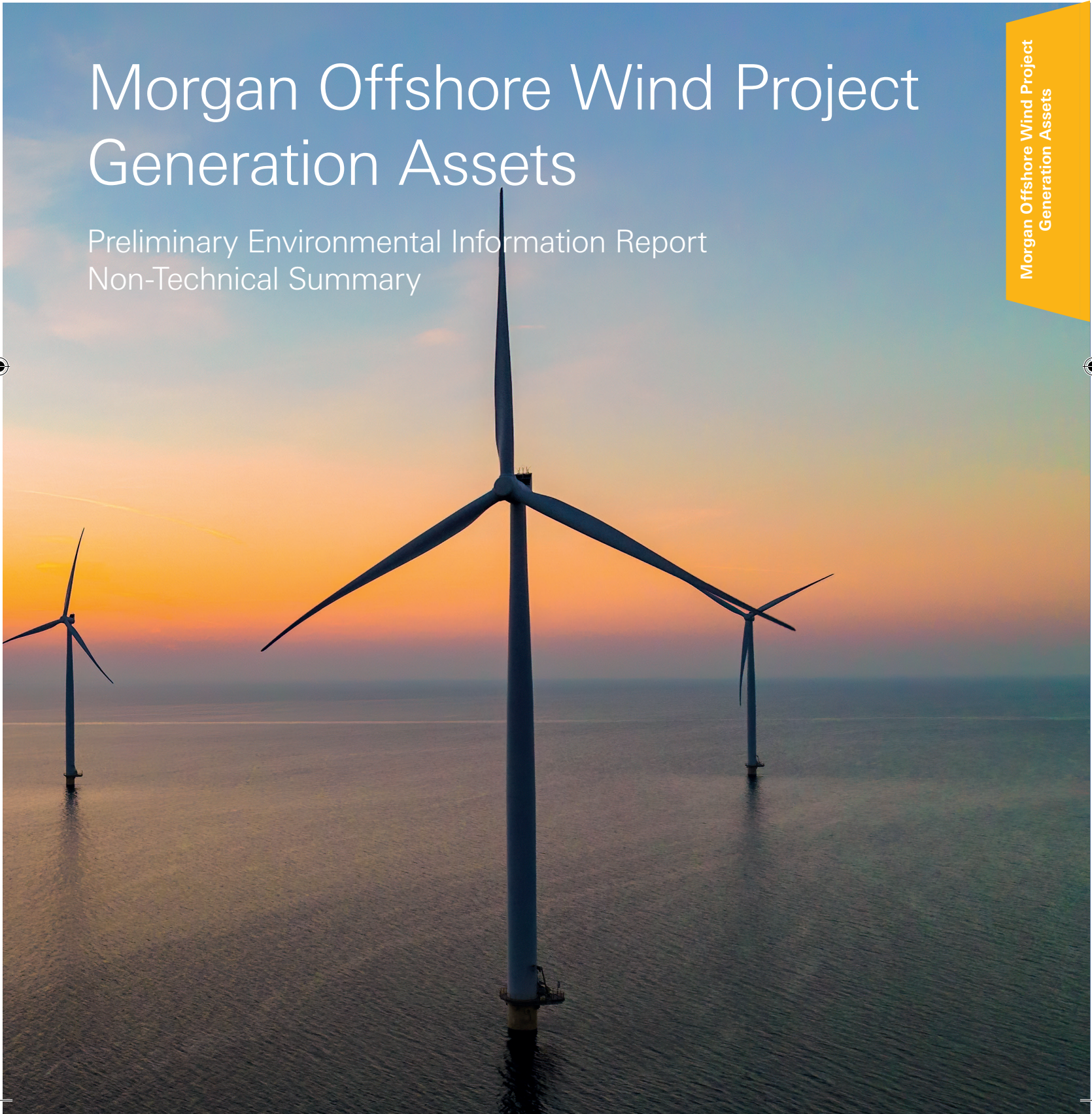




Morgan Offshore Wind Project
Generation Assets

Morgan Offshore Wind Project Generation Assets

Preliminary Environmental Information Report
Non-Technical Summary





Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
Rev0	Draft for Client Review	RPS	bpEnBW		16/12/2022
Rev02	Addressing client comments	RPS	bpEnBW		01/03/2023
Rev03	Final	RPS	bpEnBW	bpEnBW	23/03/2023

The report has been prepared for the exclusive use and benefit of our client and solely for the purpose for which it is provided. Unless otherwise agreed in writing by RPS Group Plc, any of its subsidiaries, or a related entity (collectively 'RPS') no part of this report should be reproduced, distributed or communicated to any third party. RPS does not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report. The report does not account for any changes relating to the subject matter of the report, or any legislative or regulatory changes that have occurred since the report was produced and that may affect the report.

The report has been prepared using the information provided to RPS by its client, or others on behalf of its client. To the fullest extent permitted by law, RPS shall not be liable for any loss or damage suffered by the client arising from fraud, misrepresentation, withholding of information material relevant to the report or required by RPS, or other default relating to such information, whether on the client's part or that of the other information sources, unless such fraud, misrepresentation, withholding or such other default is evident to RPS without further enquiry. It is expressly stated that no independent verification of any documents or information supplied by the client or others on behalf of the client has been made. The report shall be used for general information only.

Prepared by:
RPS

Prepared for:
Morgan Offshore Wind Ltd.





Contents

1 Non-technical summary	01	1.7 Potential environmental effects	22
1.1 Introduction	01	1.7.1 Physical processes	22
1.1.1 Purpose of this document	01	1.7.2 Benthic subtidal ecology	24
1.1.2 Introduction to the Morgan Generation Assets	02	1.7.3 Fish and shellfish ecology	26
1.1.3 Structure of the Preliminary Environmental Information Report	04	1.7.4 Marine mammals	28
1.1.4 About the Applicant	04	1.7.5 Offshore ornithology	30
1.1.5 How you can get involved	04	1.7.6 Commercial fisheries	32
1.2 Need for the Morgan Generation Assets	06	1.7.7 Shipping and navigation	34
1.2.1 Climate change and renewable energy	06	1.7.8 Marine archaeology	38
1.3.1 Policy and legislation	07	1.7.9 Other sea users	40
1.3.2 Consenting regime	07	1.7.10 Aviation and radar	41
1.4.1 Project description	08	1.7.11 Climate change	42
1.4.2 Infrastructure overview	08	1.7.12 SLVIA	44
1.4.3 Pre-construction site investigation surveys	10	1.7.13 Socio-economics	46
1.4.4 Wind turbines	10	1.7.14 Human health	48
1.4.5 Offshore Substation Platforms	10	1.7.15 Inter-related effects	50
1.4.6 Foundations for wind turbines and OSPs	12	1.8 Next steps	51
1.4.7 Operations and maintenance phase	12	1.9 References	52
1.4.8 Decommissioning phase	12	Notes	53
1.5 Site selection and alternatives	14	Tables	
1.5.1 Overview	14	Table 1.1 Maximum design parameters: wind turbines	10
1.5.2 Identification of the Morgan Array Area	14	Table 1.2 Foundation options for wind turbines and OSPs	12
1.5.3 Next steps	14	Table 1.3 Matrix used for the assessment of the significance of the effect	20
1.6 Environmental Impact Assessment methodology	16	Figures	
1.6.1 Overview	16	Figure 1.1 Location of the Morgan Generation Assets	05
1.6.2 Approach to EIA	17	Figure 1.2 Overview of the Morgan Generation Assets infrastructure	09
1.6.3 Consultation and scoping	18	Figure 1.3 Schematic of an monopile foundation design	13
1.6.4 Design envelope approach	19	Figure 1.4 Schematic of a pin pile jacket foundation	13
1.6.5 Mitigation and the iterative design process	19	Figure 1.5 Schematic of a suction bucket jacket foundation	13
1.6.6 Assessment of effects	20	Figure 1.6 Schematic of a gravity base foundation	13
1.6.7 Cumulative Effect Assessment	21		
1.6.8 Transboundary effects	21		
1.6.9 Inter-related effects	21		



Glossary

Terminology

Term	Meaning
Applicant	Morgan Offshore Wind Limited.
Candidate Special Areas of Conservation (cSACs)	SACs that were submitted to the European Commission before the end of the Transition Period following the UK's exit from the European Union (EU), but not yet formally designated. See also Special Areas of Conservation (SAC).
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Project (NSIP).
Environmental Statement	The document presenting the results of the Environmental Impact Assessment (EIA) process for the Morgan Generation Assets.
European Protected Species (EPS)	European Protected Species (such as bats, great crested newts, otters and dormice) receive full protection under The Conservation of Species and Habitats Regulations 2017.
Marine licence	The Marine and Coastal Access Act 2009 requires a marine licence to be obtained for licensable marine activities. Section 149A of the Planning Act 2008 allows an applicant for a DCO to apply for 'deemed marine licences' as part of the DCO process.
Marine spatial planning	A public process of analysing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic and social objectives that have been specified through a political process.
Maximum design scenario	The scenario within the design envelope with the potential to result in the greatest impact on a particular topic receptor, and therefore the one that should be assessed for that topic receptor.
Morgan Array Area	The area within which the wind turbines, foundations, inter-array cables, interconnector cables, offshore export cables and offshore substation platforms (OSPs) forming part of the Morgan Offshore Wind Project will be located.
Morgan Offshore Wind Project Generation Assets	The Morgan Generation Assets is comprised of both the generation assets and offshore and onshore transmission assets and associated activities.



Terminology

Term	Meaning
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 (OSPs), interconnector cables, Morgan offshore booster station, offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
Morgan Scoping Report	The Morgan Scoping Report that was submitted to The Planning Inspectorate (on behalf of The Secretary of State for Energy, Security and Net Zero) for the Morgan Generation Assets.
National Policy Statements (NPSs)	The current national policy statements published by the Department of Energy and Climate Change in 2011.
Offshore Wind Leasing Round 4	The Crown Estate auction process which allocated developers preferred bidder status on areas of the seabed within Welsh and English waters and ends when the Agreements for Lease (AfLs) are signed.
Ramsar	The Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat is an international treaty for the conservation and sustainable use of Ramsar sites.
Special Areas of Conservation (SACs)	A site designation specified in the Conservation of Habitats and Species Regulations 2017. Each site is designated for one or more of the habitats and species listed in the Regulations. The legislation requires a management plan to be prepared and implemented for each SAC to ensure the favourable conservation status of the habitats or species for which it was designated. In combination with SPAs and Ramsar sites, these sites contribute to the national site network.
Special Protection Areas (SPAs)	A site designation specified in the Conservation of Habitats and Species Regulations 2017, classified for rare and vulnerable birds, and for regularly occurring migratory species. SPAs contribute to the national site network.
The Planning Inspectorate	The executive agency of the Department for Communities and Local Government responsible for operating the planning process for NSIPs.
Secretary of State for the Department of Energy Security and Net Zero (formerly the Department for Business, Energy and Industrial Strategy (BEIS))	The Department for Energy Security and Net Zero (DESNZ) is focused on the energy portfolio from the former Department for Business, Energy and Industrial Strategy (BEIS) and is responsible for delivering security of energy supply, ensuring properly functioning energy markets, encouraging greater energy efficiency and seizing the opportunities of net zero to lead the world in new green industries



Glossary

Acronyms

Acronym	Description
AEZ	Archaeological Exclusion Zones
AfL	Agreement for Lease
ALARP	As Low as Reasonably Practicable
BEIS	Department for Business, Energy and Industrial Strategy
CAA	Civil Aviation Authority
CAS	Controlled Airspace
CEA	Cumulative Effect Assessment
CRNRA	Cumulative Regional Navigational Risk Assessment
cSAC	Candidate Special Area of Conservation
DCO	Development Consent Order
eDNA	Environmental Deoxyribonucleic Acid
EEA	European Economic Area
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EU	European Union
EWG	Expert Working Group
GHG	Greenhouse Gas
GVA	Gross Value Added
HMRI	Helicopter Main Route Indicators
HVAC	High Voltage Alternating Current

Acronym	Description
ISAA	Information to Support the Appropriate Assessment
JNCC	Joint Nature Conservation Committee
LAT	Lowest Astronomical Tide
MCA	Marine Character Area
MCZ	Marine Conservation Zone
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MSL	Mean Sea Level
NMRW	National Monuments Record of Wales
NPS	National Policy Statement
NRA	Navigation Risk Assessment
NSIP	Nationally Significant Infrastructure Project
NTS	Non-Technical Summary
OSP	Offshore Substation Platform
PAD	Protocol for Archaeological Discoveries
PEIR	Preliminary Environmental Information Report
PEXA	Practice and Exercise Areas
PRoW	Public Right of Way
pSPA	Potential Special Protected Area
PSR	Primary Surveillance Radar



Acronyms

Acronym	Description
REWS	Radar Early Warning Systems
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SCI	Site of Community Importance
SLVIA	Seascape Landscape and Visual Impact Assessment
SNCB	Statutory Nature Conservation Body
SPA	Special Protected Area
SSC	Suspended Sediment Concentrations
SSZ	Seascape Sensitivity Zone
TCE	The Crown Estate
TWT	The Wildlife Trusts
UXO	Unexploded Ordnance
WHS	World Heritage Site
WSI	Written Scheme of Investigation

Units

Unit	Description
%	Percentage
°C	Degrees Celsius
nm	Nautical miles
km²	Square kilometres
mg/l	Milligrams per litre
m/s	Metres per second
MW	Megawatt







1 Non-Technical Summary

1.1 Introduction

1.1.1 Purpose of this document

1.1.1.1 Morgan Offshore Wind Ltd (hereafter referred to as the Applicant), a joint venture of bp Alternative Energy Investments Ltd (hereafter referred to as bp) and Energie Baden-Württemberg AG (hereafter referred to as EnBW), is developing the Morgan Offshore Wind Project Generation Assets (hereafter referred to as the Morgan Generation Assets). The Morgan Generation Assets are a proposed wind farm located in the east Irish Sea (Figure 1.1) and comprise only wind turbines, Offshore Substation Platforms (OSPs) and cabling in the Morgan Array Area. The electrical connection that transports electricity from the Morgan Generation Assets to an onshore substation will form part of a separate application.

1.1.1.2 This document is a Non-Technical Summary (NTS) of the Preliminary Environmental Information Report (PEIR) prepared for the Morgan Generation Assets. The PEIR constitutes the preliminary environmental information for the Morgan Generation Assets and sets out the findings of the Environmental Impact Assessment (EIA) to date to support the pre-application consultation activities required under the Planning Act 2008 (the 2008 Act). The EIA will be finalised following completion of pre-application consultation and the Environmental Statement. The final EIA together with an updated NTS will accompany the application for consent.

1.1.1.3 This NTS is intended to act as a stand-alone document that provides an overview of the Morgan Generation Assets and its likely significant effects in non-technical language. For more detailed information, the full PEIR should be referred to (www.morganandmona.com/en).



1.1.2 Introduction to the Morgan Generation Assets

1.1.2.1 Offshore Wind Leasing Round 4 was instigated by The Crown Estate (TCE) in September 2019, and four Bidding Areas were identified for the development of offshore wind. As part of a competitive tender, bp and EnBW have secured two 60-year leases within the Wales and Irish Sea Bidding Area for the Mona Offshore Wind Project and the Morgan Offshore Wind Project. The Bidding Areas are areas of the seabed identified by TCE as offering the least constrained (most technically favourable) areas for offshore wind development.

1.1.2.2 The Morgan Offshore Wind Project was scoped into the Pathways to 2030 workstream under the Offshore Transmission Network Review (OTNR). The OTNR aims to consider, simplify and wherever possible facilitate a collaborative approach to offshore wind projects connecting to the UK National Grid. The OTNR is being led by the Department for Energy Security and Net Zero (formerly the Department for Business, Energy and Industrial Strategy (BEIS)) in conjunction with the Office of Gas and Electricity Markets (OFGEM) and the National Grid Electricity System Operator (NGESO). Under the OTNR, the NGESO is responsible for assessing options to improve the coordination of offshore wind generation connections and transmission networks. As part of the OTNR, the NGESO undertook a Holistic Network Design Review (HNDR). The output of the HNDR has concluded that the Morgan Offshore Wind Project will share a grid connection location at Penwortham in Lancashire with the Round 4 Morecambe Offshore Windfarm, also located in the east Irish Sea. The projects are being developed by separate companies, which means it is not feasible for all aspects of both projects to be consented under a single application. The Applicant agrees with the outcome of the HNDR and will progress a DCO application with the Morecambe Offshore Windfarm for the two electrically separate grid connections. This will include the sharing of offshore and onshore export cable corridors and a grid connection location at Penwortham.

1.1.2.3 Given the coordinated grid connection arrangements, the consenting strategy for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm is as follows:

- A stand-alone Development Consent Order (DCO) application to consent the construction, operations and maintenance, and decommissioning of the generation assets of the Morgan Offshore Wind Project
- A stand-alone DCO application to consent the construction, operations and maintenance, and decommissioning of the generation assets of the Morecambe Offshore Windfarm
- A stand-alone application to consent the construction, operations and maintenance and decommissioning of the transmission assets required to enable the export of electricity from both the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the National Grid entry point at Penwortham.

1.1.2.4 This PEIR, and associated NTS, is for the generation assets of the Morgan Offshore Wind Project.



1.1.3 Structure of the Preliminary Environmental Information Report

1.1.3.1 The PEIR is divided into four volumes:

- Volume 1: Introduction
- Volume 2: Offshore chapters
- Volume 3: Introduction annexes
- Volume 4: Offshore annexes.

1.1.4 About the Applicant

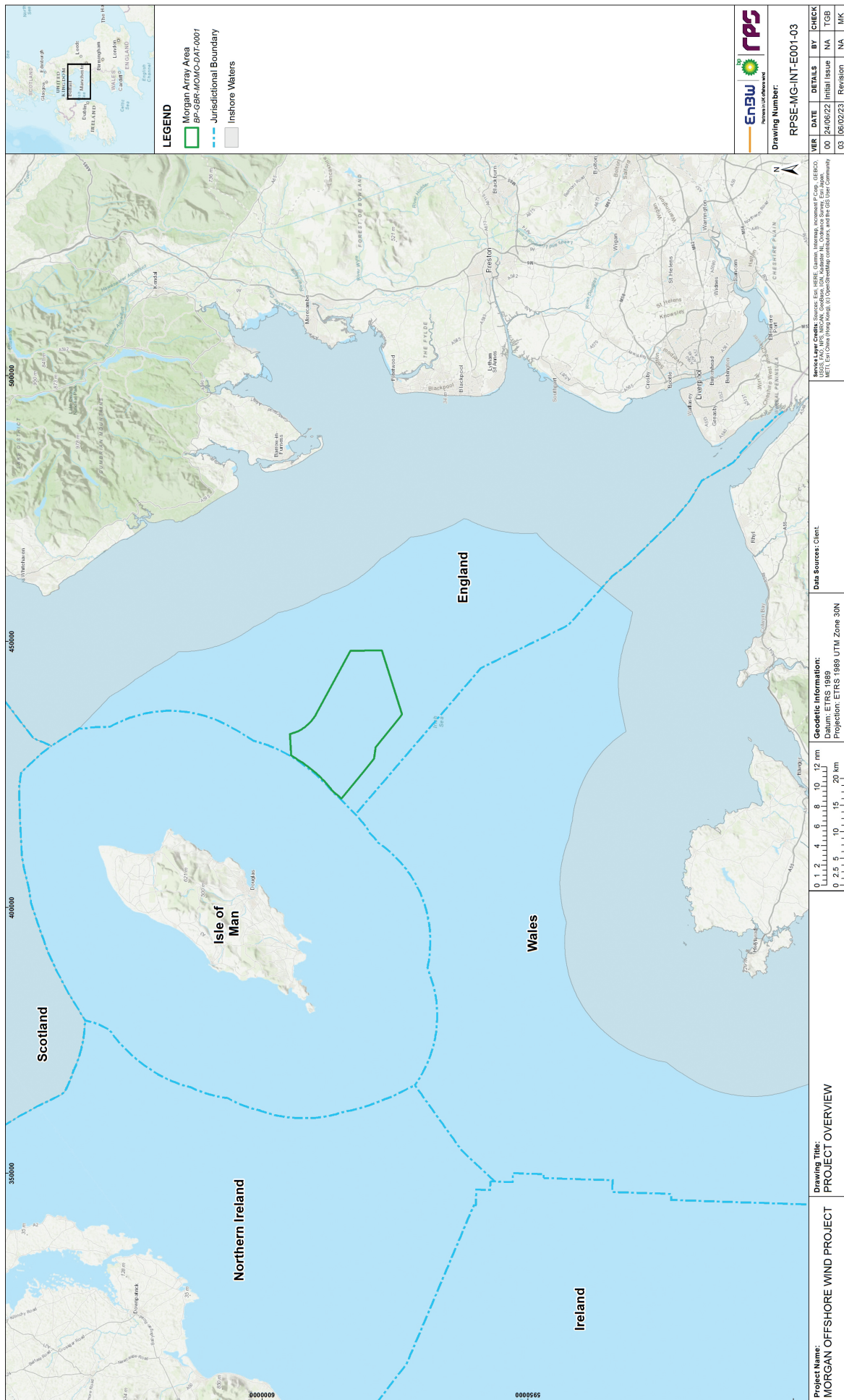
1.1.4.1 The Applicant is a joint venture between bp and EnBW, two leading energy companies. These two companies are working together as partners to deliver offshore wind projects in the UK.

- bp has set out an ambition to be a net zero company by 2050, or sooner. This strategy will see bp transform from an international oil company producing oil and gas, to an integrated energy company providing broader energy solutions to customers
- EnBW is one of the largest energy supply companies in Germany and supplies electricity, gas, water and energy solutions and energy industry services to around 5.5 million customers with a workforce of more than 23,000 employees. EnBW aims to strengthen its position as a sustainable and innovative infrastructure partner for customers, citizens and local authorities.

1.1.5 How you can get involved

1.1.5.1 This PEIR is intended to allow those taking part in the consultation to understand the nature, scale, location and likely significant effects of the Morgan Generation Assets, such that they can make an informed contribution to the process of pre-application consultation under the 2008 Act and to the EIA process. It is important to note that the PEIR contains preliminary information. The Applicant will be actively seeking feedback on the PEIR from statutory consultees and interested parties. Information on how you can get involved is outlined in section 1.8.

Figure 1.1: Location of the Morgan Generation Assets.



1.2 Need for the Morgan Generation Assets

1.2.1 Climate change, and renewable energy

1.2.1.1 The UK government has an ambition to generate 50GW of clean, renewable energy from offshore wind by 2030. Figures released by BEIS in December 2022 show that the UK currently has 13.1GW of installed offshore wind capacity in the UK. There is some way to go to meet the target. The Morgan Generation Assets therefore have a critical role to play, both in helping the UK to achieve its net zero ambitions, and specifically, in reaching our offshore wind generation goals.

1.2.1.2 The UK's ambition is 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. At the centre of this drive is a commitment to reducing UK greenhouse gas (GHG) emissions and reaching net zero. Under the Climate Change Act 2008, the UK committed to a net reduction in GHG emissions of 80% by 2050 against the 1990 baseline in line with the commitments of the Kyoto Protocol. In June 2019, secondary legislation (the Climate Change Act 2008 (2050 Target Amendment) Order 2019) was passed that extended that target to at least 100% against the 1990 baseline. In order for the UK to meet these ambitions it needs to work with developers to support proposals to produce clean, renewable energy within the UK. As the Morgan Generation Assets are planned to be operational by 2030 it would significantly contribute to meeting these ambitions.

1.2.1.3 On 7 April 2022, the UK Government published its British energy security strategy (BEIS and Prime Minister's Office, 2022). The strategy builds on the UK net zero target, placing a heavy reliance on a renewable and low carbon energy supply with a view to "bring clean, affordable, secure power to the people for generations to come...". The strategy plans to accelerate delivery of offshore wind by developing an Offshore Wind Acceleration Task Force to work on reducing the consenting and delivery times for offshore wind projects and fast tracking priority projects. Specifically, the strategy states an ambition to deliver up to 50GW of offshore wind by 2030, an increase on previous targets of 40GW. The Morgan Generation Assets would bring clean, affordable, secure power to millions of homes and be a key project to deliver 50GW of offshore wind by 2030.

1.2.1.4 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).



1.3.1 Policy and legislation

1.3.1.1 This section provides a summary of the policy and legislative context for the Morgan Generation Assets with reference to the consenting process, including details of the Planning Act 2008 and associated planning policy.

1.3.1.2 Policy and legislation specific to individual environmental topics and EIA are set out within each topic chapter of this PEIR.

1.3.2 Consenting regime

1.3.2.1 The Morgan Generation Assets require consent under the Planning Act 2008, as amended. This section provides a summary of the consenting process and describes the legal requirements for EIA.

1.3.2.2 An EIA is required for the assessment of the effects of certain projects on the environment under EU Directive 2011/92/EU (as amended by Directive 2014/52/EU) (the EIA Directive). The EIA Directive is transposed into English law for Nationally Significant Infrastructure Projects (NSIPs) by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

1.3.2.3 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) and the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) set out the requirements for EIA under the Planning Act 2008 (in compliance with the EIA directive) and the Marine and Coastal Access Act 2009 respectively.

1.3.2.4 The EIA ensures that the decision maker has enough information on the likely significant effects on the environment arising from a project. The approach to EIA for the Morgan Generation Assets is set out in section 1.6.

Habitats Regulations

1.3.2.5 The Conservation of Habitats and Species Regulations 2017 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) require the assessment of significant effects on internationally important nature conservation sites where these may arise as a result of a project. These internationally important sites include Special Areas of Conservation (SACs), or candidate SACs (cSACs), Special Protection Areas (SPAs) or potential SPAs (pSPAs), sites of community importance (SCI) and Ramsar sites. The assessment is to be undertaken by the 'competent authority', which in the case of the Morgan Generation Assets is the Secretary of State for the Department for Energy Security and Net Zero (formerly BEIS).

1.3.2.6 In order to carry out the Habitats Regulations Assessment (HRA), the competent authority requires a report to be submitted alongside the application for development consent that provides the information required to undertake the Appropriate Assessment. A Draft Information to Support Appropriate Assessment (ISAA) is provided alongside this PEIR. The ISAA will be finalised following completion of pre-application consultation and will accompany the application to the Secretary of State for development consent.



1.4.1 Project description

1.4.1.1 This section of the NTS provides an outline description of the design of the infrastructure and activities associated with the construction, operations and maintenance, and decommissioning of the Morgan Generation Assets.

1.4.1.2 It is important to note that the Morgan Generation Assets are in the early stages of the development process, therefore the project description is indicative and has been designed to include flexibility to accommodate further project refinement during detailed design, post consent. Offshore wind is a continually evolving industry with a constant focus on cost reduction, therefore improvements in technology and construction methodologies occur frequently and flexibility is required to allow for the adoption of new technology and methods.

1.4.2 Infrastructure overview

1.4.2.1 The Morgan Array Area (i.e. the area within which the offshore wind turbines (up to 107) and OSPs will be located) is 322.2km² in area and is located 22.3km (12nm) from the Isle of Man coastline, and 36.3km (19.6nm) from the northwest coast of England (when measured from Mean High Water Springs (MHWS)). The Morgan Array Area is located wholly within English offshore waters (beyond 12nm from the English coast) (Figure 1.1).

1.4.2.2 The key components of the Morgan Generation Assets include:

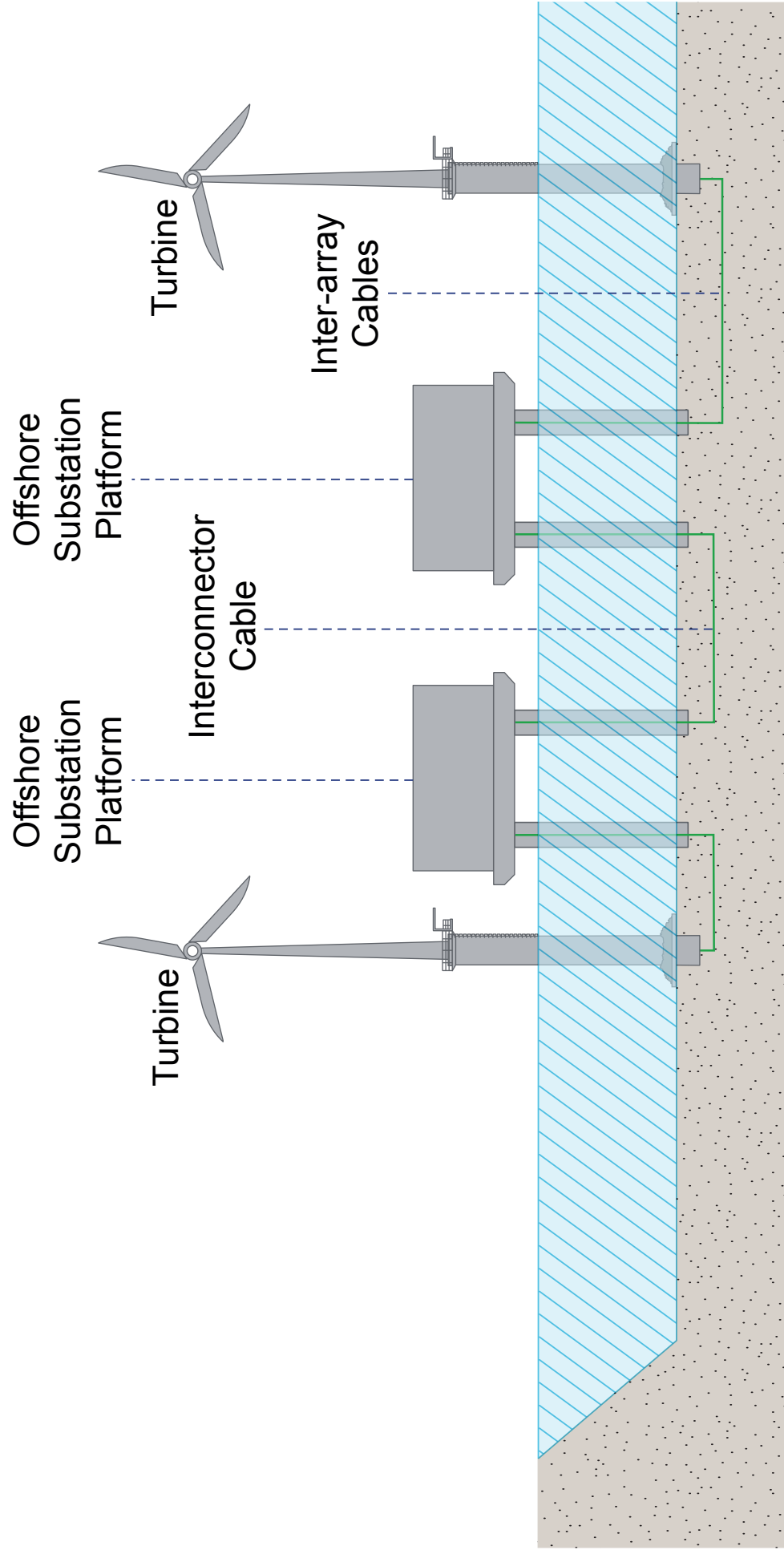
- Offshore wind turbines
- Foundations (for wind turbines and OSPs)
- Inter-array cables linking the individual wind turbines to the OSPs
- Scour protection for foundations and cables where required
- High Voltage Alternating Current (HVAC) transmission system components including:
 - OSPs
 - Offshore interconnector cable(s) between the OSPs.

1.4.2.3 The key components of the Morgan Generation Assets are shown in Figure 1.2.

1.4.2.4 Construction of the Morgan Generation Assets is anticipated to commence in 2026 and the project to be fully operational by 2030 in order to provide a vital contribution to the UK Government's renewable energy targets.



Figure 1.2: Overview of the Morgan Generation Assets infrastructure.



1.4.3 Pre-construction site investigation surveys

1.4.3.1 In addition to the work carried out to date, pre-construction site investigation surveys will be undertaken to provide detailed information on seabed conditions and to identify the presence/absence of any potential obstructions or hazards. Pre-construction site investigation surveys are likely to include geophysical and geotechnical surveys which will be conducted within, and in the vicinity of, the footprint of the wind turbines and OSPs.

1.4.4 Wind turbines

1.4.4.1 The Morgan Generation Assets will consist of up to 107 wind turbines, with the final number of wind turbines determined during the post-consent detailed design phase (see Table 1.1). The wind turbines will follow the traditional wind turbine design with a horizontal rotor axis with three blades.

Parameter	Smallest wind turbine	Largest wind turbine
Number of turbines	107	68
Minimum height of lowest blade tip above Lowest Astronomical Tide (LAT) (m)	34	34
Maximum blade tip height above LAT (m)	293	324
Maximum rotor blade diameter (m)	250	280

Table 1.1: Maximum design parameters: wind turbines

1.4.5 Offshore Substation Platforms

1.4.5.1 The OSPs will contain the equipment required to transform electricity generated at the wind turbines to a higher voltage for transportation onshore. They may also house secondary equipment and facilities for operating, maintaining and controlling the OSP. They are likely to have one or more decks, a helicopter platform, cranes and communication antenna.

1.4.5.2 Up to four separate OSPs will be required and they will all be located within the Morgan Array Area. The exact locations will be determined during the post-consent detailed design phase. Locations will take into account the ground conditions and the most efficient cable routing amongst other considerations. OSPs are generally constructed by installing the foundation structure, then the substation itself will be lifted from a transport vessel/barge onto the foundation.



1.4.6 Foundations for wind turbines and OSPs

1.4.6.1 The wind turbines and OSPs will be attached to the seabed by foundation structures. The Applicant requires flexibility in foundation choice to ensure that anticipated changes in available technology can be accommodated within the Morgan Generation Assets final design.

1.4.6.2 The foundation types that are being considered for the Morgan Generation Assets are shown in Table 1.2 and Figure 1.3 to Figure 1.6.

Foundation option	Wind turbines	OSP's
Maximum number of structures	107	4
Monopile	Yes	Yes
Pin piled 3-legged Jacket	Yes	Yes
Pin piled 4-legged Jacket	Yes	Yes
Pin piled 6-legged Jacket	No	Yes
Suction bucket 3-legged Jacket	Yes	Yes
Suction bucket 4-legged Jacket	Yes	Yes
Suction bucket 6-legged Jacket	No	Yes
Gravity base	Yes	Yes

Table 1.2: Foundation options for wind turbines and OSPs

1.4.7 Operations and maintenance phase

1.4.7.1 The overall operations and maintenance strategy will be finalised once the operations and maintenance base location and technical specification of the Morgan Generation Assets are known, including wind turbine type and final layout. The operations and maintenance requirements for the Morgan Generation Assets will be set out within an outline Offshore Operation and Maintenance Plan which will be submitted alongside the application for consent.

1.4.8 Decommissioning phase

1.4.8.1 The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment. The Energy Act 2004 requires that a decommissioning plan must be submitted to the Secretary of state for the Department for Energy Security and Net Zero prior to the construction of the Morgan Generation Assets and is typically prepared post-consent. The Decommissioning Plan and programme will be updated during the Morgan Generation Assets' lifetime to take account of changes in regulations, best practice and new technologies. Wind turbines will be removed and any piled foundations are likely to be cut approximately 1m below the seabed.

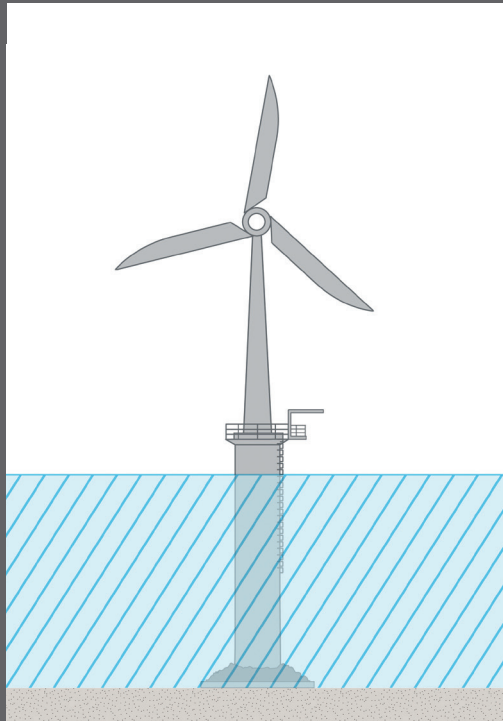


Figure 1.3:
Schematic of a monopile foundation design

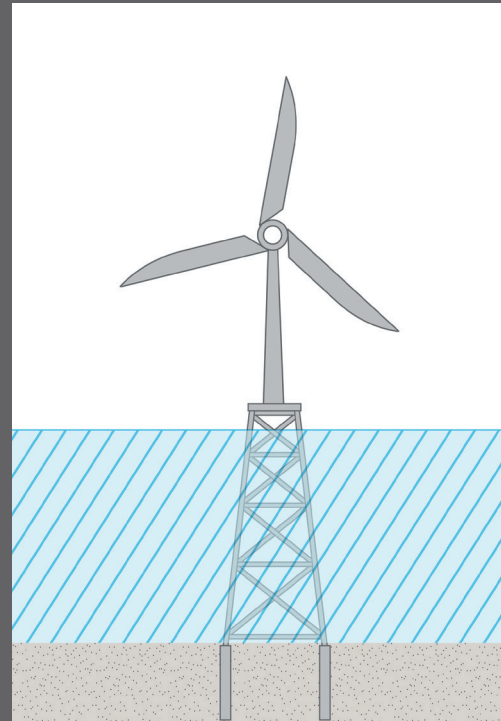


Figure 1.4:
Schematic of a pin pile jacket foundation

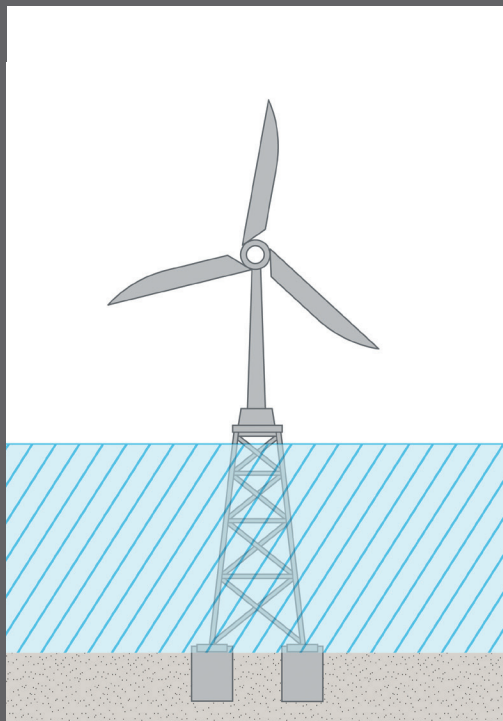


Figure 1.5:
Schematic of a suction bucket jacket foundation

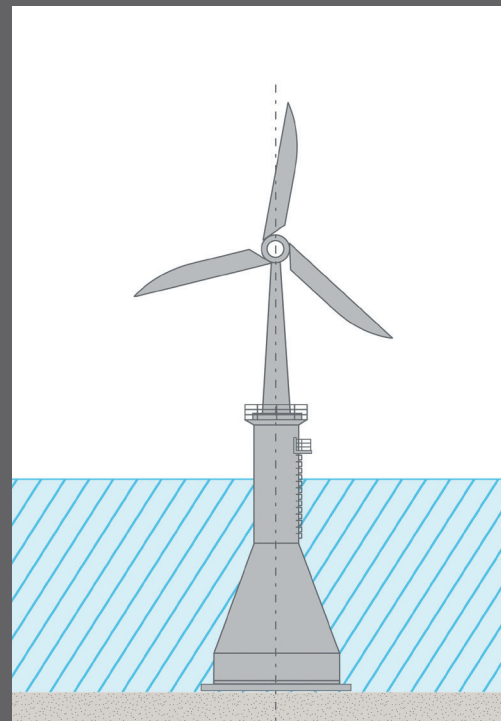


Figure 1.6:
Schematic of a gravity base foundation

1.5 Site selection and alternatives

1.5.1 Overview

1.5.1.1 The Applicant has undertaken a site selection process to identify the location of the Morgan Generation Assets infrastructure. The aim was to identify sites that are environmentally acceptable, deliverable and consentable, whilst also enabling the benefits in the long term of the lowest energy cost to be passed to the consumer.

1.5.1.2 The process has taken account of environmental, physical, technical, commercial, and social considerations and opportunities as well as engineering requirements. Each stage of the site selection process forms part of an iterative design process undertaken to identify the most suitable locations and configuration for the Morgan Generation Assets.

1.5.2 Identification of the Morgan Array Area

1.5.2.1 TCE launched the Offshore Wind Leasing Round 4 process in 2019. The Northern Wales and Irish Sea Bidding Area was one of four Bidding Areas identified by TCE through the Offshore Wind Leasing Round 4 process. The Morgan Array Area was identified from within the Northern Wales and Irish Sea Bidding Area.

1.5.2.2 The Morgan Array Area extent was limited to the south by the Mona Agreement for Lease (AfL) area, which was awarded prior to the Morgan AfL area as part of Offshore Leasing Round 4. The Morgan Array Area was limited to the west by the extent of the North Wales and Irish Sea bidding area and the Isle of Man territorial waters.

1.5.2.3 The Morgan Array Area extent was limited to the east by the presence of existing oil and gas infrastructure associated with the North Morecambe and Dalton fields. The Morgan Array Area extent was also limited to the east by the project decision to maintain a 10km offset from the Liverpool Bay SPA.

1.5.2.4 Further refinements to the Morgan Array Area will be undertaken between PEIR and application submission. The final Morgan Array Area will be described in detail within the Environmental Statement that will accompany the application for consent.

1.5.3 Next steps

1.5.3.1 The Applicant will continue to develop and refine the project design as it progresses towards the final application for Development Consent and beyond this as it moves towards construction. Up to this point, the Applicant has engaged with a range of stakeholders in refining the project and identifying suitable options among the alternatives considered.

1.5.3.2 As the Morgan Generation Assets progresses past the statutory consultation stage, the Applicant will continue engagement with stakeholders, via the Expert Working Groups (EWGs) and other consultation as appropriate. The Applicant will continue to keep stakeholders informed about the project design as it continues to evolve, and the selection process for preferred options where they remain in consideration.





1.6 Environmental Impact Assessment methodology

1.6.1 Overview

1.6.1.1 This section presents an outline of the EIA methodology that has been employed for the Morgan Generation Assets in the preparation of the PEIR. The EIA for the Morgan Generation Assets describes the likely effects on the environment arising from the construction, operations and maintenance, and decommissioning of the Morgan Generation Assets. Where likely significant effects are predicted, it identifies mitigation to reduce the significance of these effects (where practicable).





1.6.2 Approach to EIA

1.6.2.1 The approach to determining the scope of the EIA to be included in an application for a DCO can be broadly summarised as consisting of three main elements that take place prior to the submission of the application for the DCO and Environmental Statement:

- Scoping: To determine the issues to be addressed during the EIA process
- Consultation: Pre-application consultation in accordance with the 2008 Act (as amended), including production of a PEIR which forms the basis of statutory consultation
- Environmental Statement Preparation: Reporting on the EIA process, updating the information provided in the PEIR and continuing with design iteration and consultation.

1.6.2.2 The assessment of each topic (e.g. marine mammals, shipping and navigation etc.) forms a separate chapter of this PEIR. For each topic chapter, the following components are included:

- Identification of the study area for the topic-specific assessments
- Description of the planning policy and guidance context
- Summary of key consultation activity, including comments received in the Scoping Opinion
- Description of the environmental baseline conditions (including future baseline conditions)
- Presentation of impact assessment, which includes:
 - Identification of the Maximum Design Scenario (MDS) for each impact assessment
 - Identification of likely impacts and assessment of the significance of identified effects
 - A description of the measures adopted as part of the Morgan Generation Assets to prevent, reduce or offset likely significant effects
 - Where required, identification of any further measures required in respect of likely significant effects, together with consideration of any residual effects
 - Identification of any future monitoring which may be required
 - Assessment of any cumulative effects with other major developments, including those that are proposed, consented and under construction
 - Assessment of any transboundary effects (i.e. effects across state boundaries).

1.6.2.3 Inter-related effects (i.e. inter-relationships between environmental topic areas) are assessed in a separate chapter in the PEIR.

1.6.2.4 The approach to the principal components of the EIA process is described in further detail in the following sections.



1.6.3 Consultation and scoping

Scoping

1.6.3.1 Consultation on the proposed EIA methodology (including the Cumulative Effects Assessment (CEA) methodology and approach to assessing transboundary and inter-related effects) was undertaken at the EIA scoping stage. The Morgan Generation Assets Scoping Report (Morgan Offshore Wind Ltd, 2022), which contained details of the proposed approach to EIA for each topic was submitted to the Secretary of State for BEIS in June 2022. The Applicant received the Scoping Opinion in July 2022 (The Planning Inspectorate, 2022). The Applicant met with a range of stakeholders to discuss their feedback in more detail and to consider refinements to the Morgan Generation Assets ahead of formal consultation on the PEIR.

Topic-specific consultation

1.6.3.2 The Applicant is facilitating the Evidence Plan Process for the Morgan Generation Assets. The process provides an opportunity for stakeholders to advise on proposals at an early stage to help mitigate likely significant effects. As part of this, a steering group has been established, as well as Expert Working Groups (EWGs) to discuss topic-specific issues with relevant stakeholders. The Steering Group consists of the following members:

- Natural England
- Joint Nature Conservation Committee (JNCC)
- The Marine Management Organisation (MMO)
- Natural Resources Wales (NRW)
- The Planning Inspectorate.

1.6.3.3 EWGs have been established for the following topics:

- Physical processes, benthic ecology and fish and shellfish ecology (members include: Natural England, JNCC, MMO, The Wildlife Trusts (TWT), NRW and the Isle of Man government)
- Marine mammals (members include: Natural England, JNCC, MMO, TWT, NRW and the Isle of Man government)
- Offshore ornithology (members include: Natural England, JNCC, MMO, TWT, Royal Society for the Protection of Birds (RSPB), NRW and the Isle of Man government).

1.6.3.4 In addition to the Evidence Plan Process, the Applicant is also facilitating a Maritime Navigation Engagement Forum (MNEF) to enable the Applicant to regularly update stakeholders on plans and progress of the Morgan Generation Assets, and for stakeholders to express views or concerns on the impacts of the Morgan Generation Assets for discussion and, where possible, resolution. Four pre-PEIR MNEF meetings have been held, in November 2021, May 2022, October 2022 and January 2023.

1.6.3.5 The Applicant is committed to consultation with commercial fisheries stakeholders. MarineSpace provides the role of Company Fisheries Liaison Officer (CFLO) on behalf of the Applicant. Consultation has been undertaken with key local and regional fisheries stakeholders since June 2021, to date.



- 1.6.3.6 An Archaeology and Heritage Engagement Forum has been established in order to consult with the MMO, Historic England, CADW and the Royal Commission on the Ancient and Historical Monuments of Wales on the potential impacts that the Morgan Generation Assets may have on the offshore historic environment.
- 1.6.3.7 The Applicant has undertaken consultation for seascape, landscape and visual resources with the Isle of Man Government, Statutory Nature Conservation Bodies (SNCBs) and the applicable local councils on the representative viewpoint locations which formed the basis for the site survey work and photography on which the EIA is based.

1.6.4 Design envelope approach

- 1.6.4.1 The Morgan Generation Assets EIA process has employed an MDS approach, also known as the 'Rochdale Envelope' approach. The MDS approach allows the EIA process to be conducted on the basis of a realistic 'worst case' scenario (i.e. the maximum project design parameters) which is selected from different design and construction scenarios. For each of the impacts assessed within the topic chapters, the MDS is identified from the range of potential options for each parameter within the project description of the PEIR.
- 1.6.4.2 For example, where several wind turbine options are included in the design, then the assessment of the Morgan Generation Assets has been based on the wind turbine type considered to have the greatest impact. This may be the wind turbine type with the largest footprint, the greatest tip height or the largest area of seabed disturbed during construction, depending upon the topic under consideration. By identifying the MDS for any given impact, it can therefore be concluded that the impact (and therefore the effect) will be no greater for any other design or construction scenario than that assessed for the MDS. By employing the MDS approach, the Applicant retains some flexibility in the final design of the Morgan Generation Assets, but within certain maximum parameters, which are fully assessed in the EIA. The final Morgan Generation Assets design will be selected after development consent has been granted, in line with the parameters stated in the project description within the Environmental Statement.

1.6.5 Mitigation and the iterative design process

- 1.6.5.1 During the EIA process, potential environmental effects are taken into account as part of the ongoing iterative design process. The process of EIA has therefore been used as a means of informing the design, with the Applicant making design decisions that mitigate impacts on the environment (referred to as measures adopted as part of the Morgan Generation Assets). The assessments within this PEIR therefore include a range of measures that have been designed to reduce or prevent significant adverse effects arising.



1.6.6 Assessment of effects

- 1.6.6.1 The Morgan Generation Assets have the potential to create a range of 'impacts' and consequent 'effects' with regard to the physical, biological and human environment. The term 'impact' is defined as a change that is caused by an action. The term 'effect' is defined as the consequence of an impact. For example, the laying of an inter-array cable (action) results in seabed disturbance (impact), with the potential to disturb benthic habitats and species (effect).
- 1.6.6.2 For each of the impacts assessed in this PEIR, a magnitude has been assigned. The magnitude of an impact considers the spatial extent, duration, frequency and reversibility of the impact from the construction, operations and maintenance, or decommissioning phase of the Morgan Generation Assets.
- 1.6.6.3 Receptors are defined as the physical or biological resource or human user group that could be affected by the Morgan Generation Assets impacts. These receptors are identified through available data and baseline studies that have been reviewed in the preparation of this PEIR. In defining the sensitivity for each receptor, the vulnerability, recoverability and value/importance has been taken into consideration.
- 1.6.6.4 The overall significance of an effect is evaluated by considering the magnitude of the impact alongside the sensitivity of the receptor. Each chapter defines the approach taken to the assessment of significance. Unless set out otherwise within the chapter, the matrix approach shown in Table 1.3 has been adopted as a guide.

Sensitivity of receptor	Magnitude of impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major
Very High	No change	Minor	Minor or Moderate	Major	Major

Table 1.3: Matrix used for the assessment of the significance of the effect



1.6.7 Cumulative Effect Assessment

1.6.7.1 Cumulative effects are defined as those that result from incremental changes caused by other reasonably foreseeable projects, alongside the project in question. The CEA therefore considers the likely effects arising from the Morgan Generation Assets alongside the likely effects of other projects, plans and activities in the vicinity of the Morgan Generation Assets, based on the information available in the public domain. Cumulative effects are considered within each topic chapter of the PEIR.

1.6.7.2 The ISAA for the Morgan Generation Assets considers in-combination effects as set out under the Conservation of Habitats and Species Regulations 2017 (as amended). These are similar to cumulative effects but are defined as the combined effect of the Morgan Generation Assets, with the effects from a number of different projects, plans and activities, on the integrity of European Sites designated for their nature conservation value. In-combination effects are presented separately within the ISAA.

1.6.8 Transboundary effects

1.6.8.1 Transboundary effects arise when impacts from a project within one State affect the environment of another State(s). Transboundary effects have been considered in each topic chapter of the PEIR, based on the outcome of the transboundary screening.

1.6.9 Inter-related effects

1.6.9.1 The 2017 EIA Regulations require consideration of the indirect and secondary likely significant impacts of the Morgan Generation Assets. For example, the separate impacts of noise and habitat loss may have an effect upon a single receptor such as marine mammals or the impact of noise and visual effects on people living nearby.

1.6.9.2 The approach presented in the PEIR has been developed in line with the Planning Inspectorate Rochdale Envelope Advice Note (Advice Note Nine) (Planning Inspectorate, 2018) which states that: "Inter-relationships consider impacts of the proposals on the same receptor. These occur where a number of separate impacts, (e.g. noise and air quality), affect a single receptor such as fauna."



1.7 Potential environmental effects

1.7.1 Physical processes

- 1.7.1.1 Physical processes refer to the coastal and marine processes and their relationship with the physical environment which includes tidal currents, wave climate and sediment transport regime. The physical processes of the Morgan Generation Assets were numerically modelled using datasets collected from a series of site-specific surveys, including geophysical and metocean data. This was coupled with a detailed desktop review of existing studies and datasets.
- 1.7.1.2 The seafloor morphology of the Morgan Array Area includes several distinct features such as sandwaves, megaripples, sediment waveforms and outcrops (XOCEAN, 2022; Gardline, 2022). Seabed substrate within the Morgan Array Area ranged from gravelly sand to muddy sandy gravel with the majority of the area classified as gravelly muddy sand. The Morgan Array Area lies within the central gravel belt in the Irish Sea containing coarse sand and gravel (Mellett et al., 2015). Small areas of bedrock outcrop at the seabed have been observed. Seabed levels across the Morgan Array Area range from depths of 32m to 54m Mean Sea Level (MSL) with a deeper corridor travelling across the Morgan Array Area from the southwest to the northeast. Shallower depths are observed in the north and the south of the Morgan Array Area.
- 1.7.1.3 The wave climate in the Morgan Array Area is described as dominant short period, southwesterly waves. Across the Morgan Array Area, the tidal current floods to the east-northeast and ebbs to the west-southwest. Relatively strong flows are present during spring tides, however, within the Morgan Array Area, the residual current speeds are several orders of magnitude smaller than those along the coastline. Sediment transport rates are highest during spring tides.
- 1.7.1.4 A number of potential impacts on the physical processes receptors due to the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets were identified. These included:
- Increase in suspended sediment concentrations (SSCs) due to construction, operations and maintenance and/or decommissioning related activities, and the potential impact to physical features
 - Impacts to the tidal regime due to the presence of infrastructure
 - Impacts to the wave regime due to the presence of infrastructure
 - Impacts to sediment transport and sediment transport pathways due to the presence of infrastructure and associated potential impacts to physical features and bathymetry
 - Impacts to temperature and salinity stratification due to the presence of infrastructure.



- 1.7.1.5 Increased SSCs may arise due to seabed preparation involving sandwave clearance, the installation of the wind turbines and OSP foundations. Sediment plumes produced during construction are considered localised and not to persist beyond the study location for physical processes. Sedimentation increase is not considered to be sufficient or significant enough to influence bathymetry of key receptors such as sandbanks, mudflats and sandflats. The effects during the decommissioning phase would be of lesser magnitude than both the construction phase and the operations and maintenance phase, with scour and cable protection remaining in situ. Increases in SSCs may occur during decommissioning if suction caisson foundations are removed however sediment plume would not interact with any designated areas.
- 1.7.1.6 The presence of infrastructure may lead to changes in impacts to the tidal regime, wave regime, sediment transport and associated sediment transport pathways and the associated potential impacts along adjacent shorelines and physical features. However, the impacts on receptors such as the sandbanks, mudflats and sandflats were deemed to be of negligible significance which is not significant in EIA terms. These minor changes in hydrodynamics occur in close proximity to the location of the wind turbines and do not extend beyond the physical processes study area. The limited magnitude of changes observed would not alter the hydrography of sandbanks. Overall, for all receptors, the effect will be of negligible significance which is not significant in EIA terms. All cumulative impacts assessed were deemed negligible. No physical processes mitigation in addition to the measures adopted as part of the Morgan Generation Assets (e.g. scour protection) is considered necessary because the predicted impacts in the absence of mitigation is not significant in EIA terms.
- 1.7.1.7 No significant transboundary effects with regard to physical processes from the Morgan Generation Assets on the interests of other States were predicted.



1.7.2 Benthic subtidal ecology

1.7.2.1 Benthic subtidal ecology refers to the communities of animals and plants which live on or in the seabed and the relationships that they have with each other and with the physical environment. The subtidal benthic ecology of the Morgan Generation Assets was characterised via a series of site-specific surveys using grab sampling and underwater video and eDNA.

1.7.2.2 These surveys indicated that seabed within the Morgan Array Area supports a variety of plant and animal communities that are typical of this area. Key habitats recorded included habitat dominated by marine worms, bivalves and echinoderms in finer sediments, as well as more mixed and coarse sediments which support a more varied community on the seabed including mobile crustacea and bivalves.

1.7.2.3 Additionally, the West of Copeland Marine Conservation Zone (MCZ) overlaps with the Morgan benthic subtidal ecology study area for the Morgan Generation Assets. The West of Copeland MCZ is designated for subtidal sand and subtidal mud. The West of Walney MCZ is located just outside the zone of influence for the Morgan Generation Assets but has still been included in the assessment. The West of Walney MCZ is designated for subtidal sand, subtidal coarse sediment and subtidal mixed sediment.

1.7.2.4 A number of potential impacts on benthic subtidal communities/species, associated with the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets, were identified. These included:

- Temporary habitat loss/disturbance
- Increased SSCs and deposition
- Disturbance/remobilisation of sediment-bound contamination
- Long-term habitat loss
- Colonisation of hard structures
- Increased risk of introduction and spread of invasive non-native species (INNS)
- Removal of hard substrates
- Changes in physical processes
- Electromagnetic fields from subsea electrical cabling
- Heat from subsea electrical cables.

1.7.2.5 With the measures adopted as part of the Morgan Generation Assets (e.g. cable burial where possible) in place, all of these impacts result in effects of either negligible or minor adverse significance which is not significant in EIA terms.

1.7.2.6 Temporary and long-term habitat loss/disturbance was deemed to be of minor adverse significance to benthic receptors in the benthic ecology study area which is not significant in EIA terms, as the proportion of habitat lost is predicted to be small in the context of available habitats in the Morgan Array Area.

1.7.2.7 Temporary increases in SSCs and associated deposition were also deemed to be of minor or negligible adverse significance which is not significant in EIA terms due to the short-term nature of the impact and as the seabed plants and animals in this area have a low sensitivity to this type of impact.



- 1.7.2.8 Additionally, the impacts on the protected features of the West of Walney MCZ and West of Copeland MCZ, in all phases of the Morgan Generation Assets, have been assessed as not significant in EIA terms.
- 1.7.2.9 In the assessment of cumulative effects, the cumulative temporary habitat disturbance to subtidal sand and muddy sand sediments with benthic communities was predicted to be of moderate adverse significance in the short term, reducing to minor adverse significance in the medium to long term as the sediments and communities recover. For all other impacts and receptors, the assessment of cumulative effects was predicted to result in effects that would not be significant in EIA terms.
- 1.7.2.10 Additionally, the cumulative impacts on the protected features of the West of Walney MCZ and West of Copeland MCZ, in all phases of the Morgan Generation Assets, have been assessed as not significant in EIA terms.
- 1.7.2.11 No transboundary effects with regard to benthic subtidal ecology from the Morgan Generation Assets were predicted.



1.7.3 Fish and shellfish ecology

1.7.3.1 Fish and shellfish ecology refers to the communities of animals (various commercially and ecologically important fish, crustacean, and mollusc species) which live in the water column or on and in the seabed, including diadromous fish which move into freshwater environments for spawning activity, and the relationships these organisms have with each other and the physical environment. The fish and shellfish ecology of the Morgan Generation Assets was characterised primarily through desktop review due to the large amount of data publicly available, with incorporation of relevant data from seabed characterisation surveys included to help increase the scope of the review.

1.7.3.2 The desktop review and incorporated survey results showed the presence of a range of fish, shellfish, and shark and ray species with spawning or feeding grounds in the vicinity of the Morgan Generation Assets, and in the wider fish and shellfish ecology study area. Species of particular ecological interest included herring, which are a commercially important species with high and low intensity spawning grounds to the immediate northwest of the Morgan Generation Assets. Sandeel species were also noted as having important populations and spawning grounds in this area, with these being of interest as a prey species which act as a food source and thus support a wide range of other predator species. Consultation with stakeholders highlighted the importance of queen and king scallop to commercial fishing activities. Therefore, information from vessel position data and reports of fishing effort were incorporated to show the distribution of fishing and spawning grounds for these species, with significant overlap with the Morgan Generation Assets noted. Basking shark and angel shark populations were also examined, with the potential for these passing through the Morgan Generation Assets highlighted, although the likelihood of this occurring is considered low.

1.7.3.3 A number of potential impacts on fish and shellfish species associated with the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets were identified. These included:

- Temporary habitat loss or disturbance
- Underwater sound impacts
- Increased SSCs and associated sediment deposition
- Long-term habitat loss
- Electromagnetic fields from subsea electrical cabling
- Colonisation of hard structures by new communities
- Injury to basking shark due to increased risk of collision with vessels.

1.7.3.4 With the measures adopted as part of the Morgan Generation Assets (e.g. implementation of piling soft-start and ramp-up measures) in place, almost all of these impacts in all phases result in effects of either negligible or minor adverse significance which is not significant in EIA terms.



- 1.7.3.5 However, the effect of underwater sound was noted to have a potential moderate adverse significance on herring spawning grounds, due to their proximity to construction piling activities of the Morgan Generation Assets and a conservative sound impact threshold based on the desktop review. Despite this potential significant effect, the greatest impact would only take place if piling was occurring concurrently (piling at two locations at the same time) at the locations closest to the spawning grounds during the peak spawning times during autumn, and it is expected that this impact can be mitigated through measures adopted as part of the Morgan Generation Assets which are currently being investigated.
- 1.7.3.6 Cumulative effects from nearby offshore wind farm construction, dredging and disposal, and other project construction activities were assessed within a 50km radius of the Morgan Generation Assets for direct impacts, and a 100km radius for underwater noise. These nearby projects were examined and predicted to result in negligible to minor adverse impacts on fish and shellfish species within the defined 50km study area which is not significant in EIA terms. For underwater sound, the impact was assessed to still be moderate adverse due to the very low level of cumulative sound impact from other projects.
- 1.7.3.7 No transboundary effects with regard to fish and shellfish ecology from the Morgan Generation Assets on the interests of other States were predicted.



1.7.4 Marine mammals

1.7.4.1 The site-specific surveys indicated that the species found in the vicinity of the Morgan Array Area include bottlenose dolphin, harbour porpoise, Risso's dolphin, grey seal and harbour seal. Other species known to occur regularly in the region include short-beaked common dolphin and minke whale. Harbour porpoise occur throughout the marine mammal study area, whilst short-beaked common dolphin and Risso's dolphin are largely restricted to the south of the Irish Sea. Sightings of bottlenose dolphin are highest in coastal waters of Cardigan Bay. Harbour porpoise and bottlenose dolphin occur year-round, whereas short-beaked common dolphin, Risso's dolphin and minke whale occur in highest numbers during summer months, moving further offshore in winter months. Grey seal occur extensively throughout the south Irish Sea, whereas harbour seal are concentrated along the northeast coast of Ireland, east coast of Northern Ireland and the Firth of Clyde.

1.7.4.2 A number of potential impacts on marine mammals, associated with the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets, were identified. These included:

- Injury and disturbance from elevated underwater sound during piling
- Injury and disturbance to marine mammals from elevated underwater sound during clearance of unexploded ordnance (UXO).
- Injury and disturbance to marine mammals from elevated underwater sound due to vessel use and other activities
- Increased risk of injury to marine mammals due to collision with vessels
- Injury and disturbance to marine mammals from elevated underwater sound during site investigation surveys
- Underwater sound from wind turbine operation
- Changes in fish and shellfish communities affecting prey availability.

1.7.4.3 With the measures adopted as part of the Morgan Generation Assets (e.g. the inclusion of low order techniques as a UXO clearance option) in place, these impacts result in effects of either negligible or minor adverse significance which are not significant in EIA terms.

1.7.4.4 Injury and disturbance from elevated underwater sound during piling was deemed to be of minor (adverse) significance which is not significant in EIA terms to marine mammals in the marine mammal study area; whilst underwater sound modelling predicted ranges of impact which had the potential to result in injury and disturbance to a small number of animals. For the assessment of injury, with a Marine Mammal Mitigation Protocol (MMMP) in place, the impact would result in a very small risk of injury, as animals will be deterred beyond the predicted injury range. For the assessment of disturbance, it was considered that whilst a small number of animals could experience mild disturbance, this was unlikely to lead to population level effects. In addition, population modelling was carried out to explore the potential of disturbance during piling to affect the population trajectory over time for four species, which confirmed the assessment that this impact was unlikely to lead to population effects.



- 1.7.4.5 Increased risk of injury of marine mammals due to collision with vessels was deemed to be of minor adverse significance which is not significant in EIA terms. Whilst an increase in vessel movements could lead to an increase in interactions between marine mammals and vessels, resulting in fatal and non-fatal injuries, vessels travelling at 7m/s or faster are those most likely to cause death or serious injury to marine mammals. Largely, vessels involved in the construction phase are likely to be travelling considerably slower than this, and all vessels will be required to follow an Environmental Management Plan (EMP), including measures to minimise disturbance to marine mammals. With the adherence to this EMP, in combination with the likelihood that animals will be deterred by the noise of moving vessels, the risk of collision is reduced.
- 1.7.4.6 Changes in fish and shellfish communities affecting prey availability was deemed to be of minor adverse significance which is not significant in EIA terms. The assessment for fish and shellfish included the impacts listed in section 1.7.3. Whilst potential effects on fish assemblages could have indirect effects on marine mammals, the fish and shellfish assessment concluded that impacts are unlikely to lead to significant levels of mortality, and as such the marine mammal assessment concluded that this would therefore not lead to significant changes to prey availability, particularly given the ability of marine mammals to avoid disturbed areas and switch prey if necessary.
- 1.7.4.7 Cumulative effects were assessed for injury and disturbance from elevated underwater sound during piling, injury and disturbance to marine mammals from elevated underwater sound during site investigation surveys, injury and disturbance to marine mammals from elevated underwater sound during UXO clearance, injury and disturbance to marine mammals from elevated underwater sound due to vessel use and other activities, increased risk of injury of marine mammals due to collision with vessels, and changes in fish and shellfish communities affecting prey availability. These were predicted to result in effects of negligible or minor adverse significance upon marine mammals within the Celtic and Irish Seas which is not significant in EIA terms.
- 1.7.4.8 No transboundary effects with regard to marine mammals from the Morgan Generation Assets on the interests of other States were predicted.



1.7.5 Offshore ornithology

- 1.7.5.1 Seabirds refer to species that depend on the marine environment for survival at some point in their life cycle. In addition to the true seabirds, any non-seabirds which use the area during their migration or have additional reliance on marine areas, especially in the non-breeding season are referred to as seabirds for the purpose of the assessment. Information on seabirds within the Morgan offshore ornithology array area study area was collected through a detailed desktop review of existing studies and datasets and site-specific digital aerial surveys.
- 1.7.5.2 The site-specific digital aerial surveys indicated that the Morgan Array Area supported a seabird assemblage that is typical of the Irish Sea, and dominated by common guillemot, razorbill, black-legged kittiwake, Manx shearwater and northern gannet. For most seabirds, distribution was varied depending on year and month.
- 1.7.5.3 A number of potential impacts on seabird species, associated with the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets, were identified. These included:
- Increased disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure
 - Indirect impacts from underwater sound affecting prey species
 - Collision
 - Temporary habitat loss/disturbance and increased SSCs
 - Barrier effects.
- 1.7.5.4 With the measures adopted as part of the Morgan Generation Assets (e.g. an offshore EMP which will include measures to reduce disturbance to rafting birds from transiting vessels) in place, these impacts result in effects of either negligible or minor adverse significance which are not significant in EIA terms.
- 1.7.5.5 Cumulative effects from offshore renewable developments were assessed and predicted to result in effects of negligible to minor adverse significance (not significant in EIA terms) upon seabirds within a 500km buffer of the Morgan Generation Assets. The effect of collision was deemed to be negligible to minor for all species, and therefore not significant in EIA terms. The combined collision risk and disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure were assessed for black-legged kittiwake and northern gannet as being of minor adverse significance which is not significant in EIA terms.
- 1.7.5.6 No transboundary effects with regard to offshore ornithology from the Morgan Generation Assets on the interests of other States were predicted.



1.7.6 Commercial fisheries

- 1.7.6.1 Commercial fisheries are defined as any form of fishing activity where the catch is sold for taxable profit. The commercial fisheries baseline was characterised via a review of publicly available data, site-specific surveys and consultation with fisheries stakeholders.
- 1.7.6.2 Within the region, landings are dominated by dredge vessels and shellfish are the most important species group in terms of landed weight and value. Within the Morgan Array Area there is a queen scallop ground of particular importance to dredge vessels from the west coast of Scotland. These vessels, as well as vessels from the Isle of Man and nomadic vessels from Ireland and Northern Ireland also engage in the king scallop fishery in the region. English static gear vessels targeting whelk and crab in the Morgan Array Area operate out of Fleetwood and Whitehaven. Beam trawl vessels from Belgium and the south coast of England are also present within the commercial fisheries study area targeting flatfish, such as sole and plaice. Vessels from Ireland and Northern Ireland, deploying pelagic trawls and seine nets that target herring, are active across the commercial fisheries study area. Nephrops grounds off the coast of Cumbria are of particular importance to vessels that deploy demersal trawls and otter trawls, which are predominantly from England and Northern Ireland.
- 1.7.6.3 A number of potential impacts on commercial fisheries groups, associated with the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets, were identified. These included:
- Loss or restricted access to fishing grounds
 - Displacement of fishing activity
 - Interference with fishing activity
 - Temporary increase in steaming distances
 - Loss or damage to fishing gear due to snagging
 - Potential impacts on commercially important fish stocks
 - Supply chain opportunities for local fishing vessels.
- 1.7.6.4 With the measures adopted as part of the Morgan Generation Assets (e.g. development of a Fisheries Co-existence and Liaison plan) in place, and in some cases with the implementation of further mitigation, the majority of these impacts result in effects of negligible or minor adverse significance which are not significant in EIA terms.
- 1.7.6.5 Loss or restricted access to fishing grounds is an impact that is of particular importance for Scottish west coast vessels, which rely on a queen scallop ground within the west section of the Morgan Array Area. During construction, the loss or restricted access to fishing grounds is assessed as an effect of no greater than minor adverse significance on all commercial fisheries receptor groups, which is not significant in EIA terms, due to the temporary and intermittent nature of the works. During the operations and maintenance phase, a moderate adverse effect is predicted on the Scottish west coast scallop vessels receptor, which is significant in terms of the EIA Regulations. In order to mitigate this effect, options to increase the minimum distance between wind turbines and options to align the turbines with orientations of fishing tows are being explored by the Applicant to increase the potential for coexistence.



- 1.7.6.6 With the measures adopted as part of the Morgan Generation Assets in place, which will be fully captured in the Environmental Statement, the impact magnitude is predicted to reduce to minor and the residual effect will be of minor adverse significance which is not significant in EIA terms.
- 1.7.6.7 Displacement of vessels into other fishing grounds can cause conflict with other fishing gears. During construction, the displacement of vessels into other areas, and the potential adverse impacts on existing fisheries in the areas that vessels are displaced into, is assessed as an effect of no greater than negligible adverse significance on all commercial fisheries receptor groups which is not significant in EIA terms. This is due to the temporary and intermittent nature of the works during the construction phase. During the operations and maintenance phase, the minimum spacing between wind turbines (875m) and between rows of wind turbines (1,000m) may restrict mobile gear such as the scallop vessels during fishing within the Morgan Array Area. However, displacement of fishing activity is assessed as an effect of negligible adverse significance due to the relatively large operational ranges of most fishing vessels that operate within the Morgan Array Area.
- 1.7.6.8 Significant cumulative impacts on commercial fisheries receptors, in EIA terms, were identified for the Morgan and Morecambe Offshore Windfarms Transmission Assets, the Mona Offshore Wind Project and the Morecambe Offshore Windfarm Generation Assets. The main cumulative impact identified between the Morgan Generation Assets and these projects for commercial fisheries focused on loss or restricted access to fishing grounds from the operations and maintenance phase. The cumulative effect of loss or restricted access to fishing grounds on the Scottish west coast, as a result of other offshore wind developments and the operations and maintenance phase of the Morgan Generation Assets, is of moderate adverse significance, which is significant in EIA terms. Following further mitigation measures, the residual impacts on Scottish west coast scallop vessels are assessed as minor adverse, which is not significant in EIA terms.
- 1.7.6.9 Transboundary effects outside UK waters are limited to the potential displacement of effort from the Morgan Generation Assets into non-UK waters and potential effects on commercially important fish and shellfish resources which could occur in non-UK waters. It is not anticipated that these effects would be significant.



1.7.7 Shipping and navigation

- 1.7.7.1 The construction, operations and maintenance and decommissioning of an offshore wind farm can have impacts upon maritime safety and the activities of commercial shipping, ferries, ports/harbours, commercial fisheries, recreational cruising and other maritime operations.
- 1.7.7.2 A shipping and navigation baseline was developed through a review of relevant publications, collection and analysis of historical vessel traffic and incident data, and consultation with key stakeholders. The Morgan Generation Assets are located in an area frequently utilised by a variety of different maritime users. It should be noted that during the operations and maintenance phase, there will be a minimum spacing between wind turbines of 875m and a minimum spacing between rows of wind turbines of 1,000m. Existing offshore wind farms, oil and gas and aggregate activities occur within the shipping and navigation study area. Key commercial shipping routes bound for the Port of Liverpool pass clear of the shipping and navigation study area, but smaller shipping routes to Douglas and Heysham cross through the Morgan Array Area. Regular ferry services between the UK, Isle of Man and the Republic of Ireland operate through or adjacent to the Morgan Array Area. Fishing by static and mobile gear takes place throughout the shipping and navigation study area. Offshore recreational cruising routes between the UK and the Isle of Man were also identified, however, the numbers of vessels using them is low. Tug and service activities supporting existing offshore infrastructure is widespread.
- 1.7.7.3 Adverse weather, particularly from the prevailing southwest, was demonstrated to have an influence on vessel traffic patterns. Historical incident data demonstrated that relatively few navigational incidents had occurred within the shipping and navigation study area, with the majority analysed occurring in the approaches to Liverpool.
- 1.7.7.4 A number of potential impacts on shipping and navigation, associated with the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets, were identified. The impacts assessed include:
- Impacts to vessel routing
 - Impacts to port operations
 - Impacts to navigational safety
 - Impacts to emergency response.
- 1.7.7.5 With the measures adopted as part of the Morgan Generation Assets (e.g. the use of guard vessels) in place, the majority of these impacts result in effects which are not significant, with the exception of two significant effects which are described below.
- 1.7.7.6 Firstly, impacts on adverse weather routing as a result of the presence of the Morgan Array Area were assessed as potentially significant. During adverse weather conditions, Stena vessels operating between Liverpool and Belfast, and Isle of Man Steam Packet Company vessels operating between Heysham and Douglas navigate through the footprint of the Morgan Array Area. With the wind turbines in place, vessels would be required to deviate to the southwest of the Morgan Array Area to maintain safe and comfortable vessel motions. This has the potential to increase transit durations and cancellations of services.



- 1.7.7.7 Secondly, impacts on vessel to vessel collision risk due to deviations of vessel routes and increased encounters due to the presence of the Morgan Array Area were assessed as significant. In particular, the creation of a narrow corridor between the Morgan Array Area and Walney Offshore Wind Farm was considered to be of insufficient width to enable collision avoidance during periods of high traffic density or in adverse weather. Furthermore, the close proximity of the Morgan Array Area with these routes increased the potential for small craft emerging from the site being involved in a collision with passing vessels.
- 1.7.7.8 To address these significant effects, possible additional risk control options have been identified to reduce these risks to Broadly Acceptable or Tolerable if As Low As Reasonably Practicable (ALARP), including changing the array boundaries and additional management of vessel movements. The Applicant has committed to exploring these additional risk controls through further studies and engagement with stakeholders to ensure they are appropriate and adequate for reducing risks to ALARP prior to submission of the application. Appropriate risk controls will then be secured through the DCO or marine licences.
- 1.7.7.9 The assessment of impacts on shipping and navigation of the Morgan Generation Assets were considered cumulatively with other proposed and existing projects. The assessment noted that these would result in narrow corridors between projects which increased navigational risk and would be potentially unsafe to navigate in adverse weather conditions. In particular, the assessment of the cumulative impacts of the Mona Offshore Wind Project, Morgan Generation Assets, Morecambe Offshore Windfarm Generation Assets and Awel y Môr Offshore Wind Farm array areas identified significant effects.
- 1.7.7.10 Firstly, the cumulative impact on ferry routing as a result of the presence of the cumulative projects were assessed. Routes from Stena, Isle of Man Steam Packet Company and Seatruck would be all impacted by the presence of the array areas and the narrow corridors. Whilst these deviations were generally small, in combination they were assessed as significant. This assessment also considered issues of congestion within the corridors, resulting in greater collision avoidance and reduced speed which have further schedule impacts.
- 1.7.7.11 Secondly, impacts on adverse weather routing as a result of the presence of the cumulative projects were assessed as significant. During adverse weather, and as a result of the inadequate width of the corridors, significant deviations of ferry routes would be required around the array areas. These would result in increased delays and cancellations due to insufficient contingency in existing schedules.
- 1.7.7.12 Thirdly, cumulative impacts on vessel to vessel collision risk due to deviations of vessel routes and increased encounters due to the presence of the array areas were assessed as significant. The width of corridors and the volume of traffic was not considered sufficient for effective collision avoidance, particularly between the Morgan Array Area and the Mona Array Area. Furthermore, the likely presence of small craft including crew transfer vessels, fishing and recreational craft were at risk of collision within the corridors.
- 1.7.7.13 Fourthly, a significant impact on the risk of allision (contact between a moving vessel or a stationary one) was identified. As for the risk of collision, the presence of narrow corridors, during adverse weather and avoiding other traffic, may cause commercial ships to come into contact with generation or transmission assets.





- 1.7.7.14 To address these significant effects, possible additional risk control options have been identified to reduce these risks to Broadly Acceptable or Tolerable if ALARP, including changing the array boundaries and additional management of vessel movements. The Applicant has committed to exploring these additional risk controls through further studies and engagement with stakeholders to ensure they are appropriate and adequate for reducing risks to ALARP prior to submission of the application. Appropriate risk controls will then be secured through project consents.
- 1.7.7.15 A screening of transboundary impacts has been carried out and any potential for significant transboundary effects with regard to shipping and navigation from the Morgan Generation Assets upon the interests of other EEA States has been assessed as part of this PEIR. Each individual vessel may be internationally owned or operating between ports in different EEA States. These impacts have been captured and assessed within the shipping and navigation chapter, Navigation Risk Assessment and Cumulative Regional Navigational Risk Assessment. Therefore, no additional transboundary impacts are anticipated.





1.7.8 Marine archaeology

1.7.8.1 Marine archaeology is the physical remains of our human past that survive within the marine environment. This includes maritime archaeology such as shipwrecks and submerged prehistoric archaeological material associated with ancient landscapes. The marine archaeology of the Morgan Generation Assets was characterised through a detailed desktop review of existing data and studies alongside an assessment of site-specific geophysical surveys for the Morgan Generation Assets.

1.7.8.2 The site-specific geophysical survey data corroborates academic theories (Brooks et al., 2011, Jackson et al., 1995, Mellett et al., 2015; Fitch et al., 2011) that the now submerged coastal areas of the east Irish Sea would have formed a partially terrestrial landscape during the Upper Palaeolithic and into the Mesolithic. Final submergence of the marine archaeology study area to the modern coastline would have occurred towards the end of the Mesolithic c.6000 BP. This partially terrestrial landscape would have allowed humans the opportunity to exploit the resources of the intertidal zone during these times and therefore there is the potential for the survival of archaeological material associated with these activities.

1.7.8.3 The east Irish Sea was an area of historically high maritime traffic, however only 52 anomalies of potential archaeological interest were identified within the Morgan Generation Assets survey data, of which five are considered to be of high potential, five are considered to be of medium potential and 42 of low potential. The high potential anomalies include the identification of five wrecks; the Limesfield, a British steamship sunk in 1918, the Flying Meteor, a British paddle steamer tug sunk in 1874, the Ben Rein, a British carrier sunk in 1918, the Hibernian, a British steam ship sunk in 1894 and the Lucy a small British steam ship sunk in 1910.

1.7.8.4 A number of potential impacts on marine archaeology and cultural heritage receptors, associated with the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets, were identified. These included:

- Sediment disturbance and deposition leading to indirect effects on marine archaeology receptors
- Direct damage to marine archaeology receptors
- Direct damage to deeply buried marine archaeology receptors (submerged prehistoric receptors)
- Alteration of sediment transport regimes.

1.7.8.5 These impacts were considered to result in effects of minor adverse or negligible significance, which are not significant in EIA terms.

1.7.8.6 Sediment disturbance and deposition leading to effects on known marine archaeology was deemed to be of minor adverse significance which is not significant in EIA terms, considering the implementation of a Written Scheme of Investigation (WSI) which will ensure that, where possible, known archaeological sites are avoided, any new observations are recorded, and sites are protected or preserved by record where required.



- 1.7.8.7 Direct damage to marine archaeology receptors was deemed to be of minor adverse significance which is not significant in EIA terms, due to the implementation of Archaeological Exclusion Zones (AEZs) around each known shipwreck site and potential site, and review of pre-construction surveys to inform the refined layout of infrastructure around any newly identified archaeological constraints, with provision also made for the recording of any new discoveries.
- 1.7.8.8 Direct damage to deeply buried marine archaeology receptors (submerged prehistoric receptors) was deemed to be of minor adverse significance which is not significant in EIA terms, considering the implementation of a Written Scheme of Investigation and Protocol for Archaeological Discoveries (PAD) which will ensure that, where possible, known archaeological sites are avoided, any new observations are recorded, and sites are protected or preserved by record where required. The PAD will provide a system for the reporting of any prehistoric archaeological material that may be uncovered during the lifetime of the Morgan Generation Assets.
- 1.7.8.9 Cumulative impacts of sediment disturbance and deposition leading to indirect effects on marine archaeology receptors and alteration of transport regimes potentially altering the sediment transport and transport pathways were assessed with other projects and plans screened into the assessment including the construction, operation and maintenance and decommissioning phases of the Morgan Generation Assets.
- 1.7.8.10 The measures adopted as part of the Morgan Generation Assets ensure that any newly exposed archaeological assets are recorded with a WSI and PAD being implemented to facilitate the recording and reporting of any archaeological material discovered during the operations and maintenance phase.
- 1.7.8.11 The cumulative significance of effect for sediment disturbance and deposition and alteration of transport regimes leading to indirect impacts is considered to be minor adverse for all stages of the project which are not significant in EIA terms.
- 1.7.8.12 No transboundary effects with regard to marine archaeology from the Morgan Generation Assets on the interests of other States were predicted.



1.7.9 Other sea users

1.7.9.1 The other sea users include recreational activities, cables, pipelines, aggregate extraction, disposal activities, and oil and gas activities.

1.7.9.2 Within the other sea users study area there are a number of receptors including offshore energy projects, other offshore wind farms, oil and gas activities and carbon capture and storage, cable and pipeline operators, offshore microwave fixed communication links and recreational activities such as sailing, motor cruising and recreational fishing.

1.7.9.3 A number of potential impacts on other sea users, associated with the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets, were identified. The impacts assessed include:

- Displacement of recreational activities
- Increased SSCs and associated deposition affecting recreational diving and bathing sites
- Impacts to existing cables or pipelines or restrictions on access to cables or pipelines
- Increased SSCs and associated deposition affecting aggregate extraction areas
- Alterations to sediment transport pathways affecting aggregate extraction areas
- Reduction or restriction of oil and gas exploration activities (including surveys, drilling and the placement of infrastructure) within the Morgan Array Area.

1.7.9.4 With the measures adopted as part of the Morgan Generation Assets (e.g. commercial crossing agreements) in place, these impacts result in effects which are not significant in EIA terms.

1.7.9.5 Consultation with stakeholders is ongoing to determine the effect of interference with the performance of Radar Early Warning Systems (REWS), and offshore microwave fixed communication links on oil and gas platforms. This impact will be fully assessed in the Environmental Statement.

1.7.9.6 The cumulative effects assessment takes into account the impact associated with the Morgan Generation Assets together with other projects and plans. All cumulative impacts assessed were deemed to be of minor adverse significance which is not significant in EIA terms.

1.7.9.7 No transboundary effects with regard to other sea users from the Morgan Generation Assets on the interests of other States were predicted.



1.7.10 Aviation and radar

- 1.7.10.1 The aviation and radar study area covers all aviation radar systems that provide radar coverage over the Morgan Generation Assets, and which may detect the highest wind turbine blade tip height of 324m above LAT. It has been defined on the basis of the Civil Aviation Authority (CAA) Civil Aviation Publication (CAP) 764 Policy and Guidelines on Wind Turbines (CAA, 2016a) consultation zones and criteria.
- 1.7.10.2 The Morgan Generation Assets would be located within a multi-layered area of lower, Class G uncontrolled airspace and higher, Class C Controlled Airspace (CAS). Above and surrounding the Morgan Generation Assets, the Class G airspace is used by both military and civil registered aircraft. There are no Military Practice and Exercise Areas (PEXAs) located within close enough proximity to the Morgan Generation Assets to create an effect and consequently there will be no direct obstruction created to airborne activities conducted in PEXAs. A network of Helicopter Main Route Indicators (HMRI) is established to the east and southeast of the Morgan Generation Assets. No HMRIs cross the Morgan Generation Assets and they are located at a sufficient distance not to be impacted by the operation of the Morgan Generation Assets.
- 1.7.10.3 The potential impacts on aviation and radar, associated with the construction, operations and maintenance, and decommissioning phases include:
- The creation of physical obstacles to aircraft operations
 - Wind turbines causing interference on civil and military primary surveillance radar systems.
- 1.7.10.4 The creation of physical obstacles to aircraft operations will take place during the construction, operations and maintenance and decommissioning phases due to the implementation or removal of physical objects as part of the Morgan Generation Assets. This will be particularly impactful to military and other low flying operations, including survey work and helicopters operating in the support of the renewables industry. The significance of effect is deemed to be of minor adverse significance across all phases of the project, which is not significant in EIA terms.
- 1.7.10.5 For the interference by wind turbines on civil and military surveillance radar systems the operational wind turbines in the Morgan Array Area would be theoretically detectable by the NATS Lowther Hill and St Anne's Primary Surveillance Radar (PSR), MOD West Freugh PSR, the Ronaldsway (IoM) Airport and BAE Warton PSR systems. Wind turbines detectable by a PSR system might degrade the system by creating false targets, reduce system sensitivity, create radar shadowing behind the wind turbines and saturate the radar receiver leading to clutter potentially concealing real aircraft targets. Overall, the significance of the effect will be of minor adverse significance after technical mitigation, which will be agreed with operators, is applied. This is not significant in EIA terms.
- 1.7.10.6 The cumulative effect for the creation of physical obstacles to aircraft operations is considered to be minor during all phases of the project due to the regional spatial extent of the impact which is not significant in EIA terms.
- 1.7.10.7 The cumulative effect for the wind turbines causing interference on civil and military primary surveillance radar systems when factoring in mitigation measures is considered to be minor adverse during the operations and maintenance phase of the project which is not significant in EIA terms.
- 1.7.10.8 A screening of transboundary impacts has been carried out and has identified that there was no potential for significant transboundary effects with regard to aviation and radar from the Morgan Generation Assets upon the interests of other States.



1.7.11 Climate change

- 1.7.11.1 Climate change refers to the long-term shifts in temperatures and weather patterns that are fundamentally driven by human activities. The GHG emissions arising from the Morgan Generation Assets are characterised by a series of desk-based assessments and articles using published data to determine the impact of the Morgan Generation Assets with the impacts of the effects on climate change being established through the risk assessment process. The potential risks to the Morgan Generation Assets from a changing climate have also been assessed and reported.
- 1.7.11.2 A number of potential impacts on climate change, associated with the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets, were identified as a result of the production of GHG emissions. Adverse effects relating to climate change upon the Morgan Generation Assets were also considered.
- 1.7.11.3 The construction stage impact due to the extraction of raw materials, manufacturing and transportation of materials to site has been assessed. The GHG impacts were calculated to be approximately 1,169,961 tCO₂e, causing a minor adverse effect that is not significant in EIA terms once the measures adopted as part of the Morgan Generation Assets (e.g. application of anti-corrosion protective coatings and integrated scour protection to offshore equipment) are in place. Furthermore, the operations and maintenance stage emissions will predominantly arise from transportation emissions required to maintain the Morgan Generation Assets. Additionally, the operations and maintenance phase of the Morgan Generation Assets would enable the use of excess renewable electricity (avoiding generation curtailment) and the displacement of fossil fuels. When considering the avoided emissions, in addition to operations and maintenance emissions, the operational impact results in the order of approximately 2,256,417 tCO₂e savings by 2064. This would result in a beneficial effect which is significant in EIA terms.
- 1.7.11.4 Despite the high GHG emissions resulting from the construction stage of the development, the magnitude of avoided emissions resulting from the operations and maintenance phase will allow the Morgan Generation Assets to have prevented more emissions than it has produced from the end of the fourth year of operation. Over the lifetime of the Morgan Generation Assets, they would result in 1,019,235 tCO₂e of avoided emissions.
- 1.7.11.5 All developments that emit, avoid or sequester GHGs have the potential to impact the atmospheric mass of GHGs as a receptor, and so may have a cumulative impact on climate change. Consequently, cumulative effects due to other specific local development projects are not individually predicted but are taken into account when considering the impact of the Morgan Generation Assets by defining the atmospheric mass of GHGs as a high sensitivity receptor.
- 1.7.11.6 Consideration of the net impact of the offshore wind turbines and infrastructure will be necessary to ensure that the whole life carbon and net emissions associated the Morgan Offshore Wind Project are assessed. As such, the cumulative assessment completed within the Morgan Generation Assets PEIR incorporates information from other projects, plans and activities with no significant cumulative effects identified.



1.7.11.7 A screening of transboundary impacts has been carried out and any potential for significant transboundary effects with regard to climate change from the Morgan Generation Assets upon the interests of other states has been assessed as part of this PEIR.

1.7.11.8 All developments which emit GHGs have the potential to impact the atmospheric mass of GHGs as a receptor, and so may have a transboundary impact on climate change. Consequently, transboundary effects due to other specific international development projects are not individually identified but would be taken into account when considering the impact of the Morgan Generation Assets by defining the atmospheric mass of GHGs as a high sensitivity receptor. Each country has its own policy and targets concerning carbon and climate change which are intended to limit GHG emissions to acceptable levels within that country's defined budget and international commitments.



1.7.12 SLVIA

- 1.7.12.1 This presents an overview of the baseline environment and the assessment of the potential impact of the Morgan Generation Assets upon the seascape, landscape character and visual resources and receptors, comprising a Seascape Landscape and Visual Impact Assessment (SLVIA).
- 1.7.12.2 Seascape, landscape and visual resources refer to the existing character of the seascape, the physical elements of the landscape, landscape character, areas designated for their scenic or landscape-related qualities and views from publicly accessible locations such as Access Land, Public Rights of Way (PRoW) and transport routes, including national cycleway networks. The SLVIA study area for the Morgan Generation Assets was determined to be a 50km area from the Morgan Array Area.
- 1.7.12.3 A number of potentially significant impacts upon seascape, landscape, and visual resources and receptors associated with the construction, operations and maintenance and decommissioning phases of the Morgan Generation Assets, were identified. 1.7.12.4 The Morgan Array Area would have direct effects upon English Marine Character Area (MCA) 38 Irish Sea South. The section of this seascape that would incorporate the Morgan Array Area would cause very localised significant effects which would reduce with distance and is within an area partly characterised by commercial shipping and ferries, static sea infrastructure and by several operational offshore wind farms including a cluster to the east-northeast of the Morgan Array Area (Northwest England cluster) and a cluster to the south of the Morgan Array Area (the North Wales cluster).
- 1.7.12.5 Regarding the area of offshore waters occupied by the Morgan Array Area, a significant, adverse seascape character effect would arise during the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets. The long-term but reversible, significant seascape effect would extend a modest distance from the Morgan Array Area across MCA 38 Irish Sea South (England) during operations and maintenance, overlapping with the edges of the adjacent Isle of Man MCA 'A' and Welsh Seascape Sensitivity Zone (SSZ) 5. The extent of significant effects would be less during construction and decommissioning. The significant seascape effects predicted to arise during the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets are localised within the above MCAs and SSZs and would not significantly affect these areas when considered as a whole.
- 1.7.12.6 The proposed development would result in no significant effects upon the landscape character of the SLVIA study area, given that these areas of landscape would not be directly affected by the Morgan Array Area. The Morgan Array Area lies over 22km from the nearest land which is the Isle of Man. Douglas Head, Onchan Head and Clay Head are the closest part of the Isle of Man coast. The separation distance between these areas of coastal landscape and the Morgan Array Area is such that significant adverse character effects on land would be avoided. This applies, to a greater extent, with the closest parts of England (the west coast of Cumbria is situated approximately 36km from the Morgan Array Area and the Lancashire coast around Blackpool approximately 50km) and also to the character of the elevated inland landscapes of the Isle of Man (approximately 30km distant) the Lake District National Park and The English Lake District World Heritage Site (WHS) (approximately 38km closest distance) which would not be significantly affected.



- 1.7.12.7 No significant effects are predicted during the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets on nationally designated landscapes in the SLVIA study area, namely Lake District National Park and The English Lake District WHS. The SLVIA concludes that the special qualities of this nationally designated landscape would remain intact and the Morgan Generation Assets would not conflict with or compromise the reasons for the designations.
- 1.7.12.8 A significant adverse visual effect (long-term and reversible) is predicted during the operations and maintenance phase of the Morgan Generation Assets for people using Douglas promenade and other similar publicly accessible, seafront/shoreline locations on the Isle of Man's east coast where framed views of the Morgan Array Area are available at distances less than approximately 25km (e.g. Laxey).
- 1.7.12.9 A significant adverse visual effect (long-term and reversible) is predicted for people onboard the Liverpool to Douglas and Heysham to Douglas ferries during the construction, operations and maintenance and decommissioning phases of the Morgan Generation Assets when passing the Morgan Array Area, travelling in either direction. The visual effect during construction and decommissioning would be less, temporary, short-term in duration and not significant beyond the Morgan Array Area.
- 1.7.12.10 Significant cumulative effects on seascape, landscape and visual resources as a result of the Morgan Generation Assets in combination with other projects and plans are not anticipated to arise during the construction, operations and maintenance and decommissioning phases.



1.7.13 Socio-economics

- 1.7.13.1 This chapter of the PEIR presents the assessment of the potential impact of the Morgan Generation Assets on socio-economics and community. There is a complexity with the socio-economic and community impacts associated with the Morgan Generation Assets' activities primarily manifesting onshore. This chapter's approach is focused on the 'source' of the impact, rather than the location of the physical infrastructure.
- 1.7.13.2 The socio-economics and community regional study area is linked to the selection of construction (and decommissioning), and operations and maintenance ports that will support the associated supply of a range of inputs and services for the Morgan Generation Assets. These ports, and their socio-economic catchment areas are anticipated to form focal points of impact on socio-economic and community receptors. The final selection of port facilities required for the Morgan Generation Assets has not yet been determined. The Applicant is exploring ports, supporting infrastructure and labour markets to understand the potential capabilities, capacities and availability that exists. Subject to these findings, a single port or multiple ports could be used to support primary elements of the construction, operations and maintenance, and decommissioning phases of the Morgan Generation Assets as part of a wider supply chain.
- 1.7.13.3 The potential impacts considered are those economic receptors including employment, Gross Value Added (GVA) and supply chain demand, impact of increased employment opportunities, impact on the demand for housing, accommodation and local services and the impact on tourism and recreation.
- 1.7.13.4 Of the potential impacts considered, most were assessed to be of minor beneficial significance in all socio-economics regional study areas which is not significant in EIA terms. The exception is the impact on economic receptors including employment, GVA, and supply chain demand. During the construction phase effects on economic receptors are assessed as moderate beneficial in North Wales, Northwest England, and Wales – this is significant in EIA terms. During the operations and maintenance phase effects on economic receptors are assessed as moderate beneficial in North Wales and Wales – this is significant in EIA terms. In North Wales and Northwest England the effect on tourism and recreation is assessed as minor adverse for all project phases, which is not significant in EIA terms.
- 1.7.13.5 Of the cumulative impacts considered, the significance of cumulative construction phase employment and GVA impacts were assessed to be of moderate beneficial significance in North Wales, Northwest England, and Wales, which is significant in EIA terms. Cumulative operations and maintenance phase employment and GVA impacts were assessed to be of moderate beneficial significance in North Wales and Wales, which is significant in EIA terms. The cumulative impact upon increased employment opportunities was assessed to be of minor beneficial significance which is not significant in EIA terms. The cumulative impact upon the demand for housing, accommodation and local services during the construction, and operations and maintenance phases was assessed to be of minor beneficial significance which is not significant in EIA terms. The cumulative impact upon tourism and recreation during all phases is assessed as minor adverse, which is not significant in EIA terms.



1.7.13.6 A screening of transboundary impacts has been carried out and any potential for significant transboundary effects with regard to socio-economics and community from the Morgan Generation Assets upon the interests of other States has been assessed as part of the PEIR. Potential transboundary socio-economics and community impacts upon other States may arise through the purchase of project components, equipment and the sourcing of labour from companies based outside the UK. The sourcing of materials and labour from other States is assumed to provide beneficial effects to the economies of said States, and so the consideration of measures envisaged to reduce or eliminate such effects is not relevant in the context of transboundary impacts. Since relevant topic chapters have assessed no significant transboundary effects, it is likely that no related transboundary effects on socio-economics and community receptors will be significant in EIA terms. The screening of transboundary impacts therefore identifies no potential for significant effects with regards to socio-economics and tourism.



1.7.14 Human health

1.7.14.1 The health assessment is informed by the findings of other PEIR chapters, including on commercial fisheries; shipping and navigation; other sea users; seascape, landscape and visual resources; climate change; and socio-economics and community. The health assessment has also been informed by a review of relevant public health evidence sources, including scientific literature, baseline data, health policy, local health priorities and health protection standards.

1.7.14.2 An overall baseline health profile was gathered for the Isle of Man and North West England using publicly available public health evidence. This data reflects slightly poorer health outcomes on the Isle of Man compared to England. For example, healthy life expectancy on the Isle of Man is similar for males but slightly lower for females compared to England. Mortality rates from all causes considered preventable are higher for the Isle of Man than in England. Public health data also indicates poorer health outcomes in the North West region compared to England. Socio-economic conditions and other health determinants are typically worse in the North West compared to England. For example, there is a higher percentage of children in relative and absolute low-income families compared to the England average. The indicators confirm elevated sensitivity, particularly for vulnerable groups, on several measures.

1.7.14.3 The following health effects of the Morgan Generation Assets have been considered:

- The health effects of changes to transport modes, access and connections are considered. The assessment finds that disruption of shipping access to the Isle of Man particularly in relation to adverse weather routing, may lead to a minor adverse effect which is not significant in EIA terms. The Applicant has made commitments to reducing the potential impacts on shipping and navigation receptors and the significant effects that have been identified as part of the individual and cumulative shipping and navigation assessment. These will be tested and applied as part of the assessment post PEIR and included in the Environmental Statement which will be submitted for the DCO application. Therefore, the residual effect is expected to be negligible adverse which is not significant in EIA terms
- The health effects of changes to community identity, culture, resilience and influence have been considered. The assessment finds that changes to the seascape from the Morgan Generation Assets may positively and negatively affect community identity. This may lead to a minor adverse and minor beneficial effect which is not significant in EIA terms
- The health effects of changes to employment and income are considered. The assessment finds that disruption to commercial fisheries may lead to a minor adverse effect. The Applicant has made firm commitments to reducing the potential impacts on shipping and navigation receptors and the significant effects that have been identified as part of the individual and cumulative shipping and navigation assessment. These will be tested and applied as part of the assessment post PEIR and included in the Environmental Statement which will be submitted for the DCO application. The residual effect is expected to be negligible adverse which is not significant in EIA terms
- The health effects of climate change are considered. The assessment finds that renewable energy generation by the Morgan Generation Assets may have a minor beneficial effect which is not significant in EIA terms



- Lastly, the health effects of wider societal infrastructure and resources are assessed. The assessment concludes that the Morgan Generation Assets contribution to renewable energy generation may have a moderate beneficial effect which is significant in EIA terms.

1.7.14.4 The cumulative effects of the Morgan Generation Assets and other relevant proposed developments have been considered:

- The cumulative health effect of changes to transport modes, access and connections in relation to disruption of shipping access to the Isle of Man is judged to be moderate adverse. The Applicant has made firm commitments to reducing the potential impacts on shipping and navigation receptors and the significant effects that have been identified as part of the individual and cumulative shipping and navigation assessment. These will be tested and applied as part of the assessment post PEIR and included in the Environmental Statement which will be submitted for the DCO application. The residual effect is therefore expected to be negligible which is not significant in EIA terms
- The cumulative health effect of changes to community identity, culture, resilience and influence in relation to changes to the seascape is judged to be minor adverse and minor beneficial which is not significant in EIA terms
- The cumulative health effect of changes to employment and income in relation to commercial fisheries is judged to be up to moderate adverse. The Applicant has made commitments to reducing the potential impacts on shipping and navigation receptors and the significant effects that have been identified as part of the individual and cumulative shipping and navigation assessment. These will be tested and applied as part of the assessment post-PEIR and included in the Environmental Statement which will be submitted for the DCO application. Therefore, the residual effect is expected to be negligible which is not significant in EIA terms
- The cumulative health effect of changes to climate is judged as remaining minor beneficial which is not significant in EIA terms
- The cumulative health effect to wider societal infrastructure and resources in relation to renewable energy generation is assessed as being moderate beneficial which is significant in EIA terms.

1.7.14.5 The population health effects identified and assessed have the potential to interact with each other. Having had regard to the nature of the interactions and the degree to which the same people are likely to be affected, the conclusion is that any combined effects are not expected to be of greater significance than the individual effects.

1.7.14.6 Overall, the public health conclusion is that there are a range of beneficial and adverse effects, with more likely significant effects that are beneficial than there are those that are adverse.



1.7.15 Inter-related effects

- 1.7.15.1 The EIA is required to consider indirect and secondary likely significant impacts. For example, the separate impacts of noise and habitat loss may have an effect upon a single receptor such as marine mammals. The inter-related effects assessment is presented in a separate chapter of the PEIR.
- 1.7.15.2 Based on one or a combination of the following factors the overall significance of any inter-related effects was not judged to increase above the significance value assessed for individual effects in the topic-specific chapters:
- The low sensitivity of receptors
 - Small scale nature of effects
 - Availability of alternative habitats
 - Measures adopted as part of the Morgan Generation Assets.

Project lifetime effects

- 1.7.15.3 Inter-related effects can originate from impacts occurring on a receptor group over several phases of the Morgan Generation Assets. For example, a receptor group may experience impacts during the construction and decommissioning phases of the Morgan Generation Assets. These inter-related effects are collectively described as project lifetime effects.
- 1.7.15.4 For all receptor groups identified, following the implementation of measures adopted as part of the Morgan Generation Assets and further mitigation (if required), impacts arising during the construction, operations and maintenance and decommissioning phases of the Morgan Generation Assets are unlikely to result in significant project lifetime effects.

Receptor-led effects

- 1.7.15.5 Inter-related effects may also occur where a receptor group experiences impacts across several different aspects of the environment. For example, a protected species may be impacted by habitat loss, elevated sound levels, and dust during the construction phase of the Morgan Generation Assets. These inter-related effects are collectively described as receptor-led effects.
- 1.7.15.6 All the potential receptor-led effects identified during the construction, operations and maintenance and decommissioning phases of the Morgan Generation Assets have already been considered within the relevant chapters of the PEIR. Therefore, the potential significance of receptor-led effects of the Morgan Generation Assets on each of the identified receptor groups was not considered further in the inter-related effects chapter of the PEIR.



1.8 Next steps

- 1.8.1.1 Consultees are invited to consider all of the information provided in this NTS and to advise on whether they agree with the conclusions. There are a number of ways that stakeholders can provide feedback on the PEIR as part of statutory consultation.
- 1.8.1.2 The Applicant is holding a number of public exhibitions. At these events, the Applicant will specifically consult stakeholders and the local community on the contents of this PEIR. Anyone who could potentially be affected by or may have an active interest in the Morgan Generation Assets is encouraged to attend. The timings and locations of the consultation events are further detailed on the Morgan website: www.morecambeandmorgan.com/morgan.
- 1.8.1.3 Comments on the Morgan Generation Assets PEIR should be made in writing and submitted:
- By post to: **FREEPOST MORGAN**
(please be advised it is not possible to send registered post to a freepost address)
 - By email to: **info@morganoffshorewind.com**
 - By feedback form: available on the project website **www.morecambeandmorgan.com/morgan**, at community events or by request from the consultation team.
- 1.8.1.4 The deadline for receipt of comments on this statutory consultation is 04 June 2023. Any comments received during statutory consultation will be provided to the Planning Inspectorate and may be made public.
- 1.8.1.5 The Applicant will refine further the Morgan Generation Assets design and EIA based on the consultation responses received in relation to the PEIR. The final results of the EIA will be presented in an Environmental Statement and a summary of all the consultation responses received will be presented in a Consultation Report, both of which will accompany the DCO application to be submitted in 2024.



1.9 References

Brooks, A.J., Bradley, S.L., Edwards, R.J. and Goodwyn, N. (2011) The palaeogeography of Northwest Europe during the last 20,000 years. *Journal of Maps*, 573-587.

Department for Business, Energy and Industrial Strategy (BEIS) and Prime Minister's Office (2022). British Energy Security Strategy Available: <https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy>. Accessed June 2022.

Fitch, S., Gaffney, V., Ramsey, E., and Kitchen, E. (2011) West Coast Palaeolandscapes Survey. Available:
<https://www.dyfedarchaeology.org.uk/lostlandscapes/WCPStechical.pdf>. Accessed June 2022.

Jackson, D.I., Jackson, A.A., Evans, D., Wingfield, R.T.R., Barnes, R.P. and Arthur, M.J. (1995) United Kingdom Offshore Regional Report: The geology of the Irish Sea. British Geological Survey.

Mellet, C., Long, D., Carter, G., Chiverrell, R. and Van Landegham, K. (2015) Geology of the seabed and shallow subsurface: The Irish Sea. British Geological Survey Commissioned Rep.

Morgan Offshore Wind Limited (2022) Morgan Generation Assets EIA Scoping Report. Available:
<https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010136/EN010136-000039-Morgan%20Offshore%20Wind%20Farm%20-%20EIA%20Scoping%20Report.pdf>. Accessed October 2022.

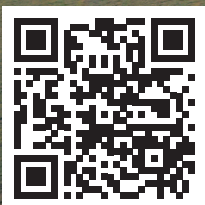
National Grid ESO (2022) Pathway to 2030 Holistic Network Design. Available: <https://www.nationalgrideso.com/document/262681/download>. Accessed July 2022.

The Planning Inspectorate (2018) Advice Note Nine: Rochdale Envelope. Available:
<https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-nine-rochdale-envelope/>. Accessed March 2023.

The Planning Inspectorate (2022) Scoping Opinion Proposed Morgan Generation Assets. Available:
https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010136/EN010136-000057-EN010136_Morgan%20OWF%20Scoping%20Opinion.pdf. Accessed October 2022.

United Nations (1992) United Nations Framework Convention on Climate Change. Available: https://unfccc.int/sites/default/files/convention_text_with_annexes_english_for_posting.pdf. Accessed June 2022.





Project website:
[www.morecambeandmorgan.com/
 morgan](http://www.morecambeandmorgan.com/morgan) or use this QR code



info@morganoffshorewind.com



**FREEPOST
 MORGAN**



**0800 915 2493
 (option 1)**

