~	~~The cabling route will use the most direct and efficient routes to minimise the amount of cabling.~~	~~**Cable Statement** ((Document Reference 4.2))~~	~~*Functionality & Adaptability*~~ ~~*Planet Positive*~~
DC1~~5~~6	Technology	The detailed design will seek to use the latest technology in line with the most up to date regulations and the most cost-effective solutions where possible.	**Planning, Development Consent and Need Statement** (Document Reference 4.8) Section 2.2.1	*Functionality & Adaptability*
DC1~~6~~7	Seabed preparation	The layout of the Project will seek to minimise seabed preparation where possible.	**Chapter 5 Project Description** (Document Reference 5.1.5) Section 5.6.2.3	*Synergies and reuse*

No.	Project Element	Design Code Item	Measures secured in dDCO / considered in the Environmental Statement	Relevant Preliminary Design Principle(s)
DC178	Resilience	The Project would be designed with sufficient safety margins for extreme weather events such as storm surges and high winds.	**Chapter 21 Climate Change** (Document Reference 5.1.21)	*Climate*
DC189	Climate	Measures to reduce greenhouse gas emissions during the lifetime of the Project will be captured through the implementation of standard carbon management processes and best practice measures.	**Chapter 21 Climate Change** (Document Reference 5.1.21) Section 21.7	*Climate*
DC1920	Climate	Low-carbon solutions (including technologies, materials and products) will be utilized where possible to minimise resource consumption and embodied carbon during the construction, operation and maintenance, and at end-of life.	**Chapter 21 Climate Change** (Document Reference 5.1.21) Section 21.3.3.1	*Climate* *Planet positive*
DC201	Resilience	The Project will be designed to be resilient to hazards arising from extreme weather events and climatic conditions and adapted to future climate change impacts where appropriate.	**Chapter 21 Climate Change** (Document Reference 5.1.21) Section 21.3.3.2	*Climate*
DC212	Marine archaeology	Identifiable known heritage assets are protected by Archaeological Exclusion Zones and non visible known heritage assets are protected by temporary exclusion zones	**Chapter 15 Marine Archaeology and Cultural Heritage** (Document Reference 5.1.15) Section 15.3.3	*Excellence in Safety* *Planet positive*
DC223	Marine archaeology	Potential heritage assets are avoided through micro siting of infrastructure. The process is managed through an Offshore WSI.	**Chapter 15 Marine Archaeology and Cultural Heritage** (Document Reference 5.1.15) Section 15.3.3 Outline Offshore WSI (Document Reference 6.10)	*Excellence in Safety* *Planet positive*

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