



Partners in UK offshore wind

Mona Offshore Wind Project

Preliminary Environmental Information Report
Non-Technical Summary

Mona Offshore Wind Project



Document status					
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Glossary

Terminology

Term	Meaning
Applicant	Mona 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 Mona Generation Assets 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 2010.
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.
Mona 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 Mona Offshore Wind Project will be located.

Term	Meaning
Mona Scoping Report	The Mona Scoping Report that was submitted to The Planning Inspectorate (on behalf of the Secretary of State) for the Mona Offshore Wind Project.
Nationally Significant Infrastructure Project (NSIP)	Large scale development including power generating stations which requires development consent under the Planning Act 2008. An offshore wind farm project with a capacity of more than 100MW in England constitutes an NSIP.
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.
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 decision maker with regards to the application for development consent for the Mona Offshore Wind Project.

Glossary

Acronyms

Acronym	Description
AEZ	Archaeological Exclusion Zones
AfL	Agreement for Lease
ALARP	As Low as Reasonably Practicable
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
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
EMF	Electro-Magnetic Field
EU	European Union
EWG	Expert Working Group
GHG	Greenhouse Gas
GVA	Gross Value Added

Acronym	Description
HGV	Heavy Goods Vehicle
HMRI	Helicopter Main Route Indicators
HVAC	High Voltage Alternating Current
IAQM	Institute for Air Quality Management
ISAA	Information to Support the Appropriate Assessment
Joining Bay	Joint Bay
LAT	Lowest Astronomical Tide
LB	Link Box
LSS	Land Substation
MCZ	Marine Conservation Zone
MHWS	Mean High Water Springs
MOD	Ministry of Defence
MSL	Mean Sea Level
MU	Management Unit
NMRW	National Monuments Record of Wales
NRA	Navigation Risk Assessment
NSIP	Nationally Significant Infrastructure Project
NTS	Non-Technical Summary
OSP	Offshore Substation Platform
PAD	Protocol for Archaeological Discoveries

Units

Acronym	Description
PEIR	Preliminary Environmental Information Report
PEXA	Practice and Exercise Areas
PPW	Planning Policy Wales
PRoW	Public Rights of Way
pSPA	Potential Special Protection Area
PSR	Primary Surveillance Radar
REWS	Radar Early Warning Systems
SAC	Special Area of Conservation
SCI	Site of Community Importance
SLA	Special Landscape Area
SPA	Special Protection Area
SSC	Suspended Sediment Concentrations
SSSI	Site of Special Scientific Interest
TAN	Technical Advice Note
TCE	The Crown Estate
UXO	Unexploded Ordnance
WSI	Written Scheme of Investigation
ZTV	Zone of Theoretical Visibility

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 Mona Offshore Wind Ltd (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 Mona Offshore Wind Project. The Mona Offshore Wind Project is a proposed offshore wind farm located in the east Irish Sea (Figure 1.1).
- 1.1.1.2 This document is a Non-Technical Summary (NTS) of the Preliminary Environmental Information Report (PEIR). The PEIR constitutes the preliminary environmental information for the Mona Offshore Wind Project 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 Mona Offshore Wind Project and the likely significant effects of the Mona Offshore Wind Project in non-technical language. The full PEIR is located at: www.morganandmona.com/en, www.morganandmona.com/cym.

1.1.2 Introduction to the Mona Offshore Wind Project

- 1.1.2.1 The Applicant entered into an Agreement for Lease (AfL) for the seabed from The Crown Estate for the Mona Offshore Wind Project in early 2023. The Mona Array Area (i.e. the area within which the offshore wind turbines will be located) is 449.97km² in area and is located approximately 28.2km (15.2nm) from the Anglesey coastline, 39.9km (21.5nm) from the northwest coast of England and 42.6km (23nm) from the Isle of Man. The Mona Array Area is predominantly located in Welsh offshore waters (beyond 12nm from the Welsh coast), with small parts of the boundary located within English offshore waters (beyond 12nm from the English coast) (Figure 1.1).
- 1.1.2.2 The offshore export cables (cables that bring the electricity from the Mona Array Area to shore) and related works located within and between the Mona Array Area and the landfall will be routed through the Mona Offshore Cable Corridor, which overlaps with both Welsh offshore and Welsh inshore waters. The onshore export cables and onshore substation will be located within the Mona Proposed Onshore Development Area, which is within Conwy and Denbighshire, in north Wales.
- 1.1.2.3 The Mona Scoping Report provided details of the proposed approach to EIA and was submitted to the Secretary of State for the Department of Energy Security and Net Zero (formerly the Department for Business, Energy and Industrial Strategy (BEIS)). The Applicant received responses from stakeholders in the form of the Scoping Opinion in June 2022 (Planning Inspectorate, 2022) and in Quarter 3 of 2022 the Applicant met with stakeholders informally to discuss their feedback in more detail and to refine the proposal ahead of formal consultation on the PEIR.
- 1.1.2.4 The site selection process undertaken for the Mona Offshore Wind Project is presented in section 1.5 and a more detailed description of the Mona Offshore Wind Project is presented in section 1.4.

1.1.3 Structure of the Preliminary Environmental Information Report

- 1.1.3.1 The PEIR contains separate chapters for the offshore and onshore aspects of the EIA. For the purposes of the EIA (including the PEIR) 'offshore' generally refers to the receptors on the seaward side of MHWS and 'onshore' refers to the receptors on the landward side of Mean High Water Springs (MHWS) however there are exceptions where works in the intertidal area are likely to have impacts on land above MHWS. There is an overlap of jurisdiction in the intertidal area between MHWS and Mean Low Water Springs (MLWS) of the marine and terrestrial consenting and regulatory regimes.
- 1.1.3.2 The PEIR is divided into eight volumes:
- Volume 1: Introduction
 - Volume 2: Offshore chapters
 - Volume 3: Onshore chapters
 - Volume 4: Onshore and offshore combined chapters
 - Volume 5: Introduction annexes
 - Volume 6: Offshore annexes
 - Volume 7: Onshore annexes
 - Volume 8: Offshore and onshore combined annexes.

1.1.4 About the Applicant

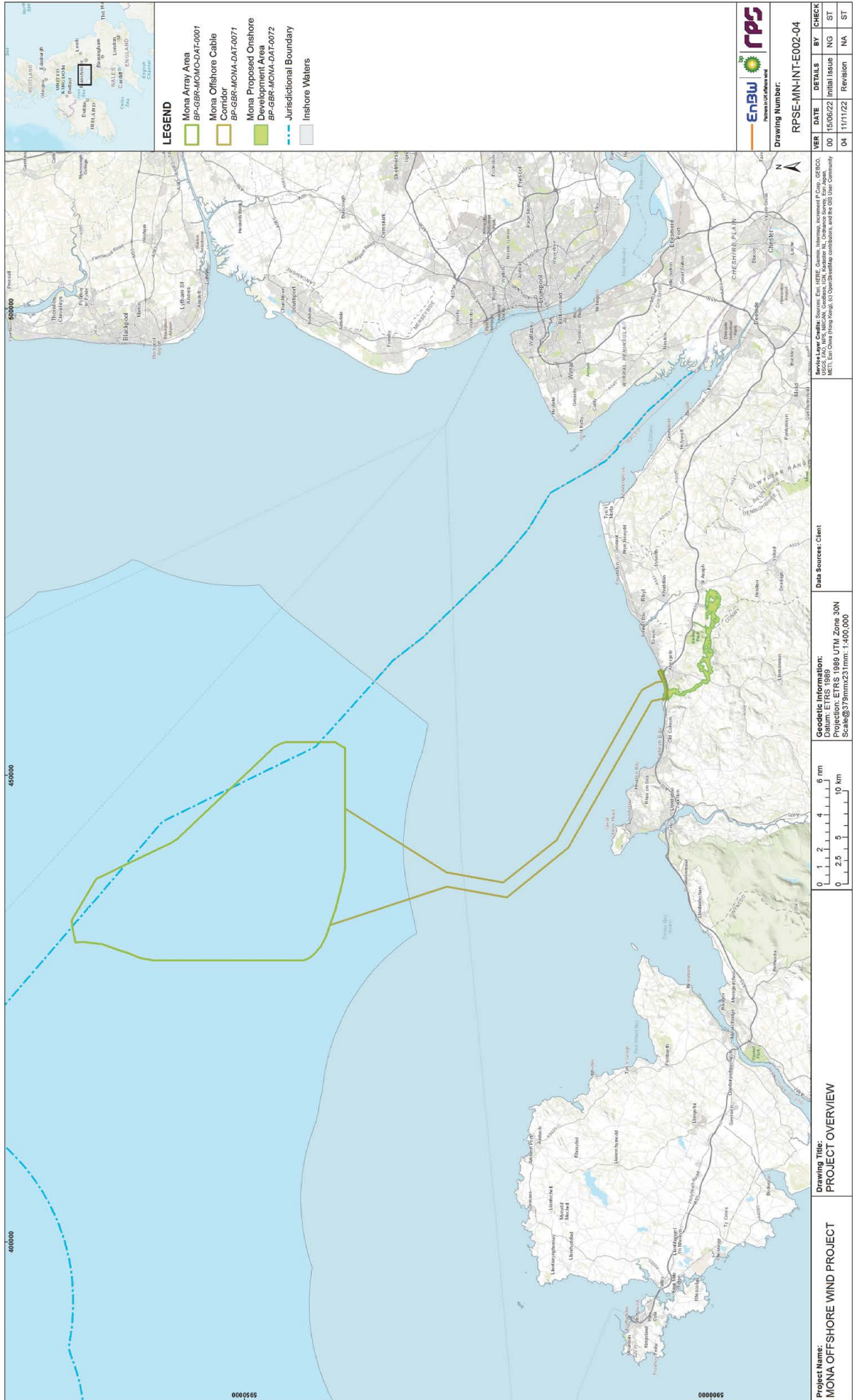
1.1.4.1 The Applicant is a joint venture between two leading energy companies (bp and EnBW). These two companies are working together as partners to deliver offshore wind projects in the UK.

- 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 environmental effects of the Mona Offshore Wind Project, such that they can make an informed contribution to the process of pre-application consultation and to the EIA process. It is important to note that the PEIR contains preliminary information which will be updated with the results of additional surveys and in response to consultation feedback in the final Environmental Statement. The Applicant will be actively seeking feedback on the PEIR from statutory consultees, local communities and interested parties. Information on how you can get involved is outlined in section 1.11.

Figure 1.1: Location of the Mona Offshore Wind Project



1.2 Need for the Mona Offshore Wind Project

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 Mona Offshore Wind Project therefore has 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 Mona Offshore Wind Project is 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 Mona Offshore Wind Project 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 Policy and legislation

1.3.1.1 This section provides a summary of the policy and legislative context for the Mona Offshore Wind Project, 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. This includes (as applicable) National Policy Statements, Planning Policy Wales and reference to the following local authorities and their Local Development Plans:

- Conwy County Borough Council: Adopted Local Development Plan
- Denbighshire County Council: Adopted Local Development Plan.

1.3.2 Consenting regime

1.3.2.1 The Mona Offshore Wind Project requires consent under the Planning Act 2008, as amended. A separate marine licence under the Marine and Coastal Access Act 2009 is also required for licensable marine activities associated with the export cable. 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 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 Mona Offshore Wind Project is set out in section 1.6.

1.3.3 Habitats Regulations

- 1.3.3.1 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 Mona Offshore Wind Project is the Secretary of State for the Department for Energy Security and Net Zero (formerly the Department for Business, Energy and Industrial Strategy (BEIS)) for the infrastructure located wholly within Welsh inshore and offshore waters, English offshore waters and onshore, and NRW for the offshore export cables and related works located within Welsh offshore waters.
- 1.3.3.2 In order to carry out the Habitat 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 the 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 Project description

1.4.1.1 This section of the NTS provides an outline description of the design of the Mona Offshore Wind Project infrastructure, as well as activities associated with the construction, operations and maintenance, and decommissioning of the Mona Offshore Wind Project.

1.4.1.2 It is important to note that the Mona Offshore Wind Project is in the early stages of the development process, therefore the project description is indicative and has been designed to include flexibility to allow for 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 therefore flexibility is required to allow for the adoption of new technology and methods.

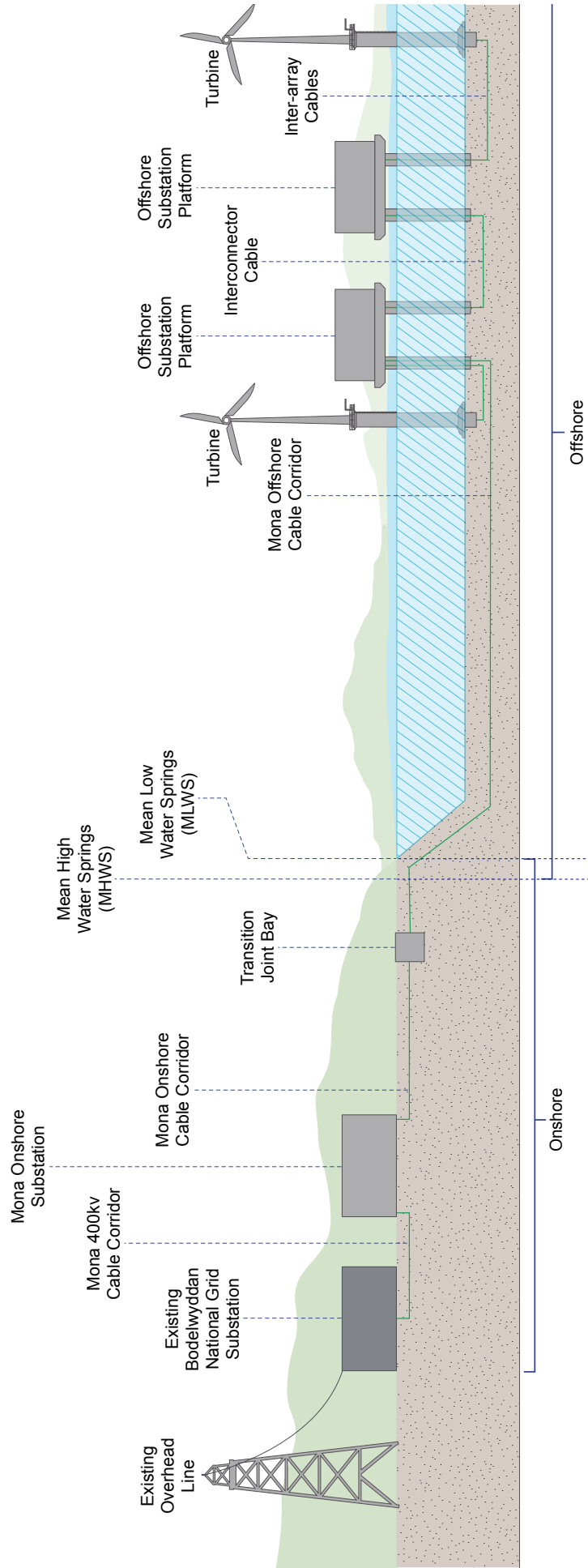
1.4.2 Infrastructure overview

1.4.2.1 The key components of the Mona Offshore Wind Project infrastructure are shown in Figure 1.2. The key components of the Mona Offshore Wind Project include:

- Offshore wind turbines
- Foundations (for wind turbines and Offshore Substation Platforms (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)
- Offshore export cables
- Transition Joint Bays (connecting the offshore and onshore cables)
- Onshore export cables
- Onshore Substation
- Connection into Existing Bodelwyddan National Grid Substation.

1.4.2.2 Construction of the Mona Offshore Wind Project is intended to commence in 2026, and the project is intended 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 Mona Offshore Wind Project 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 the Mona Array Area and Mona Offshore Cable Corridor.

1.4.4 Wind turbines

1.4.4.1 The Mona Offshore Wind Project will consist of up to 107 wind turbines, the final number of wind turbines will be 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 through the offshore export cables to shore. 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 Mona Array Area. The exact locations will be determined during the post-consent detailed design phase. Locations will take into account the seabed 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 Mona Offshore Wind Project final design.

1.4.6.2 The foundation types that are being considered for the Mona Offshore Wind Project 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 Offshore export cables

1.4.7.1 Although the Mona Offshore Cable Corridor has been identified, the exact route of the offshore export cables is yet to be determined and will be based upon geophysical and geotechnical survey information.

1.4.7.2 Up to four offshore export cables, with a voltage of up to 275kV will be required for the Mona Offshore Wind Project. The Mona Offshore Cable Corridor will be up to 90km long and 1.5km wide. Each offshore export cable will also house a fibre optic cable for communication. Where possible, the cables will be buried below the seabed to the landfall.

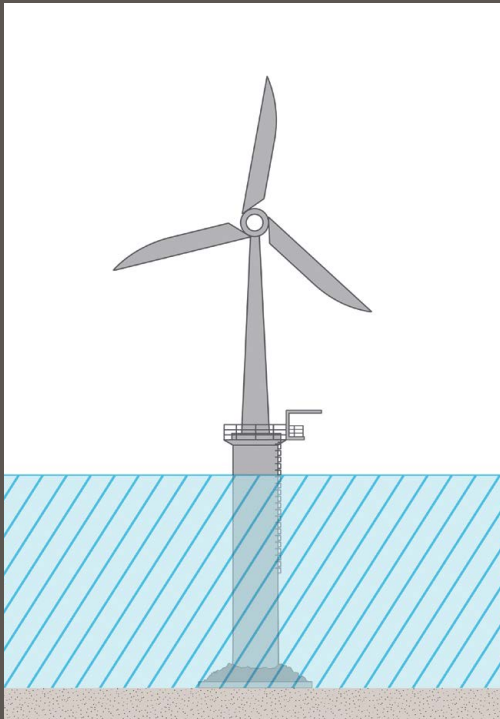


Figure 1.3:
Schematic of a monopile foundation design

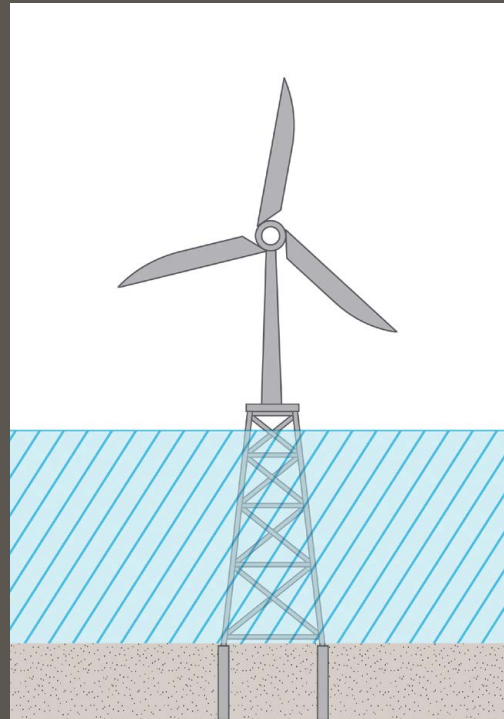


Figure 1.4:
Schematic of a pin pile jacket foundation

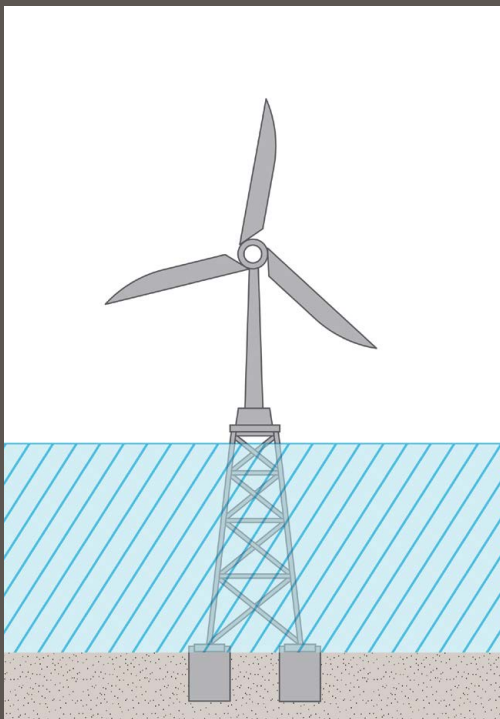


Figure 1.5:
Schematic of a suction bucket jacket foundation

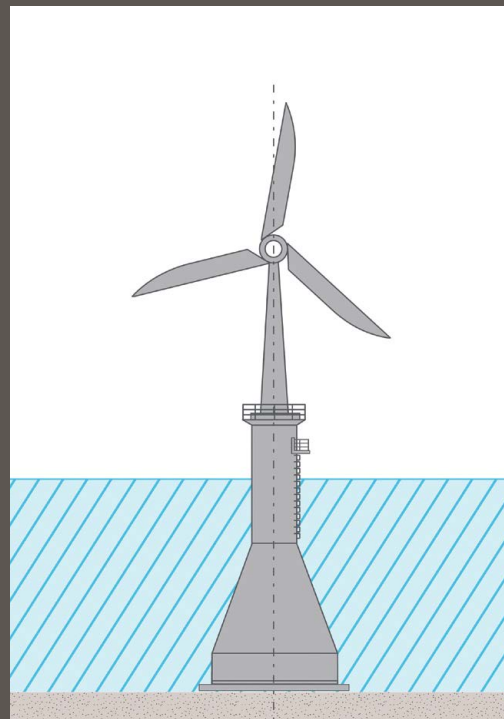
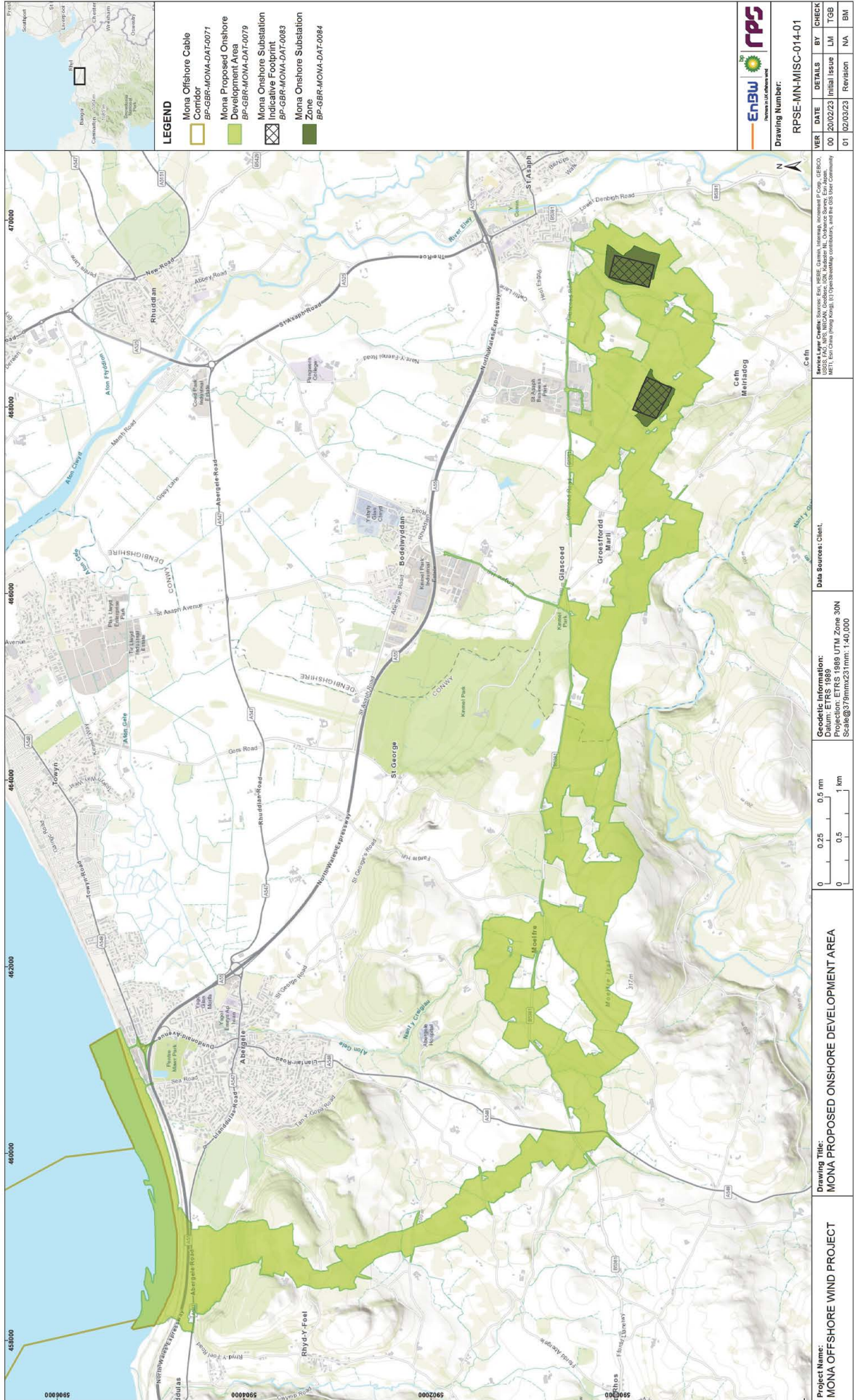


Figure 1.6:
Schematic of a gravity base foundation

1.4.8 Onshore export cables

- 1.4.8.1 The offshore export cables will connect to the onshore export cables at the transition joint bays and will transfer the electricity to the onshore substation. The onshore export cables will be buried for their entire length. Overhead lines are not proposed for the Mona Offshore Wind Project.
- 1.4.8.2 A maximum of four cable circuits has been assumed as the maximum design parameter for the environmental assessment. Each cable circuit will consist of three cables, giving a total of up to 12 cables. Once installed, the cables will occupy a corridor approximately 30m wide, although this width may change where obstacles are encountered.
- 1.4.8.3 The onshore export cables will be located within the Mona Proposed Onshore Development Area. At this time, it is anticipated that the cables would route south from the landfall and pass to the west of Abergele (Figure 1.7).
- 1.4.8.4 The Mona Onshore Cable Corridor will be approximately 18km in length. The cables will be buried underground at a target depth of 1.8m. This target burial depth may be exceeded where the route is required to cross beneath features such as pipelines, land drains, highways or rivers. The Mona Onshore Cable Corridor will be up to 100m wide (including the temporary construction width).
- 1.4.8.5 A further section of buried onshore export cabling is required to connect the Mona Onshore Substation with the existing National Grid substation at Bodelwyddan. This is referred to as the 'Mona 400kV Grid Connection Cable' and will be located within the Mona Proposed Onshore Development Area.
- 1.4.8.6 This section of cabling will be similar in design to the Onshore Cable Corridor: it will be approximately 3km and will be up to 60m wide (including the temporary construction width).

Figure 1.7: Mona Proposed Onshore Development Area



1.4.9 Onshore Substation

- 1.4.9.1 The Mona Offshore Wind Project will connect to the national grid at the Bodelwyddan substation, located south of Rhyl, North Wales. Two locations are proposed for consideration within the PEIR – Land Substation (LSS) Option 2 which is immediately south of the Bodelwyddan substation and LSS Option 7 which is east of the Bodelwyddan substation, near to Pen-rhew and southeast of St. Asaph town.
- 1.4.9.2 The Onshore Substation will contain the electrical components for transforming the power supplied from the offshore wind farm to 400kV and to adjust the power quality and power factor, as required to meet the UK Grid Code for supply to the national grid.
- 1.4.9.3 The Onshore Substation building substructures are likely to be composed of steel and cladding materials. The structural steelwork will be fabricated and prepared off site and delivered to site for construction.
- 1.4.9.4 A Hydrological, Ecological and Landscape Management Plan will be prepared for the onshore substation site that will set out the mitigation measures for screening, ecological habitats and the management of surface water runoff. This will be submitted with the application for consent.

1.4.10 Operations and maintenance phase

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

1.4.11 Decommissioning phase

- 1.4.11.1 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 Mona Offshore Wind Project and is typically prepared post-consent. The Decommissioning Plan and programme will be updated during the Mona Offshore Wind Project lifetime to take account of changes in regulations, best practice and new technologies.
- 1.4.11.2 Wind turbines will be removed and any piled foundations are likely to be cut approximately 1m below the seabed.
- 1.4.11.3 Offshore export, inter-array and interconnector cables will be removed and disposed of onshore. At this time, it is difficult to foresee what techniques will be used to remove cables during decommissioning.
- 1.4.11.4 It is expected that the onshore export cables will be left in situ to minimise the environmental disturbance during decommissioning. The cable ends will be cut, sealed and securely buried as a precautionary measure, and any above ground infrastructure will be removed.
- 1.4.11.5 Decommissioning of the onshore substation will be reviewed in discussion with the transmission system operator and the regulator in the light of any other existing or proposed future use of the onshore substation. If complete decommissioning is required, then all of the electrical infrastructure will be removed and any waste arising disposed of in accordance with relevant regulations.

1.5 Site selection and alternatives

1.5.1 Overview

1.5.1.1 The Applicant has undertaken site selection process to identify the location of the Mona Offshore Wind Project infrastructure. The aim was to identify sites and routes 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 Mona Offshore Wind Project infrastructure.

1.5.2 Identification of the Mona Array Area

1.5.2.1 The Crown Estate (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 Mona Array Area was identified from within the Northern Wales and Irish Sea Bidding Area.

1.5.2.2 The Mona Offshore Wind Project extent was limited to the south by the requirement to maintain at least a 1nm offset from the International Maritime Organisation vessel routing measure (Liverpool Traffic Separation Scheme). The Mona Array Area was limited to the east by the presence of existing oil and gas infrastructure, the closest of which (Conwy platform, operated by Eni) is located approximately 1.8km from the Mona Array Area. The Mona Array Area extent was limited to the east and the south by the project decision to maintain a 10km offset from the Liverpool Bay SPA.

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

1.5.3 Identification of the Mona Offshore Cable Corridor

- 1.5.3.1 National Grid Electricity System Operator (NGESO) coordinate changes needed to the electricity network to accommodate new offshore connections from offshore energy infrastructure. They determined that the preferred connection option representing the most optimal design (economic, efficient and co-ordinated) considering all criteria (i.e. technical, cost, environmental and deliverability) for the Mona Offshore Wind Project was a radial grid connection into Bodelwyddan Substation in North Wales.
- 1.5.3.2 One of the key considerations in the identification of onshore and offshore cable routing options was the identification of landfall options in the vicinity of the National Grid substation at Bodelwyddan. An initial search area was identified for the landfall between the towns of Llandulas and Prestatyn on the North Wales coast. The extent of the landfall search area was to accommodate feasible offshore export cable options and to avoid the ecological designations of the Dee Estuary SAC, SPA and Ramsar to the east, and the Menai Strait and Conwy Bay SAC to the west.
- 1.5.3.3 The Mona Offshore Cable Corridor was designed to avoid 'hard constraints' including existing offshore wind farms (Burbo Bank, Gwynt y Môr, Awel y Môr AfL area), an existing anchorage area, pipeline and cable infrastructure and the 'Liverpool Bay' marine aggregate extraction Area 457. In addition, it sought to specifically avoid interactions as far as possible with key ecological designations including the Dee Estuary SAC and SPA, Lavan Sands SPA and Anglesey Terns SPA. It looked to minimise interaction with ecological designations that could not be avoided, specifically Menai Strait and Conwy Bay SAC and the Liverpool Bay SPA.
- 1.5.3.4 Several potential route options for the Mona Offshore Cable Corridor were identified and were taken forward for further analysis and refinement. Routes were discounted due to technical feasibility and overlap with constraints.
- 1.5.3.5 The resulting Mona Offshore Cable Corridor which has been included in PEIR (Figure 1.1) overlaps with the following constraints:
- Liverpool Bay SPA: this large site extends from the east coast of Anglesey to Morecambe Bay making crossing the site with the Mona Offshore Cable Corridor unavoidable
 - Menai Strait and Conwy Bay SAC: A small portion of the Mona Offshore Cable Corridor overlaps with the Menai Strait and Conwy Bay SAC. The Mona Offshore Cable Corridor avoids the mapped features of the SAC
 - Constable Bank Annex 1 Sandbank Feature: the Applicant has not been able to identify a route that avoids the Constable Bank whilst also avoiding designated reef features of the /Menai Strait and Conwy Bay SAC. The Applicant has routed the Mona Offshore Cable Corridor as far to the west as possible to avoid the admiralty charted Constable Bank feature
 - Sabellaria alveolata reef: The intertidal survey of the Mona Offshore Cable Corridor identified an extensive mature Sabellaria alveolata reef, an Annex 1 habitat at the landfall. The Applicant has mapped this habitat and has committed to maintaining a 50m buffer from the reef at its current extent.

1.5.4 Identification of the Mona Onshore Cable Corridor

- 1.5.4.1 Through reference to the identified area of search, combined with constraints analysis, a list of possible Mona Onshore Cable Corridor options were identified. The location of the Mona Onshore Cable Corridor is driven by the location of the Bodelwyddan National Grid substation and the location of the landfall to the proposed onshore substation site.
- 1.5.4.2 An iterative and multidisciplinary approach incorporating engineering, constructability, cost, environmental, landowner, community, and stakeholder considerations was used in the development of onshore cable route options. A series of internal Mona Offshore Wind Project team workshops were held to ensure each of the factors were considered effectively.
- 1.5.4.3 At this stage of the proposed development of the Mona Offshore Wind Project, it has been noted that the Mona Onshore Cable Corridor would pass through the Llanddulas Limestone and Gwrych Castle Wood SSSI and ancient woodland. It is recognized that open-cut trenching through this would likely result in:
- Cutting through SSSI woodland resulting in a likely significant ecological impact and additional scrutiny on site selection
 - A permanent change to the woodland within the Gwrych Castle Historic Park and Garden (i.e. removal of it) which would require compensatory land to be replace the losses
 - A very visible permanent change to the woodland resulting in a significant visual impact from the coastal footpath and A55 as trees cannot be planted over the onshore cable route
 - A potential significant impact associated with a change to the historic setting of the Gwrych Castle.
- 1.5.4.4 As a responsible developer, the Applicant has made the early commitment to use trenchless techniques (HDD, micro-tunnelling, auger boring, etc. yet to be determined) to avoid these potential impacts.
- 1.5.4.5 Following detailed investigation of the section of the Mona Onshore Cable Corridor between the Abergele Road and Glascoed Road crossroad to the Bodelwyddan National Grid substation a number of significant utilities (such as high pressure gas main, water mains and overhead lines) have been identified that mean that a straight route cannot be optimized.
- 1.5.4.6 As such, the Mona Onshore Cable Corridor as assessed in the PEIR contains optionality that will be refined following formal consultation. Within the identified Mona Proposed Onshore Development Area, emerging routes of ~100m are identified. At the point of final application, a single route of ~70m will be defined which incorporates the results of ongoing studies, and feedback received during consultation.
- 1.5.4.7 Following consultation on the PEIR, the Mona Onshore Cable Corridor will be reviewed and a final option produced for the Mona Offshore Wind Project and its EIA to be set out in the Environmental Statement.



1.5.5 Identification of Mona Offshore Wind Project onshore substation options

- 1.5.5.1 The guiding principles for locating the project's onshore substation are to achieve an economic and efficient connection (i.e. as close as possible to the National Grid connection point) whilst taking into account environmental. The onshore substation area of search was initially defined as a 3km buffer around the grid connection point at Bodelwyddan National Grid Substation.
- 1.5.5.2 The 3km buffer was subsequently expanded to 5km following engineering review of the maximum electrical distance between the Mona Offshore Wind Project onshore substation and the National Grid substation. This also increased the potential number of areas to site the onshore substation as part of the site selection process. Hard constraints (e.g. areas of infrastructure, landfills, roads, railways, overhead lines, etc.) were plotted and removed from the onshore substation area of search.
- 1.5.5.3 Five onshore substation search zones were identified with zone boundaries coinciding with the perimeters of hard constraint areas. An appraisal of each zone was made. Only Zone 5 was retained for further assessment, the other four having been discounted from further consideration.
- 1.5.5.4 Key areas removed from the area of search were the city of St. Asaph with its associated Conservation Area and listed buildings, as well as the Main River (Elwy), and its associated Flood Zones 2 and 3 to the east. The south boundary was refined to avoid a further stretch of the River Elwy and its associated flood zones, along with the Coedwigoedd Dyffryn Elwy/Elwy Valley Woods SAC, Coedydd ac Ogofau Elwy a Meirchion SSSI and the Lower Elwy Valley Historic Landscape, which encompasses scattered listed buildings and Scheduled Monuments.
- 1.5.5.5 The area of search (Zone 5) then formed the basis for the selection of available parcels of land to site potential onshore substations for site selection consideration. In parallel with the Scoping phase of the Mona Offshore Wind Project, in March to June 2022, a long list of onshore substation zones within the overall area of search was identified.

- 1.5.5.6 Following statutory stakeholder consultation and further engineering analysis, discounting of the long list resulted in seven options comprising the short-list for the onshore substation. This short-list of onshore substation options was used to form the basis of a target onshore substation consultation that ran from Monday 26 September 2022 until Monday 07 November 2022. The targeted consultation was designed specifically to seek feedback on the shortlisted locations; intending to combine the ongoing environmental assessment and technical studies with local knowledge to help narrow the location for the onshore substation for PEIR assessment. The intention of the consultation was to select one or more preferred onshore substation location(s) which would be the subject of PEIR to feed into the selection of a preferred onshore substation for the Environmental Statement. Events were held at Bodelwyddan Village Hall, as well as an online webinar, and feedback forms were available on the Mona Offshore Wind Project website – with the potential to email, use a written feedback form or freephone call.
- 1.5.5.7 Following consultation responses, a further review of the preferred onshore substation options was undertaken. Following the discounting of the options outlined in the long list, the following two options comprise the preferred option(s) for the onshore substation: Onshore substation option 2 and Onshore substation option 7.
- 1.5.5.8 Two preferred zones were considered, relative to one another, to determine preferred options for PEIR assessment and consultation. Further consideration was given to matters such as topography, access, landscape framework/screening, hydrology and ground conditions, with a particular focus on heritage, ecology, and LVIA assessment. No conclusion has been drawn on the preferred onshore substation option for the Mona Offshore Wind Project. The indicative onshore substation areas provided for the purposes of PEIR will be further refined, subject to further site investigation, technical design work, ongoing EIA analysis, and any feedback received during the formal consultation at the PEIR stage. A decision will be made post-PEIR of the preferred onshore substation option, with an announcement to be made in mid-late 2023.

1.5.6 Next steps

1.5.6.1 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. The Mona Offshore Wind Project is currently at Stage 4 in the design process. 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.

1.5.6.2 As the Mona Offshore Wind Project progresses past the statutory consultation stage, the Applicant will continue engagement with stakeholders, via the Expert Working Groups (EWGs) and other consultation as necessary. 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 Mona Offshore Wind Project in the preparation of the PEIR. The EIA for the Mona Offshore Wind Project describes the likely effects on the environment arising from the construction, operation and maintenance, and decommissioning of the Mona Offshore Wind Project. 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 Development Consent Order (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 the EIA, 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 Mona Offshore Wind Project to prevent, reduce or offset environmental 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) is discussed further in section 1.6.8 of this document.
- 1.6.2.3 Inter-related effects (i.e. inter-relationships between environmental topics) are assessed in separate chapters (one for onshore and one for offshore) in the PEIR.
- 1.6.2.4 The approach to the principal components of the approach to EIA 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 Mona Offshore Wind Project Scoping Report (Mona 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 May 2022. The Applicant received the Scoping Opinion in June 2022 (The Planning Inspectorate, 2022). The Applicant met with stakeholders to discuss their feedback in more detail and to consider refinements to the Mona Offshore Wind Project ahead of formal consultation on the PEIR.
- 1.6.3.2 Consultation will continue throughout the lifetime of the Mona Offshore Wind Project.

Statement of Community Consultation

- 1.6.3.3 The Applicant has prepared a Statement of Community Consultation (SoCC), which sets out how it plans to consult local communities on the Mona Offshore Wind Project. The Applicant will conduct its consultation in line with the SoCC. The Applicant has consulted on the scope of the SoCC and will consult on the contents of the SoCC with each of the local authorities in whose area the Mona Offshore Wind Project is situated.
- 1.6.3.4 In Wales, community/town councils are also prescribed consultees and will be notified and consulted by the Planning Inspectorate and the Applicant as part of the pre-application consultation.
- 1.6.3.5 Because of the location of the Mona Offshore Wind Project, the local authorities which the Applicant has consulted with are:
- Conwy County Borough Council
 - Denbighshire County Council
 - Flintshire County Council
 - Gwynedd Council
 - Isle of Anglesey Council
 - Powys County Council
 - Wrexham County Borough Council.

Public consultation

- 1.6.3.6 The Applicant carried out a phase of public consultation between 7 June and 3 August 2022. Over the consultation period, a number of events took place. These included an online event (in the form of a webinar), public exhibitions and pop-up events which allowed those interested in, or affected by, the Mona Offshore Wind Project to view the information provided. A second non-statutory consultation phase was undertaken in Autumn 2022 on the potential substation locations.
- 1.6.3.7 At these events (whether online or in person), members of the public were able to view the latest information on the Mona Offshore Wind Project, including maps and diagrams illustrating the proposed infrastructure. They were able to speak directly with members of the Mona Offshore Wind Project team and ask any questions or raise any concerns they had. Participants had the opportunity to complete a feedback form.
- 1.6.3.8 At the end of the non-statutory consultations, feedback was collated and considered and has informed future development of the consultation and EIA processes, where appropriate. All feedback will be comprehensively presented within the Consultation Report, which will be submitted as part of the application.
- 1.6.3.9 Further information on the Mona Offshore Wind Project and its consultation is published on the project website: www.morganandmona.com/en, www.morganandmona.com/cym.

Topic-specific consultation

- 1.6.3.10 The Applicant is facilitating the Evidence Plan Process for the Mona Offshore Wind Project. The process provides an opportunity for stakeholders to advise on proposals at an early stage to help mitigate environmental effects. As part of this, a Steering Group has been established, as well as EWGs to discuss topic-specific issues with relevant stakeholders. The Steering Group consists of the following members:
- Natural Resources Wales (NRW)
 - Natural England
 - Joint Nature Conservation Committee (JNCC)
 - The Marine Management Organisation (MMO)
 - The Planning Inspectorate.
- 1.6.3.11 EWGs have been established for the following topics:
- Physical processes, benthic ecology and fish and shellfish ecology (members include: NRW, Natural England, JNCC, MMO, The Wildlife trusts (TWT) and the Isle of Man government)
 - Marine mammals (members include: NRW, Natural England, JNCC, MMO, TWT and the Isle of Man government)
 - Offshore ornithology (members include: NRW, Natural England, JNCC, MMO, TWT, Royal Society for the Protection of Birds (RSPB) and the Isle of Man government)
 - Onshore ecology (member include Conwy County Borough Council, NRW, RSPB, Denbighshire County Council, north Wales wildlife trust and Welsh Government)
 - Site selection (Conwy County Borough Council, Denbighshire County Council).
- 1.6.3.12 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 Mona Offshore Wind Project, and for stakeholders to express views or concerns on the impacts of the Mona Offshore Wind Project for discussion and, where possible, resolution. Four pre-PEIR MNEF meetings have been held, in November 2021, May 2022, October 2022 and January 2023.
- 1.6.3.13 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.
- 1.6.3.14 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 Mona Offshore Wind Project may have on onshore and offshore historic environment.
- 1.6.3.15 The Applicant has undertaken consultation for seascape, landscape and visual resources with 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 Mona Offshore Wind project EIA process has employed a maximum design scenario (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 Mona Offshore Wind Project 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 Mona Offshore Wind Project, but within certain maximum parameters, which are fully assessed in the EIA. The final Mona Offshore Wind Project 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 Mona Offshore Wind Project). The assessments within the 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 Mona Offshore Wind Project has 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 Mona Offshore Wind Project.

1.6.6.3 Receptors are defined as the physical or biological resource or human user group that could be affected by the Mona Offshore Wind Project 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 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 (IEMA, 2017). The CEA therefore considers the likely effects arising from the Mona Offshore Wind Project alongside the likely effects of other projects, plans and activities in the vicinity of the Mona Offshore Wind Project, 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 Mona Offshore Wind Project 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 Mona Offshore Wind Project, 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 Mona Offshore Wind Project. 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: "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 – Offshore

1.7.1 Physical processes

- 1.7.1.1 Physical Processes refer to the coastal and marine processes as well as tidal currents, wave climate and sediment transport . The physical processes receptors applicable to the Mona Offshore Wind Project 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 site-specific geophysical surveys and habitat assessments indicated that seabed within the Mona Array Area is comprised of sandwaves, megaripples, sediment waveforms and outcrops. The site-specific geophysical survey within the Mona Offshore Cable Corridor indicated the north section of the Mona Offshore Cable Corridor was predominantly flat and featureless however sandwaves and megaripples were observed on the south section towards the intertidal area. The seabed sediments present in the Mona Array Area are classified as sand, sandy gravel, and gravelly sand. There was a transition travelling south from the Mona Array Area of coarse gravelly seabed to finer sand. The geophysical data highlights active sandwaves in the Mona Array Area and desktop studies have drawn attention to a sandbank crossing the Mona Offshore Cable Corridor known as Constable Bank classified under the Habitat's Directive as an Annex 1 habitat although it is not within an SAC. Within the Mona Array Area, the water depth varies from 28.5m to 46.1m relative to the LAT.
- 1.7.1.3 Across the Mona Array Area, the tidal current floods to the east and ebbs to the west. The flows are relatively strong with tidal current speeds typically between 1.2 to 0.9m/s during peak flood, with ebb currents being slightly lower at 0.8 to 0.9m/s. Both the largest proportion and greatest magnitude of waves approach the Mona Offshore Wind Project from the southwest direction. Modelled currents (driven by tides and waves) within the Mona Array Area resulted in an increase of currents on the flood tide and corresponding reduction on the ebb tide during the dominant conditions.
- 1.7.1.4 Within the Mona Array Area, the residual current speeds are high resulting in high sediment transport rates, with sediment transport rates typically lower nearer the shore. During storms approaching from the west, sediment transport increases during flood tides in the Mona Array Area. The non-algal Suspended Particulate Matter (SPM) was estimated to be on average 0.9 to 3mg/l between 1998 to 2015 (Cefas, 2016) displaying typical seasonal patterns with an increase in concentration in winter months within the Mona Offshore Wind Project.

1.7.1.5 Five potential impacts on the physical processes receptors due to the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project, were identified. These were noted as:

- Increase in suspended sediments 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 presence of infrastructure and the associated potential impacts along adjacent shorelines
- Impacts to the wave regime due to presence of infrastructure and the associated potential impacts along adjacent shorelines
- Impacts to sediment transport and sediment transport pathways due to presence of infrastructure and associated potential impacts to physical features and bathymetry
- Impacts to temperature and salinity stratification due to the presence of infrastructure.

1.7.1.6 The potential impacts of an increase in suspended sediments due to construction, operations and maintenance and decommissioning related activities, and the potential impact to physical features such as the sandbanks, reefs, mudflats and sandflats which are the qualifying features of the designated sites and the Constable Bank were either of negligible or minor significance (i.e. not significant in EIA terms). The sediment plumes arising during the construction phase are identified as localised and do not persist beyond the physical processes study area with limited deposition occurring at distance from the site of construction. Sedimentation during the construction phase comprises local material which is not expected to influence the bathymetry of receptors such as sandbanks, reefs, mudflats and sandflats within the Menai Strait and Conwy Bay SAC, Traeth Pensarn Site of Special Scientific Interest (SSSI) and Constable Bank (Annex 1 habitat). Hydrodynamic processes supporting Menai Strait and Conwy Bay SAC, Traeth Pensarn SSSI and Constable Bank characteristics are not altered by the low level of bathymetric change as a result of the construction phase sediment releases. The increased sedimentation from the offshore export cable installation causes a slight increase in sedimentation within the intertidal zone, however this would be insufficient to affect the beach profile.

- 1.7.1.7 During the operations and maintenance phase the effects are reduced in comparison to the construction phase, as works are limited to intermittent, discrete repair activities. Overall, for all receptors associated with Menai Strait and Conwy Bay SAC, Great Ormes Head SSSI, Little Ormes Head SSSI and Constable Bank, the effect will be negligible or minor significance (not significant in EIA terms). 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 suspended sediments may occur during decommissioning if suction caisson foundations are removed however the sediment plume would not interact with any designated areas.
- 1.7.1.8 The Mona Offshore Cable Corridor passes through Menai Strait and Conwy Bay SAC and sediment plumes associated with the Mona Offshore Wind Project may reach Constable Bank and the Traeth Pensarn SSSI. The landfall intersects the Traeth Pensarn SSSI. Horizontal Directional Drilling (HDD) is being considered as an option which would largely avoid impacts at the landfall, but the MDS is open trench technology with the application of coffer dams reducing the release of sediment in the intertidal zone. Any increase in sediment material would be from the sediment cell and will therefore not affect geodiversity. The increased sedimentation from the Mona Offshore Cable Corridor installation causes little or no sedimentation in the intertidal zone which would be insufficient to affect the beach profile. Overall, for all receptors in the intertidal zone, the effect will be negligible or minor (not significant in EIA terms).
- 1.7.1.9 The presence of infrastructure may potentially lead to changes in impacts to the tidal regime, wave regime and sediment transport and associated sediment transport pathways. However, the impacts on receptors within the Menai Strait and Conwy Bay SAC, Traeth Pensarn SSSI and Constable Bank was deemed to be of negligible or minor significance (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 physical characteristics of sandbanks such as the Constable Bank.

- 1.7.1.10 During the decommissioning phase, the magnitude of the impact would be similar to the operations and maintenance phase as all structures above the seabed would be removed, however, scour protection and cable protection are to remain in situ. Increases in suspended sediment concentrations due to the removal of inter-array, interconnector and offshore export cables would be similar to those experienced during the construction phase, as retrieval would be undertaken using similar techniques to installation. Overall, for all receptors, the effect will be negligible or minor significance (not significant in EIA terms).
- 1.7.1.11 No further mitigation in addition to the measures adopted as part of the Mona Offshore Wind Project (e.g. scour protection) is considered necessary for physical processes because the predicted impacts in the absence of mitigation is not significant in EIA terms.
- 1.7.1.12 Cumulative effects are assessed in full in the PEIR. The magnitude of these cumulative effects is deemed to be low for all phases and effects to be of local spatial extent effecting receptors of low sensitivity for all assessed, therefore non were deemed to be significant in EIA terms.
- 1.7.1.13 No significant transboundary effects with regard to physical processes from the Mona Offshore Wind Project on the interests of other States were predicted.

1.7.2 Benthic subtidal and intertidal ecology

- 1.7.2.1 Benthic 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 and intertidal benthic ecology of the Mona Offshore Wind Project was characterised via a series of site-specific surveys using grab sampling, underwater video and eDNA.
- 1.7.2.2 These surveys indicated that the subtidal seabed within the Mona 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 and bivalves in offshore mixed sediments, as well as more general coarse and mixed sediment habitats dominated by marine worms, molluscs and echinoderms. Additionally, some reef-based communities were also identified through these surveys within the Mona Array Area including low resemblance stony reefs as well as sponges that live on hard substrate.
- 1.7.2.3 An Intertidal survey was also conducted for the Mona landfall which identified a diverse range of plants and animals. The upper shore at the Mona landfall contained a wide band of barren shingle and rock with lichens. The middle shore contained boulders, cobbles and rock with barnacle-based communities. The lower shore was characterised by sandy habitats dominated by marine worms and molluscs. An extensive reef formed by the honeycomb worm *Sabellaria alveolata* was also identified at the Mona landfall.
- 1.7.2.4 A number of potential impacts on benthic subtidal and intertidal communities/species, associated with the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project, were identified. These included:
- Temporary habitat disturbance/loss
 - Increased suspended sediment concentrations and associated deposition (including smothering)
 - Disturbance/remobilisation of sediment-bound contaminants
 - Long-term habitat loss
 - Colonisation of hard substrate
 - Increased risk of introduction or spread of Invasive Non-native Species (INNS)
 - Removal of hard substrate
 - Changes in physical processes
 - Electromagnetic fields and heat from subsea cabling.

- 1.7.2.5 With the measures adopted as part of the Mona Offshore Wind Project (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 negligible to minor adverse significance (not significant in EIA terms) for the subtidal, intertidal and Menai Strait and Conwy Bay SAC habitats. This conclusion was reached based on the small proportion of habitat loss predicted in the context of available habitats in the Mona Array Area and as most of the disturbed habitat is sedimentary the habitat is likely to recover following disturbance/loss. Additionally, no significant effects were predicted on protected potential reef habitats within the Mona Array Area, on the assumption that measures to avoid direct impacts to these features will be implemented.
- 1.7.2.7 Increases in suspended sediment concentrations and associated deposition were also deemed to be of negligible to minor adverse significance (not significant in EIA terms) for the subtidal, intertidal and Menai Strait and Conwy Bay SAC habitats. This conclusion was reached due to the short-term nature of the impact with sediments quickly dispersing and most of the important ecological features being of low sensitivity to this type of impact. Again, no significant effects were predicted on protected potential reef habitats within the Mona Array Area, on the assumption that measures to avoid direct impacts to these features will be implemented.
- 1.7.2.8 Long term habitat loss was deemed to be of negligible to minor adverse significance (not significant in EIA terms) for the subtidal and Menai Strait and Conwy Bay SAC habitats (no long-term habitat loss in the intertidal is predicted). This conclusion was reached due to the small area affected in relation to the Mona benthic subtidal and intertidal ecology study area. Again, no significant effects were predicted on protected potential reef habitats within the Mona Array Area, on the assumption that measures to avoid direct impacts to these features will be implemented.
- 1.7.2.9 Cumulative effects from aggregate extraction activities, dredging activities, cables and pipelines, remedial works and other offshore renewable developments were assessed for their impact in relation to:
- Temporary habitat disturbance/loss, increased suspended sediment concentrations and associated deposition, long-term habitat loss, colonisation of hard substrate, increased risk of introduction or spread of INNS and changes in physical processes.
- 1.7.2.10 The cumulative effects assessment predicted these impacts would result in effects of negligible to minor adverse significance (not significant in EIA terms) upon subtidal and intertidal benthic communities within the CEA benthic subtidal and intertidal ecology study area.
- 1.7.2.11 No transboundary effects with regard to benthic subtidal and intertidal ecology from the Mona Offshore Wind Project on the interests of other States 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 fish which travel between marine and freshwater environments for spawning activity, and the relationships these organisms have with each other and the physical environment. The fish and shellfish ecology chapter of the Mona Offshore Wind Project was characterised primarily through desktop review due to the large amount of data publicly available 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 Mona Offshore Wind Project, and in the wider fish and shellfish ecology study area. Species of particular ecological and commercial interest included herring, which have high and low intensity spawning grounds to the north and northeast of the Mona Offshore Wind Project. Sandeel, which are a key prey species for many other marine predators, were also noted as having important populations and spawning grounds in this area. Consultation with stakeholders highlighted the importance of queen and king scallop to commercial fishing activities. Therefore, information from vessel position data and outputs from fisheries stakeholder consultation were incorporated into the fish and shellfish ecology chapter to show the distribution of key fishing and spawning grounds for these species, with overlap with the Mona Array Area noted. Basking shark and angel shark populations were also examined, with the potential for these passing through or occurring within the Mona Offshore Wind Project highlighted. The likelihood of angel shark being present within the area is low, with the most abundant local populations identified approximately 30km from the Mona Array Area, and only intermittently present. Whilst basking shark are known to migrate through the wider fish and shellfish ecology study area, none were recorded from the site-specific surveys for the Mona Offshore Wind Project.
- 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 Mona Offshore Wind Project were identified. These included:
- Temporary habitat loss or disturbance
 - Underwater sound impacts
 - Increased suspended sediment concentrations 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 Mona Offshore Wind Project (e.g. implementation of piling soft-start and ramp-up measures), all of these impacts in all project phases result in effects of either negligible or minor adverse significance, which are not significant in EIA terms.
- 1.7.3.5 The impact of underwater sound was not considered to result in a significant impact to herring spawning at the known spawning grounds off the coast of the Isle of Man due to the distance from the Mona Offshore Wind Project to these grounds.
- 1.7.3.6 Temporary and long-term habitat loss/disturbance were both deemed to be of minor adverse significance (not significant in EIA terms) to fish and shellfish receptors, as the proportion of habitat lost within the Mona Offshore Wind Project was predicted to be small in the context of other similar available habitats in the wider fish and shellfish ecology study area.
- 1.7.3.7 Cumulative effects from nearby offshore wind farm construction, dredging and disposal, and other relevant projects were assessed within a 50km radius of the Mona Offshore Wind Project for direct impacts, and a 100km radius for underwater sound. These nearby projects were examined and predicted to result in negligible to minor adverse (non-significant) impacts on fish and shellfish species within the defined 50km study area. For underwater sound, the impact was assessed to still be minor adverse due to the very low level of cumulative noise impact from other projects.
- 1.7.3.8 No transboundary effects on the interests of other States are predicted for fish and shellfish ecology from the Mona Offshore Wind Project.

1.7.4 Marine mammals

- 1.7.4.1 The marine mammal chapter considers species of whales, dolphins and porpoises as well as seal species found in the vicinity of the Mona Array Area, in terms of their distribution, abundance and density. The chapter baseline was informed by a combination of site-specific surveys, in the form of digital aerial surveys, and a desk-top study.
- 1.7.4.2 The site-specific surveys indicated that the species found in the vicinity of the Mona 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 Mona 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 in west Wales. Harbour porpoise and bottlenose dolphin occur year-round, whereas 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 southern Irish Sea, whereas harbour seal are concentrated along the northeast coast of Ireland, east coast of Northern Ireland and the Firth of Clyde.
- 1.7.4.3 A number of potential impacts on marine mammals, associated with the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project, were identified. These included:
- Injury and disturbance from elevated underwater sound during piling
 - 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 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.
- 1.7.4.4 With the measures adopted as part of the Mona Offshore Wind Project (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 is not significant in EIA terms.

- 1.7.4.5 Injury and disturbance from elevated underwater sound during piling was deemed to be of minor adverse significance (not significant in EIA terms) to marine mammals in the Mona 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 measures adopted as part of the Mona Offshore Wind Project in place in the form of a draft Marine Mammal Mitigation Protocol (MMMP), 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 harbour porpoise, bottlenose dolphin, minke whale and grey seal, which confirmed the assessment that this impact was unlikely to lead to population level effects.
- 1.7.4.6 Increased risk of injury of marine mammals due to collision with vessels was deemed to be of minor adverse significance (not significant in EIA terms). 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 the provisions set out in the offshore Environmental Management Plan (EMP). With the adherence of this EMP, in combination with the likelihood that animals will be deterred by the noise of moving vessels, the risk of collision is reduced.
- 1.7.4.7 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 (section 1.7.3). These were predicted to result in effects of negligible or minor adverse significance (not significant in EIA terms) upon harbour porpoise, short-beaked common dolphin, Risso's dolphin, minke whale, grey seal and harbour seal within the Celtic and Irish Seas. For bottlenose dolphin, a moderate adverse effect (significant in EIA terms) resulted when considering the impact in the context of the Irish Sea Management Unit population, however when considered in the context of the wider combined population of the Offshore Channel and Southwest England MU plus the Irish Sea MU, there is no significant effect.
- 1.7.4.8 No transboundary effects with regard to marine mammals from the Mona Offshore Wind Project 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, seaducks, divers and grebes are also considered because of their additional reliance on marine areas, especially in the non-breeding season. Information on seabirds within the Mona offshore ornithology array area study area and the Mona offshore ornithology offshore cable corridor study area was collected through a detailed desktop review of existing studies and datasets and site-specific surveys (digital aerial surveys).
- 1.7.5.2 The site-specific digital aerial surveys indicated that the Mona Array Area supported a seabird assemblage that is the 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 Mona Offshore Wind Project, 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 suspended sediment concentrations (SSCs)
 - Barrier effects.
- 1.7.5.4 With the measures adopted as part of the Mona Offshore Wind Project in place (e.g. an offshore EMP which will include measures to reduce disturbance to rafting birds from transiting vessels), the impacts resulted in effects of either negligible or minor adverse significance which is not significant in EIA terms.
- 1.7.5.5 Disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure was deemed to be of either negligible to minor adverse significance (not significant in EIA terms) to the seabird species within the Mona Array Area and in the vicinity of the Mona Offshore Wind Project, due to the short-term nature of the impact during the construction and decommissioning phases. Furthermore, seabirds recorded in the site-specific surveys over the Mona Array Area (plus buffer) had a low sensitivity to this type of impact during the operations phase of the wind farm.

- 1.7.5.6 Indirect impacts from underwater sound affecting prey species were also deemed to be of minor adverse significance (not significant in EIA terms) on ornithological receptors due to the short-term nature of the impact. Similarly, temporary habitat loss/disturbance and increased suspended sediment concentrations (SSCs) were deemed to be of minor adverse significance (not significant in EIA terms). Crucially no significant effects of collision were predicted on seabirds and migratory non-seabirds within the Mona Array Area and the barrier effect was deemed to be of negligible adverse significance which is not significant in EIA terms.
- 1.7.5.7 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 Mona Offshore Wind Project. In addition, population modelling was carried out to explore the potential of the combined collision risk and disturbance and displacement to affect the population trajectory over time for common guillemot and great black-backed gull which confirmed the assessment that this impact was unlikely to lead to population level effects. The combined collision risk and disturbance and displacement from airborne noise, underwater sound, and presence of vessels and infrastructure was considered to be of minor adverse significance (not significant in EIA terms).
- 1.7.5.8 No transboundary effects with regard to offshore ornithology from the Mona Offshore Wind Project 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 were dominated by dredge vessels and shellfish were the most important species group in terms of landed weight and value. Within and around the Mona Array Area there are queen scallop grounds, of particular importance to dredge vessels from the west coast of Scotland. These vessels, as well as 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 Mona Array Area operate out of Fleetwood and Whitehaven. Beam trawl vessels from Belgium and the south coast of England are also occasionally present within the vicinity targeting flatfish, such as sole. Within the nearshore parts of the Mona Offshore Cable Corridor, small static gear vessels are present in low numbers, which operate out of ports along the North Wales coast.
- 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 Mona Offshore Wind Project, 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 Mona Offshore Wind Project (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 is not significant in EIA terms.
- 1.7.6.5 Loss or restricted access to fishing grounds is a impact that is of particular importance for Scottish west coast vessels, who rely on a queen scallop grounds within and around the Mona Array Area. During construction, the loss or restricted access to fishing grounds is assessed as an effect no greater than minor adverse significance (not significant in EIA terms) on all commercial fisheries receptor groups, 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 EIA terms. In order to mitigate this effect, options to increase the minimum distance between wind turbines and options to align the wind 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 Mona Offshore Wind Project (e.g. development of a Fisheries Co-existence and Liaison Plan), 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 no greater than minor adverse significance (not significant in EIA terms) on all commercial fisheries receptor groups. This is due to the rolling construction zones, and 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 and beam trawl vessels from fishing within the Mona Array Area. Based on this assumption, displacement of fishing activity is assessed as an effect of moderate adverse significance (significant in EIA terms). This impact was assessed as minor adverse for Isle of Man vessels, as they also target these fishing grounds, but do not rely as heavily on them. Following the implementation of further mitigation measures the residual impacts on Scottish west coast vessels are assessed as minor adverse, which is not significant in EIA terms.
- 1.7.6.8 Significant cumulative impacts, in EIA terms, were identified with the Morgan Offshore Wind Project. The main cumulative impact identified between the Mona Offshore Wind Project and the Morgan Offshore Wind Project for commercial fisheries focused on loss or restricted access to fishing grounds arising from the operations and maintenance phase. The cumulative effect of loss or restricted access to fishing grounds on Scottish west coast scallop vessels, as a result of other offshore wind developments, is of moderate adverse significance (which is significant in EIA terms). In order to mitigate this effect on the Scottish west coast scallop fleet, options to increase the minimum distance between wind turbines and options to align the wind turbines with orientations of fishing tows are being explored by the Applicant that could allow for continued scallop dredging activity within the Mona Array Area, thus potentially enabling co-existence. Following further measures, the residual impacts on Scottish west coast scallop vessels will be assessed within the Environmental Statement and are expected to be 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 Mona Offshore Wind Project 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 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 Mona Offshore Wind Project is 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. Traffic separation schemes, existing offshore wind farms, oil and gas and aggregate activities occur within the shipping and navigation study area. Commercial shipping bound for the ports of Liverpool, Douglas and Heysham cross through the Mona Array Area. Regular ferry services between the UK, Isle of Man and the island of Ireland operate through or adjacent to the Mona 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. An anchorage is located to the east of Anglesey, near to the Mona Offshore Cable Corridor.
- 1.7.7.3 Adverse weather, particularly from the prevailing southwest, was demonstrated to have an influence of 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 Mona Offshore Wind Project, were identified. The impacts assessed include: impacts to vessel routing, impacts to port operations, impacts to navigational safety and impacts to emergency response. With the measures adopted as part of the Mona Offshore Wind Project (e.g. guard vessels) in place, the majority of these impacts result in effects which are not significant. However, two significant effects were identified:
- Firstly, impacts on adverse weather routing for some ferry service routes as a result of the presence of the Mona Array Area were assessed as significant. During adverse weather conditions, Stena vessels operating between Liverpool and Belfast, and Isle of Man Steam Packet Company vessels operating between Liverpool and Douglas navigate through the footprint of the Mona Array Area. With the wind turbines in place, vessels would be required to deviate to the southwest of the Mona Array Area to maintain safe and comfortable vessel motions. This has the potential to increase transit durations and some additional cancellations of services
 - Secondly, impacts on vessel-to-vessel collision risk due to deviations of vessel routes and increased encounters due to the presence of the Mona Array Area were assessed as significant. In particular, the impacts to commercial vessel routing to the southwest of the Mona Array Area was assessed to lead to increased interactions and reduced the ability of ships to comply with collision regulations. Furthermore, the close proximity of the Mona Array Area with these routes increased the potential for small craft emerging from the site being involved in a collision with passing vessels.

- 1.7.7.5 To address these significant effects, the Applicant has committed to additional risk control options to reduce these risks to Broadly Acceptable or Tolerable if As Low as Reasonably Practicable (ALARP), including:
- Amendments to the Mona Array Area Boundary to maintain a 2nm offset between the Mona Array Area and the approaches to the Liverpool TSS
 - Amendments to the Mona Array Area Boundary to reduce the northern extent of the Mona Array Area by approximately 3nm to increase the gap between the Mona and Morgan Array Areas
 - Commitment to two lines of orientation.
- 1.7.7.6 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 as low as reasonably practicable (ALARP) prior to submission of the application. Appropriate risk controls will then be secured through project consents.
- 1.7.7.7 The assessment of impacts on shipping and navigation of the Mona Offshore Wind Project were considered cumulatively with other proposed and existing projects. The Applicant has been collaborating with other developers of cumulative projects to identify and address any significant effects. The assessment noted that these would result in corridors between the Morgan and Mona Array Areas which increased navigational risk and were potentially unsafe to navigate in adverse weather conditions. In particular, the assessment of the cumulative impacts of the Mona, Morgan and Morecambe Array Areas identified significant effects:
- Firstly, impacts on adverse weather routing as a result of the presence of the cumulative projects were assessed as significant. Routes from Stena, Isle of Man Steampacket Company and Seatruck were all impacted by the presence of the Array Areas and the corridors. During adverse weather, and as a result of the width of the corridors between cumulative projects, deviations were required around the array areas. These would result in some additional delays and cancellations of ferry services
 - Secondly, 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 Mona and Morgan Array Areas. Furthermore, the likely presence of small craft including crew transfer vessels, fishing and recreational craft were at risk of collision within the corridors
 - Thirdly, a significant impact on the risk of allision (contact between a moving vessel and 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 elements of the Mona Offshore Wind Project.

- 1.7.7.8 To address these significant effects, the Applicant has committed to additional risk control options to reduce these risks to Broadly Acceptable or Tolerable if ALARP, including changing the array boundaries and additional management of vessel movements (see paragraph 1.7.7.5). The Mona Offshore Wind Project 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 Application. Appropriate risk controls will then be secured through project consents.
- 1.7.7.9 A screening of transboundary impacts has been carried out and any potential for significant transboundary effects with regard to shipping and navigation from the Mona Offshore Wind Project upon the interests of other States has been assessed as part of this PEIR. Each individual vessel may be internationally owned or operating between ports in different States. These impacts have been captured and assessed within this shipping and navigation chapter, Navigational Risk Assessment (NRA) and Cumulative Regional Navigational Risk Assessment (CRNRA). 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 Mona Offshore Wind Project was characterised via a detailed desktop review of existing data and studies alongside an assessment of site-specific geophysical surveys for the Mona Array Area.
- 1.7.8.2 Survey data supports 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 periods. Final submergence of the marine archaeology study area to the modern coastline would have occurred towards the end of the Mesolithic c.6000 before present. This 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 49 anomalies of potential archaeological interest were identified within the Mona Array Area survey data, including the identification of three wrecks and four potential wreck sites. Of the three verified wrecks, one location coincides with the known wreck site the *Tijl Uilenspiegel*, a late 20th century Belgian fishing trawler that was lost in 1989. The other two known wrecks have been identified as post medieval or modern lightship and a potential WWI steam ship.
- 1.7.8.4 Geophysical survey data for the Mona Offshore Cable Corridor is yet to be assessed, but the desktop data for the Mona Offshore Cable Corridor has identified two known wrecks within the Mona Offshore Cable Corridor with verifiable positional data. These are the Albanian and the Nydia, which are both 19th century ships that were lost in a collision with each other off the coast of Great Orme. The desktop study has also identified a further 32 entries that may correspond to the remains of archaeological material within the Mona Offshore Cable Corridor and there remains the potential for as yet unknown and or buried archaeological material to be present. The results of the geophysical survey assessment will provide further information on the baseline marine archaeology environment of the Mona Offshore Cable Corridor and will be included within the Environmental Statement.
- 1.7.8.5 A number of potential impacts on marine archaeology and cultural heritage receptors, associated with the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project, 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
 - Alteration of sediment transport regimes.

- 1.7.8.6 The implementation of a Written Scheme of Investigation (WSI) 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. 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.
- 1.7.8.7 Direct damage to marine archaeology receptors will be mitigated through 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. Provision will also be made for the recording of any new discoveries. Direct damage to marine archaeology receptors was deemed to be of minor adverse significance which is not significant in EIA terms.
- 1.7.8.8 The implementation of a WSI and Protocol for Archaeological Discoveries (PAD) will provide a system for the reporting of any prehistoric archaeological material that may be uncovered during the lifetime of the Mona Offshore Wind Project. Direct damage to deeply buried marine archaeology receptors was deemed to be of minor adverse significance which is not significant in EIA terms.
- 1.7.8.9 Physical processes modelling found that the Mona Offshore Wind Project structures do not have a significant influence on either tide or wave conditions. As such alteration of sediment transport regimes which may affect archaeological features is of negligible adverse significance which is not significant in EIA terms.
- 1.7.8.10 The cumulative effects assessment takes into account the impact associated with the Mona Offshore Wind Project together with other projects and plans. All cumulative impacts assessed were deemed to be of no/minor adverse significance which is not significant in EIA terms.
- 1.7.8.11 No transboundary effects with regard to marine archaeology from the Mona Offshore Wind Project 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 which included carbon capture and storage.
- 1.7.9.2 Within the other sea users regional study area there are a number of receptors including; offshore energy projects (including other offshore wind farms), oil and gas activities, cable and pipeline operators, aggregate extraction, offshore microwave fixed communication links, recreational diving and bathing sites and recreational activities such as sailing, motor cruising, diving, inshore water sports 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 Mona Offshore Wind Project, were identified. The impacts assessed include:
- Displacement of recreational activities
 - Impacts to existing cables or pipelines
 - Impacts to aggregate extraction areas
 - Reduction or restriction of oil and gas exploration activities.
- 1.7.9.4 With the measures adopted as part of the Mona Offshore Wind Project in place (e.g. commercial crossing agreements), these impacts result in effects which are of minor adverse significance and thus 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 Mona Offshore Wind Project together with other projects and plans. All cumulative impacts assessed were deemed to be of minor adverse significance and thus not significant in EIA terms.
- 1.7.9.7 No transboundary effects with regard to other sea users from the Mona Offshore Wind Project on the interests of other States were predicted.

1.7.10 Inter-related effects (offshore)

1.7.10.1 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.

1.7.10.2 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 Mona Offshore Wind Project.

Project lifetime effects

1.7.10.3 Inter-related effects can originate from impacts occurring on a receptor group over several phases of the Mona Offshore Wind Project. For example, a receptor group may experience impacts during the construction and decommissioning phase of the Mona Offshore Wind Project. These inter-related effects are collectively described as project lifetime effects.

1.7.10.4 For most receptor groups identified, following the implementation of measures adopted as part of the Mona Offshore Wind Project and further mitigation (if required), impacts arising during the construction, operations and maintenance and decommissioning phase of the Mona Offshore Wind Project are unlikely to result in significant project-lifetime effects. However, there is the potential for project-lifetime effects significant to EIA to occur on the following receptor groups identified in the Inter-related effects (offshore) chapter of the PEIR:

- Commercial fisheries: Potential adverse effect of the Mona array area on access to fishing grounds regarding Scottish west coast scallop vessels
- Shipping and navigation: Potential adverse effect of the Mona Offshore Wind Project on collision and allision risk of fishing vessels.

Receptor-led effects

1.7.10.5 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, noise, and dust during the construction phase of the Mona Offshore Wind project. These inter-related effects are collectively described as receptor-led effects.

1.7.10.6 All the potential receptor-led effects identified during the construction, operations and maintenance and decommissioning phase of the Mona Offshore Wind Project have already been considered within the relevant chapters of the PEIR. Therefore, the potential significance of receptor-led effects of the Mona Offshore Wind Project on each of the identified receptor groups was not considered further in the Inter-related effects (offshore) chapter of the PEIR.

1.8 Potential environmental effects – Onshore

1.8.1 Geology, hydrogeology and ground conditions

- 1.8.1.1 As part of the Mona Offshore Wind Project, potential impacts on geology, hydrogeology and ground conditions have been assessed. Geology is the science that deals with the earth's physical structure, its history, and the processes that act on it, whereas hydrogeology is the study of groundwater and 'ground conditions' usually refers to the geology, hydrology, soil condition and any contamination of the ground. Potential impacts were assessed during the construction, operations and maintenance, and decommissioning phases.
- 1.8.1.2 The assessment was based on a desktop review of available literature, both public and online data and information contained in a related report regarding the geology, hydrogeology and ground conditions (GHGC) study area. The report included targeted comprehensive information on the geological, hydrogeological and hydrological setting of the study area and other information such as pollutions incidents, abstraction licences and constraints. Historical Ordnance Survey mapping and aerial photography was also reviewed as part of the assessment.
- 1.8.1.3 The GHGC study area includes sections of Llandulas beach to the west of Abergele and includes a pronounced ridge that extends south-eastward towards Bodelwyddan, south of the A55 road which is formed by bedrock of the Clwyd Limestone Group and the underlying Ffernant Formation. The low-lying land situated to the north of the ridge is underlain by sandstone bedrock principally of the Warwickshire Group. Much of the high ground, south of the ridge, is underlain by old bedrock that comprises mudstones of the Silurian Elwy Formation. The limestone of the Clwyd Limestone Group and the low-lying land west of St Asaph underlain by the sandstones of the Warwickshire Group is also in the GHGC study area.
- 1.8.1.4 With respect to groundwater, the limestones constitute an important groundwater resource whereas the predominantly sandstone units of the Warwickshire Group and Ffernant Formation can form locally important groundwater bodies and the Silurian bedrock of the Elwy Formation yields little groundwater. However, the bedrock across the Mona Proposed Onshore Development Area is concealed beneath a surface layer of clay-rich glacial till, with only localised occurrence of groundwater. No groundwater source protection zones or licensed groundwater abstractions have been identified within the Mona Proposed Onshore Development Area.
- 1.8.1.5 The only geological or geomorphological sites within the Mona Proposed Onshore Development Area are the caves within the Llanddulas Limestone and Gwrych Castle Wood SSSI.

- 1.8.1.6 The Mona Proposed Onshore Development Area has been subject to significant deep, metal mining principally associated with the Clwyd Limestone Group. This metal mining is old, dating back to the 1800's and is commonly associated with surface shafts and associated infrastructure. The predominant risk to the Mona onshore transmission assets posed by historical mining relates to geotechnical stability. The former NRW Llanddulas Beach landfill could represent a risk to groundwater quality given it is crossed by the Mona Proposed Onshore Development Area.
- 1.8.1.7 A number of potential impacts on geology, hydrogeology and ground conditions associated with the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project, were identified. These included:
- The impact or loss of, or damage to, designated sites of geological and geomorphological interest
 - Loss of, or damage to non-designated sites of geological and geomorphological interest
 - Sterilisation of safeguarded limestone mineral resources
 - Alteration and deterioration to groundwater quantity or quality in the glacial till and bedrock
 - Ground stability issues associated with areas of historical deep mining operations.
- 1.8.1.8 However, with appropriate mitigation measures in place such as the use of trenchless techniques for the construction under the Llanddulas Limestone and Gwrych Castle Wood SSSI, implementation of Code of Construction Practice (CoCP) to ensure effective management of environmental risk and best practice measures as part of detailed design, the impacts are assessed to be either negligible or minor adverse which is not considered significant in EIA terms.
- 1.8.1.9 Groundwater source protection zones and licensed groundwater abstractions were deemed to not be at risk of impact given their position with the local groundwater system and therefore are not considered significant in EIA terms.
- 1.8.1.10 Cumulative effects from other developments were assessed and impacts of temporary and permanent activity considered upon geology, hydrogeology and ground condition receptors. The cumulative effect is predicted to be of local spatial extent and results in minor adverse and not considered significant in EIA terms.
- 1.8.1.11 Further surveys (e.g. the survey of private groundwater abstractions) will be undertaken in the next stages of the Mona Offshore Wind Project to evolve and refine the baseline survey information. Following this, the onshore cable route will be refined and landowners will be consulted to determine the location and details of any Private Water Supply Sources (PWSSs) present within the GHGC study area that may be affected by the Mona Offshore Wind Project.

1.8.2 Hydrology and flood risk

1.8.2.1 Information on hydrology and flood risk within the hydrology and flood risk study area was collected through a detailed desktop review of existing studies and datasets. The Mona Proposed Onshore Development Area makes landfall at Llandulas beach to the west of Abergele and traverses predominantly through agricultural land uses and woodland. Whilst there are no Main Rivers identified within the hydrology and flood risk study area, several ordinary watercourses are crossed by the route of the Mona Onshore Cable Corridor.

1.8.2.2 A number of potential impacts on hydrology and flood risk associated with the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project were identified. These included:

- The impact of increased flood risk arising from additional surface water runoff during construction
- The impact of increased flood risk arising from the diversion of any watercourse
- The impact of increased flood risk arising from additional surface water runoff during operation of the Onshore Substation
- The impact of increased flood risk arising from damage to existing flood defences
- The impact of contaminated runoff on the quality of watercourses
- The impact of damage to existing field drainage
- The impact of damage to existing water pipelines.

1.8.2.3 With the mitigation measures adopted as part of the Mona Offshore Wind Project (e.g. cofferdams and the implementation of a CoCP) in place, the majority of these impacts result in effects of either negligible or minor adverse significance and as such are not significant in EIA terms.

- 1.8.2.4 Increased flood risk arising from additional surface water runoff during construction may occur as a result of the use of open cut cable installation techniques across the beach. The site selection process for the Mona Offshore Wind Project (e.g. siting of construction compounds, the haul road, construction accesses and the Mona Onshore Cable Corridor) has accounted for potential impacts on flood risk that would arise in other parts of the Mona hydrology and flood risk study area from any change in runoff over the areas affected during construction through embedded mitigation (e.g. size and location) to minimise these impacts as much as possible. The Mona Proposed Onshore Development Area and onshore substation are situated within a mainly rural area, with limited residential properties within the surrounding area. Overall, the impact on the Mona hydrology and flood risk study area was deemed to be of minor adverse significance which is not significant in EIA terms and the impact on the Mona Proposed Onshore Development Area was deemed to be of negligible adverse significance which is not significant in EIA terms.
- 1.8.2.5 The cumulative impact of increased flood risk arising from additional surface water runoff considered the Mona Offshore Wind Project alongside the Awel y Môr offshore wind project. The construction of Awel y Môr infrastructure (such as compounds, haul roads and the onshore cable corridor) may lead to a temporary change in surface water runoff and an increased flood risk. Overall the cumulative impact on the Mona hydrology and flood risk study area was deemed to be of minor adverse significance which is not significant in EIA terms and the cumulative impact on the Mona Proposed Onshore Development Area was deemed to be of negligible adverse significance which is not significant in EIA terms.
- 1.8.2.6 A screening of transboundary impacts has been carried out and has identified that there was no potential for significant transboundary effects with regard to hydrology and flood risk from the Mona Offshore Wind Project upon the interests of other states.

1.8.3 Onshore ecology

- 1.8.3.1 Ecology refers to the communities of animals and plants which live in the environment and the relationships that they have with each other and with the physical environment. As part of the Mona Offshore Wind Project, potential impact on onshore ecology was assessed during the construction, operations and maintenance, and decommissioning phases. Potential impacts on ornithology or the 'scientific study of birds' is not included in this section as it has been assessed separately.
- 1.8.3.2 The Mona onshore ecology study area starts at the intertidal zone at the Mona landfall and continues through limestone hills that are dominated by farming and improved grassland used for sheep grazing. The baseline surveys indicated a range of habitat types and of varying quality which included habitats of importance such as semi-natural broadleaved woodland, mature broadleaved trees, scrub, waterbodies, watercourses and field boundaries comprised of species-rich hedgerows. Small areas of coastal habitats such as coastal vegetated shingle are also present at the coast.
- 1.8.3.3 The habitats within the Mona onshore ecology study area have the potential to support a range of protected species including badgers, bats, fish and eel, great crested newts, hazel dormice, invertebrates, otters, reptiles, water voles, and white clawed crayfish. Detailed surveys identified a population of great crested newt within the Mona proposed onshore development area.
- 1.8.3.4 A number of potential impacts associated with the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project, were identified. These included:
- Temporary and permanent habitat loss
 - Habitat disturbance
 - Habitat fragmentation and species isolation
 - Pollution caused by accidental spills/contaminant
 - The spread of INNS.

- 1.8.3.5 Ancient woodland is present throughout the Mona Proposed Onshore Development Area, but an assessment of the effects found that there are no effects on ancient woodland as a consequence of the commitment to avoid these areas where possible, and if not use a construction technique whereby a tunnel is drilled under the designated area known as Horizontal Directional Drilling (HDD). This method of construction avoids impacts to ancient woodland. Areas of higher value habitat are also present within the Mona Proposed Onshore Development Area, associated with the vegetated shingle beach at landfall, which is designated SSSI on the basis of the plant communities. The Mona Offshore Wind Project has committed to not installing export cables through this SSSI. Open trenching is proposed through the landfall that will result in a minor adverse effect, which is not considered significant in EIA terms.
- 1.8.3.6 The assessment of the impact of habitat fragmentation and species isolation found that the effects on habitats and species are generally found to be not significant. The temporary loss of habitat connectivity as a result of woodland, hedgerow, tree, watercourse fragmentation will result in a minor adverse effect which is not considered significant in EIA terms.
- 1.8.3.7 Cumulative effects from other developments were assessed and impacts of temporary and permanent habitat loss and habitat disturbance were assessed for protected species. The cumulative effect is predicted to be of local spatial extent and results in minor adverse effects that are not considered significant in EIA terms.
- 1.8.3.8 Further surveys will be undertaken in the next stages of the Mona Offshore Wind Project to evolve the baseline survey information and to refine and develop a Hydrological, Ecological and Landscape Management Plan which will seek to have a net increase in biodiversity across the site as a result of the development.

1.8.4 Historic environment

- 1.8.4.1 Historic environment encompasses all aspects of the past including buried archaeological remains, sedimentary classification and deposits and records preserved in ancient rocks built heritage and the character of the historic landscape. As part of the Mona Offshore Wind Project, potential impacts on the terrestrial historic environment were assessed through a combination of desk-based research and targeted site visits and fieldwork.
- 1.8.4.2 The Mona historic environment study area comprises the area of land that will be temporarily or permanently occupied during the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project. The study area includes designated historic assets of significance within 1km from the edge of the Mona Proposed Onshore Development Area and between 1-5km radius centred on the Mona Onshore Substation option sites depending on the type/importance of asset. The study area also included buried archaeology and other non-designated historic assets (as recorded on the Historic Environment Record (HER) data) within 500m from the edge of the Mona Proposed Onshore Development Area and a 1km radius centred on the Mona Onshore Substation option sites. Marine archaeology is addressed in section 1.7.8.
- 1.8.4.3 The assessment revealed that the Mona Proposed Onshore Development Area has the potential to contain archaeological remains of all periods, with the greatest potential probably being for remains of the Roman period in the vicinity of Glascoed Road where the alignment of a possible Roman Road is thought to traverse the local area. A survey of the Mona Landfall area found no evidence of peat or similar organic material outcropping at surface level, although there is still potential for such remains to be present at sub-surface levels. There was one small piece of peat identified but it had clearly been ex situ for some time, and there was no evidence to suggest the former location of this piece of peat prior to being detached and washed out. A historic environment geophysical survey is also ongoing. In addition, the Mona Proposed Onshore Development Area does not contain any designated historic landscape elements. However, there are numerous historic field boundaries present and these have been considered in the assessment.
- 1.8.4.4 Nationally important heritage assets are present within and adjacent to the Mona Proposed Onshore Development Area. Those within this defined area comprise a Registered Park and Garden of Special Historic Interest and a Grade II Listed wall forming the boundary of this park and garden.
- 1.8.4.5 A number of potential impacts on historic environment resources, associated with the construction, operation and maintenance, and decommissioning phases of the onshore elements of the Mona Offshore Wind Project, were identified. These included:
- Direct physical impacts on buried archaeological remains and deposits, as well as the two nationally important heritage assets
 - Impacts arising from change within the setting of historic assets and changes to the character of the historic landscape.

- 1.8.4.6 Direct physical impacts on buried archaeological remains and deposits of interest during construction are permanent. Well designed and targeted programmes of fieldwork undertaken ahead of construction will seek to identify such remains and deposits within the Mona Proposed Onshore Development Area and hence allow impacts to be avoided or minimised through the Mona Offshore Wind Project design at those locations. However, there is always the possibility that some remains and deposits may not be identified until they are encountered during construction, and this could in some circumstances include remains and deposits of importance.
- 1.8.4.7 The western part of the Mona Proposed Onshore Development Area passes through a Grade II* Registered Park and Garden of Special Historic Interest, the north boundary of which comprises a Grade II Listed stone wall. Whilst it is likely that the cables would be installed beneath the wall using construction techniques known as HDD which avoids impacts, the methodologies that would be employed for the installation of the cable through the historic park and garden are not yet finalised and there is the potential for effects of up to moderate adverse significance in the event that impacts cannot be avoided or minimised to an appropriate level, which would be significant in EIA terms. However, ongoing surveys will enable scheme design to be focused ahead of the Environmental Statement such that the magnitude of impact will be reduced, and the adverse effects will be reduced in significance.
- 1.8.4.8 Where direct impacts on above ground historic assets cannot be avoided through scheme design, programmes of further research and investigation will be undertaken ahead of and during construction. These will not reduce the overall impacts or effects but will serve to offset such impacts and effects. The residual effects will therefore continue to be of up to moderate adverse significance, which is significant in EIA terms.
- 1.8.4.9 During construction and decommissioning stages, the impact of the onshore transmission assets on above ground historic assets as a result of change within their setting and on the character of historic landscape will be of up to minor adverse significance, which is not significant in EIA terms.
- 1.8.4.10 During operation and maintenance stages, the impact of the Mona Onshore Substation on above ground historic assets as a result of change within their setting and on the character of the historic landscape is minor adverse and not significant in EIA terms.
- 1.8.4.11 Cumulative effects from other defined developments within the agreed study areas were assessed and predicted to result in effects of up to minor adverse significance, which is not significant in EIA terms.
- 1.8.4.12 No transboundary effects with regard to the historic environment of the Mona Proposed Onshore Development Area were predicted.

1.8.5 Land use and recreation

- 1.8.5.1 This chapter considers existing land uses, including agriculture and recreation, which may be physically or indirectly affected during the construction, operations and maintenance and decommissioning phase of the Mona Offshore Wind Project. Existing land uses were identified through a combination of desk-based analysis and site-specific surveys. Desk based analysis of existing studies and datasets identified the soil types and patterns, agricultural land quality, farm holdings and recreational resources (e.g. footpaths, bridleways) likely to be affected by the Mona Offshore Wind Project. Site specific surveys were undertaken in 2022 and comprised walkover surveys of public rights of way to establish the nature and condition of recreational resources.
- 1.8.5.2 The desk-based analysis determined that land within the Mona Proposed Onshore Development Area predominantly comprised Agricultural Land Classification (ALC) Grade 3a and Grade 3b land and 84 landholdings. In addition, several recreational resources were identified within or near the Mona Proposed Onshore Development Area, including coastal areas (e.g. beaches), Wales Coast Path, National Cycle Route (NCR) 5 and Public Rights of Way (PRoW).
- 1.8.5.3 The following potential impacts were identified with respect to land use and recreation during the construction, operations and maintenance and decommissioning phase of the Mona Offshore Wind project:
- Temporary and permanent loss of best and most versatile land
 - Temporary and permanent disruption to the operation of farm holdings
 - Temporary and permanent impact on the recreational use of coastal areas, recreational resources and Wales Coast Path and National Cycle Route 5.
- 1.8.5.4 Following the implementation of measures adopted as part of the Mona Offshore Wind Project (e.g. control of the timing of soil handling operation) in place, these impacts range from minor to moderate adverse, which are not significant in EIA terms.
- 1.8.5.5 The temporary and permanent loss of best and most versatile land during the construction, operations and maintenance and decommissioning phase of the Mona Offshore Wind Project would result in a moderate adverse effect. Based on National Policy under Planning Policy Wales (PPW) and Technical Advice Note (TAN) 6 (Welsh Government, 2010), this is not considered to be a significant loss of the best and most versatile agricultural land, as the area affected falls well below the threshold of 20ha identified in this policy. Therefore, on this basis, the loss of a maximum of approximately 4.8ha of Subgrade 3a land is not assessed to be significant in EIA terms.

- 1.8.5.6 The temporary disruption caused to the operation of farm holdings during the construction phase of the Mona Offshore Wind Project would result in a moderate adverse effect, which is significant in EIA terms. The permanent disruption caused to the operation of farm holdings during the construction, operations and maintenance and decommissioning phase of the Mona Offshore Wind Project would result in a minor adverse effect, which is not significant in EIA terms.
- 1.8.5.7 The temporary impact on the recreational use of coastal areas, Wales Coast Path and National Cycle Route 5 during the construction phase of the Mona Offshore Wind Project would result in a minor adverse effect, which is not significant in EIA terms. The temporary impact on the recreational use of recreational resources during the construction phase of the Mona Offshore Wind Project would result in a moderate adverse effect, which is not significant in EIA terms.
- 1.8.5.8 A cumulative assessment was conducted for land use and recreation that considered agricultural land quality, farm holdings and recreational resources during each of the project phases. It was found that during the construction phase, all potential cumulative effects would be of minor adverse significance, which is not significant in EIA terms. No further cumulative effects for land use and recreation are identified in the operations and maintenance phase.
- 1.8.5.9 It is considered that there is no potential for significant transboundary effects to occur during the construction, operations and maintenance and decommissioning phase of the Mona Offshore Wind Project upon the interests of other States with respect to air quality.

1.8.6 Traffic and transport

- 1.8.6.1 Traffic and transport relates to the movement demand generated by the Mona Offshore Wind Project and its effects upon other road users and surroundings. The construction phase of the Mona Offshore Wind Project will generate the greatest number of vehicle movements as the transportation of construction materials will incur the greatest number of Heavy Goods Vehicle (HGV) and staff movements and it is this phase that the traffic and transport chapter of the PEIR focusses on.
- 1.8.6.2 The traffic and transport chapter of the PEIR sets out the initial traffic and transport study area, the key highway links within this, estimations on the typical daily number of construction vehicle movements and an initial environmental impact assessment that has been undertaken in advance of access points being determined and access routes being confirmed.
- 1.8.6.3 An initial traffic and transport study area has been identified including the A55 road and relevant parts of the local highway network determined as being likely to be used by construction generated vehicles. A base position is being established by obtaining publicly available traffic surveys, undertaking new traffic surveys, analysing road safety and analysing public transport services and provision and facilities for pedestrians and cyclists.
- 1.8.6.4 An initial impact assessment has been undertaken within the PEIR chapter in advance of access points being determined and access routes confirmed and has identified that the Mona Offshore Wind Project average daily construction traffic flows are low in comparison to base traffic flows throughout the initial traffic and transport study area.
- 1.8.6.5 The effects of the Mona Offshore Wind Project average daily construction traffic flows upon driver delay, severance of routes, pedestrian delay, pedestrian amenity, accidents and road safety and hazardous and dangerous and abnormal indivisible loads were found to be of negligible or minor adverse significance, which is not significant in EIA terms. Measures will also be adopted as part of the Mona Offshore Wind Project to reduce traffic impact (e.g. the identification of suitable HGV routes).
- 1.8.6.6 As the access points have not yet been determined and therefore the access routes not yet confirmed, the full extent of the highway network to be assessed has not yet been fully confirmed. Therefore, the projects to be considered cumulatively cannot yet be confirmed and a cumulative environmental assessment will therefore be set out in the application for Development Consent.
- 1.8.6.7 No transboundary effects with regard to traffic and transport from the Mona Offshore Wind Project on the interests of other States were predicted.
- 1.8.6.8 No inter-related effects with regard to traffic and transport from the Mona Offshore Wind Project were predicted.

1.8.7 Noise and vibration

- 1.8.7.1 Unwanted noise and vibration can lead to adverse impacts on existing residential amenity and public health. As such, it's important that the impacts of noise and vibration predicted from the construction and operation of new developments be assessed and mitigated as best is reasonably practicable. The existing sound environment in the development area for the Mona Offshore Wind Project was characterised via site-specific surveys where long-term noise monitoring provided data for the determination of impact assessment criteria.
- 1.8.7.2 The long-term and short-term sound surveys highlight that much of the area forming the Mona Onshore Development area has a low noise climate due to the rural nature of the area. The dominant sources of noise were noted to be traffic on the A55 and other local roads, which became more influential towards the Mona landfall region.
- 1.8.7.3 A number of potential noise and vibration impacts associated with the construction, operational and maintenance, and decommissioning phases of the Mona Offshore Wind Project were identified. These included:
- Noise impacts arising from the construction of the offshore generation assets, the Onshore Cable Corridor, and the Onshore Substation
 - Impacts due to vibration due to piling activities in the intertidal region in close proximity to static caravans along the Abergele coastline
 - Operational noise impacts due to the Onshore Substation plant.
- 1.8.7.4 By adopting the noise control measures set out in a Construction Noise Management Plan and an Operational Noise Management Plan, the majority of these impacts will result in effects of minor adverse significance which is not significant in EIA terms.
- 1.8.7.5 Effects of moderate adverse significance have been identified where trenchless techniques are required to install the onshore transmission cables. This is due to the high noise levels associated with the construction plant as well as the potential need for night-time working where existing noise levels are low. The potential for moderate adverse effects has also been identified at the landfall. The significance of these effects will be reduced by providing enhanced acoustic mitigation (e.g. enclosures), particularly around equipment in continuous operation. Considering the temporary duration of this potential impact (construction only) and providing such measures are adopted, it is possible the significance of this effect may be reduced to minor adverse which is not significant in EIA terms.
- 1.8.7.6 Cumulative effects from nearby noise-generating developments (construction or operational) within 1 km of the Mona Offshore Wind Project were assessed and were predicted to result in minor adverse effects which is not significant in EIA terms.
- 1.8.7.7 No transboundary effects with regard to noise and vibration from the Mona Offshore Wind Project on the interests of other States were predicted.

1.8.8 Air quality

- 1.8.8.1 Air quality is a measure used to describe the level of pollutants present within the air. Dust and particulate matter can be generated by onsite construction activities and dust also can be tracked out onto the public road network. There may also be changes in atmospheric pollutant concentrations due to the combustion of fuel in vehicles.
- 1.8.8.2 During construction and decommissioning, the key pollutant is dust, covering both the particulate matter fraction that is suspended in the air that can be breathed, and the deposited dust that has fallen out of the air onto surfaces and which can potentially cause temporary annoyance effects. Property, human-health and vegetation (ecological receptors) are all potentially affected.
- 1.8.8.3 Additional traffic generated during the construction phase is not yet known and the potential effects of tracked out dust and changes in vehicle emissions cannot be determined at this stage. Therefore, this chapter only considers the potential risk of impacts of deposited dust and an increase in particulate matter generated during the construction and decommissioning phases of the Mona Offshore Wind Project.
- 1.8.8.4 The potential risk of impacts from tracked out dust and changes in vehicle emissions on air quality during the construction and decommissioning phase of the Mona Offshore Wind Project will be considered in the Environmental Statement.
- 1.8.8.5 A review of local monitoring of particulate matter was undertaken and compared with the Defra mapped background concentration estimates to determine a suitable baseline concentration.
- 1.8.8.6 The following potential impacts were identified with respect to air quality during the construction and decommissioning phase of the Mona Offshore Wind Project:
- A medium dust impact risk of dust soiling on property arising from onsite activities
 - A low dust impact risk of particulate matter on people arising from onsite activities
 - A high dust impact risk of particulate matter on ecology arising from onsite activities.

- 1.8.8.7 However, following the implementation of appropriate dust control measures (e.g. water suppression), these impacts would result in negligible effects, which are not significant in EIA terms.
- 1.8.8.8 The effect of dust soiling on property arising from onsite activities during the construction and decommissioning phase of the Mona Offshore Wind project was determined to be negligible, which is not significant in EIA terms.
- 1.8.8.9 The effect of particulate matter on people arising from onsite activities during the construction and decommissioning phase of the Mona Offshore Wind project was determined to be negligible, which is not significant in EIA terms.
- 1.8.8.10 The effect of particulate matter on ecology arising from onsite activities during the construction and decommissioning phase of the Mona Offshore Wind project was determined to be negligible, which is not significant in EIA terms.
- 1.8.8.11 Measures to reduce impact will also be adopted as part of the Mona Offshore Wind Project (e.g. the creation of a Construction Noise Management Plan).
- 1.8.8.12 Cumulative effects between the Mona Offshore Wind Project and other projects/ plans located within 700m were assessed with respect to air quality. This included the potential impact of dust and particulate matter generated by onsite construction and decommissioning activities on property, human-health and ecological receptors. The assessment determined that cumulative effects on air quality between the Mona Offshore Wind Project and other projects/plans during the construction, operations and maintenance and decommissioning phase were unlikely to be significant in EIA terms.
- 1.8.8.13 It is considered that there is no potential for significant transboundary effects to occur during the construction, operations and maintenance and decommissioning phases with respect to air quality.

1.8.9 Onshore and intertidal ornithology

- 1.8.9.1 Breeding, wintering, and migratory birds use both the terrestrial and intertidal habitats located along the Mona Proposed Onshore Development Area. Waterbird and seabird species that depend on wetlands and the marine environment for survival at some point in their life cycle use the intertidal habitats and nearshore waters of the Mona Proposed Landfall in winter and during passage periods (i.e. spring and autumn). In addition, terrestrial habitats along the Mona Proposed Onshore Development Area provide a range of functions (e.g. foraging, non-foraging activities and nesting) for breeding birds (e.g. birds of prey and passerines) and wintering and migratory birds. Information on breeding, wintering and migratory birds within the onshore ornithology study area and the intertidal ornithology study area was collected through a detailed desktop review of existing studies and datasets, and site-specific surveys, including intertidal waterbird, onshore breeding, and wintering bird surveys.
- 1.8.9.2 The site-specific intertidal ornithological surveys indicated that the Mona Proposed Landfall supported a waterbird and a seabird assemblage that is typical of the coast of north Wales and is dominated by seaducks and divers in the nearshore waters and wader species within the intertidal zone. These species primarily comprised common redshank *Tringa totanus*, Eurasian oystercatcher *Haematopus ostralegus*, Eurasian Curlew *Numenius arquata* and common ringed plover *Charadrius hiaticula*. The site-specific breeding bird surveys undertaken within the Mona Proposed Onshore Development Area found the bird assemblage to be dominated by ground nesting farmland birds in grassland/ pasture habitat, or passerine and raptor species nesting in hedgerows, and woodland.
- 1.8.9.3 Several potential impacts on bird species, associated with the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project, were identified. These included:
- Temporary and permanent habitat loss
 - Habitat disturbance
 - Habitat fragmentation and species isolation
 - Pollution caused by accidental spills/contaminant release
 - The spread of INNS.
- 1.8.9.4 With the measures adopted as part of the Mona Offshore Wind Project (e.g. pre-commencement breeding bird surveys) in place, most of these impacts result in either negligible, or minor adverse effects, which are not significant in EIA terms.

- 1.8.9.5 Temporary habitat loss was deemed to be of minor adverse significance to the seabird and waterbird species in the Mona Onshore Proposed Development Area, which is not significant in EIA terms due to the short-term nature of the impact during the construction and decommissioning phases of the Mona Offshore Wind Project. Notably, no significant effects of permanent habitat loss were predicted on breeding birds within the Mona Proposed Onshore Development Area due to the absence of overlap of breeding territories with the Mona Proposed Substations, where permanent habitat loss is expected to take place at a small scale and in habitats of low ornithological value.
- 1.8.9.6 Habitat disturbance was deemed to be of minor adverse significance to the ornithological receptors in the Mona Onshore Proposed Development Area and not significant in EIA terms, due to the short-term nature of the impact during the construction and decommissioning phases of the Mona Offshore Wind Project. Impacts from pollution caused by accidental spills/ contaminant release were also deemed to be of minor adverse significance on ornithological receptors and not significant in EIA terms, due to the short-term nature of the impact. Similarly, spread of INNS was deemed to be of minor adverse significance and not significant in EIA terms. Finally, there was no significant effect (no change) from the impact of habitat fragmentation and species isolation on birds.
- 1.8.9.7 Cumulative effects between the Mona Offshore Wind Project and other projects/plans located within 1km of the Mona Proposed Onshore Development Area were assessed with respect to onshore ornithology. This included the potential impacts of temporary and permanent habitat loss, habitat disturbance, habitat fragmentation and species isolation, pollution caused by accidental spills/ contaminant release and the spread of INNS. The assessment determined that cumulative effects on onshore ornithology between the Mona Offshore Wind Project and other plan/projects during the construction, operations and maintenance and decommissioning phase would result in negligible to minor adverse effects, which are not significant in EIA terms.
- 1.8.9.8 It is considered that there is no potential for significant transboundary effects to occur on the interests of other States during the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project with respect to onshore ornithology.

1.8.10 Inter-related effects – onshore

1.8.10.1 The EIA is required to consider the potential for inter-related effects to occur on groups of receptors (receptor groups) during the construction, operations and maintenance and decommissioning phase of the Mona Offshore Wind Project. The inter-related effects assessment (onshore) in presented a separate chapter of the PEI is presented in a separate chapter of the PEIR.

Project-lifetime effects

1.8.10.2 Inter-related effects can originate from impacts occurring on a receptor group over several phases of the Mona Offshore Wind Project. For example, a receptor group may experience impacts during the construction and decommissioning phase of the Mona Offshore Wind Project. These inter-related effects are collectively described as project lifetime effects.

1.8.10.3 For most receptor groups identified, following the implementation of measures adopted as part of the Mona Offshore Wind Project and further mitigation (if required), impacts arising during the construction, operations and maintenance and decommissioning phase of the Mona Offshore Wind Project are unlikely to result in significant project-lifetime effects. However, there is potential for significant project-lifetime effects in EIA terms to occur on the following receptor groups:

- Socio-economic factors: potential beneficial impact of the Mona Offshore Wind project on the performance of the renewable energy industry.

Receptor-led effects

1.8.10.4 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, noise, and dust during the construction phase of the Mona Offshore Wind project. These inter-related effects are collectively described as receptor-led effects.

1.8.10.5 All the potential receptor-led effects identified during the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project have already been considered within the relevant chapters of the PEIR. Therefore, the potential significance of receptor-led effects of the Mona Offshore Wind Project on each of the identified receptor groups was not considered further in the Inter-related effects (onshore) chapter of the PEIR and considered not to be significant in EIA terms.



1.9 Potential environmental effects – Offshore and Onshore

1.9.1 **SLVIA**

- 1.9.1.1 The Seascape Landscape and Visual Impact Assessment (SLVIA) assesses potential impacts of the Mona Offshore Wind Project upon the seascape, landscape character and visual resources. Seascape, landscape and visual resources and receptors refers 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. The SLVIA study area for the Mona Offshore Wind Project was agreed with statutory consultees to be a 50km area from the Mona Array Area, 20km for the offshore reactive compensation substations (within the 50km Mona Array Area study area), a 1km buffer from the Mona Proposed Onshore Development Area and 10km from the Onshore Substation.
- 1.9.1.2 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 Mona Offshore Wind Project, were identified. A summary of the SLVIA findings is set out below.
- 1.9.1.3 The Mona Array Area would have direct effects upon Welsh Seascape Sensitivity Zone (SSZ) 2, with a smaller section of the Mona Array Area in Welsh SSZ 5 and a very small part of the Mona Array Area in English Marine Character Area (MCA) 38. The section of this seascape that would incorporate the Mona 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 southeast of the Mona Array Area off the North Wales coast, and a cluster to the northeast of the Mona Array Area off the northwest coast of England.
- 1.9.1.4 Regarding the area of offshore waters occupied by the Mona Array Area, a significant, adverse seascape character effect would arise during construction, operations and maintenance and decommissioning of the Mona Offshore Wind Project. The long term but reversible, significant seascape effect would extend a modest distance from the Mona Array Area across SSZ 2, SSZ 5 and MCA 38 during the operations and maintenance phase. The significant seascape effects predicted to arise during the construction, operations and maintenance, and decommissioning phases of Mona Offshore Wind Project are localised within the above SSZs and MCA and would not significantly affect these areas when considered as a whole.

- 1.9.1.5 No significant effects are predicted on landscape character areas during construction, operations and maintenance, and decommissioning of the Mona Offshore Wind Project generation assets. The Mona Array Area lies 28.2km from the nearest land which is North Wales – northeast Anglesey, within the Isle of Anglesey Area of Outstanding Natural Beauty (AONB) and Great Orme’s Head are the closest parts of the North Wales coast. The separation distance between these areas of coastal landscape and the Mona Array Area combined with the underlying character of the baseline seascape described previously is such that significant adverse character effects would be avoided.
- 1.9.1.6 No significant effects are predicted during the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project on nationally designated landscapes, namely Eryri National Park, Anglesey AONB and the Clwydian Range and Dee Valley AONB. The assessment concludes that the special qualities of these nationally designated landscapes would remain intact and the Mona Offshore Wind Project would not conflict with or compromise the reasons for their designation.
- 1.9.1.7 A significant adverse landscape effect is predicted during the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project for land within either of the onshore substation options of the Mona Offshore Wind Project due to loss of pasture or arable farmland, hedgerows and mature hedgerow trees. This will directly affect the immediate landscape receptors and the footprint of the LANDMAP Aspect Area layers that the two substation options are located in. The LANDMAP Aspect Area layers adjacent to those directly affected may be indirectly affected.

- 1.9.1.8 There is the potential for direct significant landscape effects during the construction of the Mona Offshore Wind Project onshore cable route, due to the temporary loss of pasture or arable farmland, hedgerows and mature hedgerow trees. These direct effects include on the fabric of the Rhyd y Foel to Abergele Special Landscape Area (SLA). There will be smaller, not significant direct effects during the operations and maintenance phase and negligible effects during decommissioning. The construction of the cable route corridor will indirectly affect the Elwy and Aled Valleys SLA. The fabric of the landscape of the LANDMAP Aspect Areas that the Mona Offshore Wind Project onshore cable route passes through will be directly affected. Those LANDMAP Aspect Areas adjacent to those directly affected may be indirectly affected. These constructions effects are temporary. The operations and maintenance phase effects are not significant. The effects during the decommissioning phase will be negligible, as the cable will be left in situ.
- 1.9.1.9 A minor to moderate adverse significant potential effect will be experienced by people using main ferry routes during the construction and decommissioning phases, with a moderate adverse visual effect being experienced by the same receptors potentially during the operations and maintenance phase.
- 1.9.1.10 A significant adverse cumulative visual effect is predicted during the operations and maintenance due to the impact of the Mona Offshore Wind Project in combination with other offshore wind farms in the Irish Sea on the characteristics of the SSZs and MCA.
- 1.9.1.11 A significant adverse cumulative visual effect is predicted due to the impact of the Mona Offshore Wind Project alongside other plans, projects and activities considered in the CEA for people onboard the Liverpool to Douglas and Heysham to Douglas ferries during construction, operations and maintenance and decommissioning of the Mona Offshore Wind Project when passing to the east of the Mona Array Area.
- 1.9.1.12 A significant adverse cumulative visual effect is predicted to be experienced by users of the PRow network, including those people on the Offa's Dyke Path National Trail, as it crosses the Clwydian Range and Dee Valley AONB, and the Wales Coast Path, due to the impact of the Mona Offshore Wind Project in combination with other plans, projects and activities considered in the CEA. These effects will be experienced during the construction, operations and maintenance, and decommissioning phases for the Mona onshore substations and during the construction phase of the Mona onshore cable route.
- 1.9.1.13 A significant adverse cumulative visual effect is predicted due to the impact of the Mona Offshore Wind Project alongside other plans, projects and activities considered in the CEA during the operations and maintenance phase for people walking the Offa's Dyke National Trail, within the Clwydian Range and Dee Valley AONB.



1.9.2 Aviation and radar

- 1.9.2.1 Aviation and radar relates to the potential interactions between the Mona Array Area and the surrounding aviation activities (e.g. aerodromes, airports, search and rescue activities).
- 1.9.2.2 The aviation and radar study area covers the aviation radar systems that provide radar coverage over the Mona Array Area, and which may detect the highest wind turbine blade tip height of 324m above Lowest Astronomical tide (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.
- 1.9.2.3 The Mona Array Area would be located within a multi-layered area of lower level uncontrolled airspace and higher level Controlled Airspace (CAS). Above and surrounding the Mona Array Area, the uncontrolled 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 Mona Array Area 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 Mona Array Area. No HMRIs cross the Mona Array Area and they are located at a sufficient distance not to be impacted by the operation of the Mona Offshore Wind Project.
- 1.9.2.4 A number of potential impacts on aviation and radar, associated with the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project, were identified. The impacts assessed include the creation of physical obstacles to aircraft operations and wind turbines causing interference on civil and military primary surveillance radar systems. Measures adopted as part of the Mona Offshore Wind Project (e.g. lighting and marking) were also presented.
- 1.9.2.5 The creation of physical obstacles to aircraft operations will take place during the construction, operations and maintenance and decommissioning phases due to the installation or removal of physical objects as part of the Mona Offshore Wind Project. This will impact upon military and other low flying operations. The significance of effect is deemed to be of minor adverse significance across all phases of the Mona Offshore Wind Project which is not significant in EIA terms.

- 1.9.2.6 For the interference by wind turbines on civil and military surveillance radar systems the operational wind turbines in the Mona Array Area would be theoretically detectable by the NATS Lowther Hill, St Anne's and Great Dun Fell Primary Surveillance Radar (PSR), the Ronaldsway (IoM) Airport, the Liverpool 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 with mitigation factored in is predicted to be of minor adverse significance which is not significant in EIA terms.
- 1.9.2.7 The cumulative effect for the creation of physical obstacles to aircraft operations is considered to be minor during all phases of the Mona Offshore Wind Project due to the regional spatial extent of the impact which is not significant in EIA terms.
- 1.9.2.8 The cumulative effect for the wind turbines causing interference on civil and military primary surveillance radar systems when factoring in mitigation measures is predicted to be minor adverse during the operations and maintenance phase of the Mona Offshore Wind Project which is not significant in EIA terms.
- 1.9.2.9 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 Mona Offshore Wind Project upon the interests of other States.

1.9.3 Climate change

- 1.9.3.1 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 Mona Offshore Wind Project are characterised by a series of desk-based assessments and articles using published data to determine the impact of the Mona Offshore Wind Project on climate change, with the impact of the effects of climate change on the Mona Offshore Wind Project being established through the risk assessment process. The potential risks to the Mona Offshore Wind Project from a changing climate have also been assessed and reported. This is demonstrated through the supplementary technical reports in the PEIR.
- 1.9.3.2 A number of potential impacts on climate change, associated with the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project were identified through the production of GHG emissions. A number of potential impacts of climate change were also identified through consideration of various climate related risks that may have an adverse effect upon the Mona Offshore Wind Project. Measures adopted as part of the Mona Offshore Wind Project (e.g. application of anti-corrosion protective coatings and integrated scour protection to offshore equipment) were also presented.
- 1.9.3.3 The construction stage impact due to the extraction of raw materials, manufacturing and transportation of materials to site have been assessed. The GHG impacts were calculated to be approximately 1,216,722 tCO₂e, causing a minor adverse effect that is predicted to be not significant in EIA terms once mitigation commitments are considered. Furthermore, the operations and maintenance phase emissions predominantly arise from transportation emissions required to maintain the Mona Offshore Wind Project. Additionally, the operations and maintenance phase of the Mona Offshore Wind Project 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.
- 1.9.3.4 Despite the GHG emissions resulting from the construction stage of the Mona Offshore Wind Project, the magnitude of avoided emissions resulting from the operations and maintenance phase allows the Mona Offshore Wind Project to be in a position of net avoided emissions from the fourth year of operation (carbon payback period). Over the lifetime of the Mona Offshore Wind Project, it would result in 972,473 tCO₂e of avoided emissions.

- 1.9.3.5 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. As such, the cumulative assessment completed within the Mona Offshore Wind Project PEIR incorporates information from other project, plans and activities. Cumulative effects due to other specific local development projects are not individually predicted but are taken into account when considering the impact of the Mona Offshore Wind Project by defining the atmospheric mass of GHGs as a high sensitivity receptor.
- 1.9.3.6 A screening of transboundary impacts has been carried out and any potential for significant transboundary effects with regard to climate change from the Mona Offshore Wind Project upon the interests of other States has been assessed as part of this PEIR.
- 1.9.3.7 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 Mona Offshore Wind Project 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.

1.9.4 Socio-economics

- 1.9.4.1 The socio-economics and community impact assessment considers the local economies and populations which are located at a number of spatial levels that might be affected by the Mona Offshore Wind Project. This includes the areas closest to offshore and onshore activities as well as other important locations that may be used to support the construction, operations and maintenance, and decommissioning activities related to the Mona Offshore Wind Project (e.g. laying cables offshore, installing wind turbines, installing onshore substation etc.). These areas are primarily related to the regions where potential support facilities (i.e. ports) within the relevant spatial levels are located, and the onshore substation which will be located within Denbighshire, North Wales. Based on these criteria, the regions assessed are North Wales and Northwest England. The assessment also considers how the Mona Offshore Wind Project might affect Wales and the UK more widely.
- 1.9.4.2 At this stage the PEIR notes there is potential for indirect socio-economics and community impacts on the Isle of Man as a result of cumulative shipping and navigation impacts to commercial operators (including strategic routes and lifeline ferries). However, the Applicant has made firm commitments focused on changes to the boundary and layout design of the Mona Array Area, with the intention of reducing the potential significant effects on shipping and navigation receptors. These changes will be tested and applied as part of the assessment in the Environmental Statement, including on potential indirect socio-economics and community impacts on the Isle of Man, which will be submitted for the DCO application.
- 1.9.4.3 The number of ports involved in the project lifetime of an offshore wind farm can vary depending on the size and location of the project. Typically, an offshore wind farm project will require multiple ports throughout its lifetime, broadly covering fabrication, marshalling, operations and maintenance, and decommissioning. Given the many variables associated with port selection during the construction phase, typical delivery models incorporate multiple ports which will each deliver the fabrication and/or marshalling needs of specific components, depending on requirements. Fabrication ports can be located anywhere in the world, whilst marshalling and operations and maintenance ports are typically located within reasonable proximity of the offshore site. The final selection of port facilities required for the Mona Offshore Wind Project 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, more than one port could be used to support elements of the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project as part of a wider supply chain.
- 1.9.4.4 The socio-economics and community impact assessment of effects also considers the tourism and recreation activities which might be affected by the Mona Offshore Wind Project. This includes areas within the Zone of Theoretical Visibility (ZTV) of the project, areas within which potential ports on the coast of North Wales and Northwest England are located, and locations associated with onshore infrastructure.

- 1.9.4.5 The offshore wind sector is identified as a high priority industry within national, regional and local policies across the UK. This reflects the opportunities the sector provides for supporting economic development and growth and providing jobs and incomes for UK residents. The offshore wind sector is identified as a potential employment opportunity for workers transitioning from other related industries, in particular activities that will require a significant degree of adaptation due to the continuation of efforts to decarbonise the economy.
- 1.9.4.6 The tourism sector is an important sector within the relevant policy environments. North Wales is known for its opportunities to experience natural landscapes, and supports a wide range of adventurous activities which draw in visitors. Northwest England has a wide range of recreation assets to offer, with a mixture of rural and urban landscapes.
- 1.9.4.7 A number of potential impacts on socio-economics and community associated with the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project were identified. These included:
- Supporting employment and Gross Value Added (GVA) across the UK and Wales, and within the regions associated with identified potential port locations and onshore infrastructure sites
 - Supporting increased employment opportunities for residents where economic impacts might be focused
 - Potential temporary and permanent population changes resulting from workforce requirements, and the associated demand for short, medium, and long term accommodation and housing
 - Potential impacts on the tourism and recreation sector.

- 1.9.4.8 If a port on the coast of North Wales or Northwest England is selected for the staging and installation of up to two project components, the operations and maintenance base, or decommissioning activities associated with the Mona Offshore Wind Project:
- The potential beneficial effects on economic receptors including employment, GVA, and supply chain demand in that region during construction and operations and maintenance phases are assessed to be significant in EIA terms (moderate beneficial). Potential effects in Wales are assessed to be of moderate (beneficial) significance during the construction, and operations and maintenance phases, which is significant in EIA terms. Potential effects in the UK are assessed to be of moderate (beneficial) significance during the construction phase, which is significant in EIA terms
 - The potential beneficial effects on employment opportunities for residents during the construction, and operations and maintenance phases are assessed to be not significant in EIA terms (minor beneficial)
 - The potential beneficial effects of population changes resulting from workforce requirements, and the associated demand for housing, accommodation and local services during the construction, and operations and maintenance phases is likely to be not significant in EIA terms (minor beneficial).
- 1.9.4.9 Effects during the decommissioning phase are assessed as not significant in EIA terms. The scale and duration of decommissioning activity is uncertain, and the exact approach to decommissioning is not yet confirmed as best practice at the time is not currently known.
- 1.9.4.10 Based on a consideration of the pathways by which tourism and recreation activities might be impacted by Mona Offshore Wind Project during the construction phase, the impact on tourism and recreation is likely to be not significant in EIA terms.
- 1.9.4.11 The Mona Offshore Wind Project has the potential to support existing offshore wind sector employment through contracts placed with existing enterprises, and support new employment and economic activity by enabling the expansion of the offshore wind sector which is a high policy priority.
- 1.9.4.12 Cumulative effects with other plans and projects were assessed and predicted as likely to result in no adverse change to the levels of significance assessed when considering the Mona Offshore Wind Project in isolation. Cumulative effects with other plans are anticipated to enhance beneficial effects including supporting employment, GVA, and supply chain demand, and associated employment opportunities for residents.
- 1.9.4.13 No transboundary effects with regard to socio-economics and community from the Mona Offshore Wind Project on the interest of other States have been predicted.



1.9.5 Human health

- 1.9.5.1 The health assessment is informed by the findings of other PEIR chapters, including on commercial fisheries; shipping and navigation; seascape, landscape and visual resources; transport and traffic; noise and vibration; other sea users, 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.
- 1.9.5.2 An overall baseline health profile was gathered for Wales, Isle of Man, and North West England using publicly available public health evidence. This data shows that compared to Wales, the health study area in North Wales has similar rates of healthy life expectancy. There is 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. Public health data also indicate 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.
- 1.9.5.3 The following health effects of the Mona Offshore Wind Project have been considered:
- Transport modes, access and connections in relation to commercial operators including strategic routes and lifeline ferries to the Isle of Man will have a minor adverse effect for population health, which is not significant in EIA terms. Following mitigation, that would be reported in the Environmental Statement, which would include additional controls (see volume 2, chapter 12: Shipping and navigation of the PEIR) the residual effect is expected to be negligible (not significant)
 - Transport modes, access and connections in relation to construction works may disrupt local vehicle traffic and active travel. The effects of this are minor adverse significance, which is not significant in EIA terms
 - Community identity, culture, resilience and influence in relation to visual impacts of the wind turbines will have a minor adverse and minor beneficial effect which is not significant in EIA terms
 - Open space, leisure and play, offshore and onshore construction works leading to disruption of recreation and leisure will have a minor adverse effect which is not significant in EIA terms
 - Employment and income in relation to loss or restricted access to commercial fishing grounds will have a minor adverse effect for population health, which is not significant in EIA terms

- Noise and vibration related to construction, operations, maintenance and decommissioning of the Mona Offshore Wind Project will have a minor adverse effect (not significant)
- Radiation in relation to risk perception of EMF is expected to produce a minor adverse (not significant) effect. Following adoption of mitigation strategies for communication with local communities about EMF regulatory standards and risks of the Mona Offshore Wind Project, the residual effect is expected to be negligible (not significant)
- Climate change and adaptation in relation to renewable energy generation and subsequent reduced greenhouse gas emissions will have a minor beneficial effect for population health, which is not significant in EIA
- Wider societal infrastructure and resources in relation to renewable energy generation will have a moderate beneficial effect for population health, which is significant in EIA terms.

1.9.5.4 Overall, it is concluded that there will be no significant adverse effects arising from the Mona Offshore Wind Project during the construction, operations and maintenance or decommissioning phases. Significant public health benefits in relation to energy security are expected for population health in the operational phase.

1.9.5.5 The cumulative impacts assessed include combined effects on access to the Isle of Man and in relation to commercial fisheries. Overall it is concluded that there will be the following significant cumulative effects from the Mona Offshore Wind Project alongside other projects:

- Transport modes, access and connections in relation to commercial operators including strategic routes and lifeline ferries to the Isle of Man will have a cumulative moderate adverse effect for population health, which is significant in EIA terms. Following mitigation, that would be reported in the Environmental Statement, which would include additional controls (see volume 2, chapter 12: Shipping and navigation of the PEIR) the residual effect is expected to be minor adverse (not significant).
- Wider societal infrastructure and resources in relation to renewable energy generation will have a moderate beneficial effect for population health, which is significant in EIA terms.

1.9.5.6 No potential transboundary impacts have been identified in regard to effects of the Mona Offshore Wind Project.

1.9.5.7 The population health effects identified and assessed in this chapter 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.

1.9.5.8 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.

1.10 Next steps

- 1.10.1.1 Consultees are invited to consider all of the information provided in this NTS and the PEIR and to provide their comments. There are a number of ways that stakeholders can provide feedback on the PEIR as part of statutory consultation.
- 1.10.1.2 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 Mona Offshore Wind Project is encouraged to attend. The timings and locations of the consultation events are further detailed on the Mona website:
www.morganandmona.com/en, www.morganandmona.com/cym.
- 1.10.1.3 Comments on the Mona Offshore Wind Project PEIR should be made in writing and submitted:
- By post to: FREEPOST MONA (please be advised it is not possible to send registered post to a freepost address)
 - By email to: **info@monaoffshorewind.com**
 - By feedback form: available on the project website
www.morganandmona.com/en, www.morganandmona.com/cym,
at community events or by request from the consultation team.
- 1.10.1.4 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.
- 1.10.1.5 The Applicant will refine further the Mona Offshore Wind Project design and EIA based upon 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.

1.11 References

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Partners in UK offshore wind



Project website:
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or use this QR code



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